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## INTERSECTION OF FORENSIC ODONTOLOGY AND PSYCHOLOGY

### *Forensic Odontology and Psychology*

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## INTERSECTION OF FORENSIC ODONTOLOGY AND PSYCHOLOGY

### Abstract

Forensic odontologists are expected to deal with challenging demands which can affect their mental health while dealing with forensic activities. This study aimed to explore the psychological impacts of forensic activities on forensic odontologists and students undertaking training. Firstly, it of an integrative review (part I) on the psychological effects of forensic odontology practice. The review was performed on Scopus, Medline and Web of Science. Next, an anonymous online survey using JISC Online Surveys tool (part II) was performed to assess the inherent opinions of forensic odontologists from the the International Organization for Forensic Odonto-Stomatology (IOFOS), and Association of Forensic Odontologists for Human Rights (AFOHR), and Dentify.me. Results were quantitatively evaluated by means of descriptive statistics and qualitatively upon reflection using Microsoft Office Excel (2010). Part I, only one full-text article out of 2235 (Webb et al., 2002) was found eligible indicating a low number of eligible studies. Part II, 75 forensic odontologists and 26 students (49.9% male; 50.5% female) from over 35 countries participated. Results showed that forensic dentists are more psychologically or emotionally affected by child abuse cases and least affected by age estimation cases. Most experienced forensic odontologists reported the lowest scores of discomforts. Males were more comfortable than women in dealing with stress. 80.77% (n= 21) of the students have not experienced any behavioural changes following mortuary sessions but 19.2% (n= 5) witnessed stress. All respondents support the inclusion of a module in Psychology or stress management in training programmes in Forensic Odontology. Suggestions to maintain mental health are considered by the respondents and topics to be taught suggested by a psychologist.

**Keywords:** Forensic odontology; forensic dentistry; mental health; psychology; well-being; stress.

### Introduction

Psychology is defined as *“the study of the nature, functions, and phenomena of behaviour and mental experience”* (1). In criminal profiling, psychology is used for psychological interviews of serial killers, studies of crimes involving high profile criminals, rapists etc., whose brains need to be understood. Experts working in the field of Forensic Odontology come across a plethora of challenging cases such as human dental identification, dental age estimation of both living and deceased, analysis of bite mark identification and oro-facial injuries, child abuse or neglect and malpractice or fraud accusations in dentistry (2). Dentists trained in Forensic Odontology should be prepared to work in psychologically challenging environments, such as the mortuary. (3). Forensic Odontologists are eventually accustomed to dealing with the deceased, or they are called to the courtroom as expert witnesses in both criminal and civil cases, but this comes with risk factors such as burnout, compassion fatigue, post-traumatic stress disorder (3, 4).

Dentistry is a stressful vocation that not only affects the people who are practising but also affects other disciplines of dentistry (5). Working conditions or circumstances of a forensic odontologist magnify the less desired side of human life which is physically and emotionally challenging. Despite the honour

the forensic odontologists have in the society, they are sometimes vulnerable and should reach out for help when in need. It is suggested that forensic dentists must be aware of the potential negative impacts and should have an active check on their mental and physical health at regular intervals (2).

Overall, forensic odontologists may have to deal with some areas of mental concern such as cognitive bias, post-traumatic stress disorder and death. According to the Cambridge Dictionary, cognitive bias is “*the way a particular person understands events, facts, and other people, which is based on their own particular set of beliefs and experiences and may not be reasonable or accurate.*” (6). Our brains work very effectively and in a systematic manner. Every individual recognises and explicates information, distinguishes between right or wrong, thus reaching a decision which is called complex cognitive mechanism. In contradiction, when people become experts in a particular field, their brains become very capable to give an expert opinion but at the same time, they become susceptible to complex cognitive mechanism leading to biases by neglecting other useful facts (7).

Acute Stress Disorder is the initial trauma response and occurs prior to the chronic post-traumatic stress disorder (PTSD) (8). It is quite temporary in many but can be progressing throughout life in a few, leading to post-traumatic stress disorder (9). PTSD has been recognized by American psychiatry as the stress-induced mental sickness (10). It has been debated that the research materials are lacking because it is believed that the forensic professionals are expected to deal with stress and demands as part of their job. However, it has been viewed that the forensic professionals work under pressure and this pressure varies by field, casework, experience, and reporting conclusions (11). A previous study, 31 dentists who had performed post-mortem identification reported post-traumatic symptoms (12). 5% to 32% PTSD prevalence is seen in rescue or recovery profession, where the highest has been reported in workers with no prior training in disaster work (2).

A forensic odontologist or a student under training might experience the death of a close friend or family. This can bring about a temporary deterioration in their physical, social, and psychological well-being as they come across dreadful circumstances during their work and education. In a study conducted in Australia, a chain of destructive repercussions was experienced by the individuals who lost their dear ones. The bereaved men experienced a gradual decline in their mental health when compared to females who experienced the same at a much greater level up to four years. Symptoms such as sadness, depression, irritability, anger are seen in common, and has the possibility to be triggered when working in a mortuary (13).

Considering the sensitivity of the matter, this study aimed to explore the psychological impacts of forensic activities on forensic odontologists and students undertaking training.

## **Materials and methods**

Ethical approval was granted from `School of Health Sciences and Dentistry Research Ethics Committee`, reference number **UOD-SHS-SDEN-TPG-2020-027**.

## **Part I – Integrative review**

A research question ‘*What are the psychological effects of the forensic practice in male and female forensic odontologists?*’ was based on PICO strategy for integrative review where, Population (P) stands for forensic odontologists; Intervention (I) stands for forensic practice; Comparison (C) stands for sex; Outcome (O) stands for psychological effects.

Studies assessing the psychological or emotional effects on forensic dentists were included. Exclusion criteria consisted of studies not related to topic of interest; literature reviews; studies that did not distinguish males and females; books and book chapters; personal opinions; teaching materials; scientific reports; abstracts; patents; papers that investigated forensic experts other than forensic odontologists; case reports; letters to the editor and/or editorials; research articles published in languages other than English.

This integrative review was performed on the following electronic databases: Scopus, Medline and Web of Science. The Medical Subject Headings (MeSH) terms were used to create a strategic search string and are given in **Table 1**. Boolean operators such as “AND”, “OR” were used to merge the strategic terms. The articles retrieved were exported to Endnote X9 v9 to search for duplicates. PRISMA checklist ([www.prisma-statement.org](http://www.prisma-statement.org)) was used to screen the articles eligible for the study (14).

**Table 1: Terms used for Integrative Review using four different concepts.**

	Concept 1	Concept 2	Concept 3	Concept 4
TERMS	Forensic	Dentist* Odontology* Science* Scientist* Expert*	Psychological Well-being “Mental health” Emotional Posttraumatic Resilience Mindfulness Stress Burnout Pressure	Work-related Job-related Career Job Workplace Casework Mortuary Occupational

This process was carried out in three steps: 1) the titles were assessed by the reviewer and those which matched the research topic were selected; 2) abstract reading and 3) non-eligible articles were excluded with reasons and the eligible ones were used for a full-text reading.

The following data were collected from the paper: identification of study (authorship, year and country of publication); characteristics of sample (sample size, response rate, age range of the sample, distribution of sex and geographic origin of sample). The assessment of studies was based on the following categories: a) Aim; b) Year of publishing; c) Type of paper; d) Included subjects (Total, Males/Females\*); e) Age range; f) Geographic location; g) Area of forensic activity; h) Conclusion; i) Possible recommendations.

## Part II – Survey

The survey aimed to investigate the opinions on the psychological effects of forensic activities for forensic odontologists and students undertaking forensic odontology training.

The online survey was designed to be implemented using Jisc Online Surveys and comprised of 2 sections (I and II), where the first introductory three

questions were common for the professionals and students, and it was preceded by a Participant Information Statement (PIS). Section I consisted of nine questions to be answered by the professionals (8 closed-ended and 1 open-ended) and Section II consisted of eight questions (7 closed-ended and 1 open-ended) to be answered by students as seen in **Table 2**. The first three questions as well as the last question were common for both the categories of participants. A pilot study was performed prior to the survey, and it was circulated to 35 individuals, which included current and former staff and students at the Centre for Forensic Medicine and Dentistry, University of Dundee, Dundee, Scotland, UK. Out of 35, only 18 responded and necessary modifications were done to the final survey.

Forensic odontologists from professional organizations such as International Organization for Forensic Odonto-Stomatology (IOFOS) and associations named Association of Forensic Odontologists for Human Rights (AFOHR) and Dentify.me received a link to the survey via email to be answered in a period of two weeks. Data were quantitatively evaluated by means of descriptive statistics and qualitatively upon reflection using Microsoft Office Excel (2010).

**Table 2: Distribution of survey questions according to categories**

<b>Questions 1-3 for all</b>	<b>Categories</b>
1) Please state your gender. 2) Please choose the country you are based in. 3) Please mention the number of years of experience in Forensic Odontology.	General information of the participant.
<b>Questions 4-11 for professionals only</b>	
4) On a range of 0-4, how psychologically/emotionally comfortable are you in dealing with any forensic activity in general? 5) How easy is it to deal with stress in this field most of the time?	Level of comfort (0-Very uncomfortable; 1-Uncomfortable; 2-Neutral 3-Comfortable; 4-Very comfortable)
6) Which aspect of Disaster Victim Identification (DVI) is more difficult to deal with? Please select all that apply. a) Practical work b) Psychological state c) I never worked in DVI but willing to work d) I used to work in DVI in the past e) None of the above f) Other 7) Which aspect of bite mark cases is more difficult to deal with? Please select all that apply. a) Practical work b) Psychological state c) I never carried out bite mark analysis but willing to do d) I used to do bite mark cases in the	Case type and possible challenges

<p>past</p> <p>e) None of the above</p> <p>f) Other</p> <p>8) Which area of an investigation do you think is more likely TO NOT affect you psychologically/emotionally? Please select all that apply.</p> <p>a) Dental identification of a traumatised body</p> <p>b) Dental identification of a burnt victim</p> <p>c) Dental identification of a body found in water</p> <p>d) Dental identification of a decomposed body</p> <p>e) Child Abuse- Physical or sexual</p> <p>f) Child abuse- emotional or negligence</p> <p>g) Bite Mark Analysis or other injuries</p> <p>h) Age estimation of a crime suspect</p> <p>i) Age estimation of an asylum seeker</p> <p>j) Disaster Victim Identification- number of bodies or body parts</p>	
<p>9) How would you deal with your colleague who is distressed by Disaster Victim Identification (DVI) operation? Please select all that apply.</p> <p>a) Talk to the colleague personally.</p> <p>b) Talk to the team leader.</p> <p>c) Advise the colleague to consult the psychologist on site.</p> <p>d) I have never worked in DVI</p> <p>e) Other</p> <p>10) What would you suggest, on a personal level, to your colleague who is facing any psychological/emotional work distress for some stress relief? Please select all that apply.</p> <p>a) Companionship</p> <p>b) Exercise</p> <p>c) Music</p> <p>d) Funny movie</p> <p>e) Games</p> <p>f) Go for a walk</p> <p>g) Take a break/vacation</p> <p>h) A cup of tea/coffee/meal</p> <p>i) Speaking to a friend/ family</p> <p>j) Advice to consult a psychologist</p> <p>k) All the above</p>	<p>Solutions to the problems.</p>

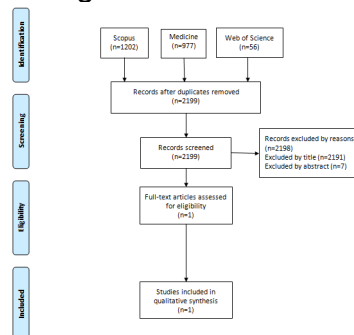
l) Other	
11) Do you agree or disagree with the following statement: " <i>There should be an inclusion of a module in psychological/stress management in the Forensic Odontology programmes</i> "	Inclusion of Psychology module
<b>Questions 12 - 19 for students only</b>	
<p>12) Are you aware that visiting a mortuary for dental identification might be part of a Forensic Dentistry programme?</p> <p>13) In case you have already attended a mortuary for the very first time, what were your concerns before going to?</p> <p>a) 0- very apprehensive  b) 1- slightly apprehensive  c) 2- neutral  d) 3- slightly excited  e) 4- very excited  f) I have never been to a mortuary</p> <p>14) In case you have been to the mortuary, have you witnessed a classmate that has been distressed?</p> <p>15) Did you ever have behavioural changes in your routine following a forensic case? Please select all that apply.</p> <p>a) Yes - Unable to sleep  b) Yes - Unable to concentrate  c) Yes - Anger or irritability  d) Yes - Avoiding conversations, thoughts, places or people who remind you of it.  e) No, never  f) Other</p>	Experiences related to mortuary sessions.
<p>16) What would you suggest, on a personal level, to your colleague who is facing any psychological/ emotional work distress during training for some stress relief? Please select all that apply.</p> <p>a) Companionship  b) Exercise  c) Music  d) Funny movie  e) Games  f) Go for a walk  g) Take a break/vacation  h) A cup of tea/coffee/meal</p>	Solutions to the stress challenges



i) Speaking to a friend/ family j) Advice to consult a psychologist k) All the above l) Other	
17) Do you agree or disagree with the following statement: "There should be an inclusion of a module in psychological/stress management in the Forensic Odontology programmes". 18) In your opinion, a psychologist/counsellor should be part of the team delivering Forensic Odontology programmes?	Inclusion of psychology module and a psychologist
<b>Question 19 for all</b>	
19) Do you have any suggestions to support the mental health of Forensic odontologists or forensic odontology students?	Suggestions to improve mental health of forensic odontologists and forensic odontology students.

## Results

Part I, a total of 2235 studies were obtained on performing an integrative search. 116 duplicates were found, which gave a total of 2199 studies to be further screened. 2191 results were excluded by title and seven studies were excluded by abstract. Only a single full-text article was found eligible (**Figure 1**).



**Figure 1: Flowchart of integrative literature search and selection criteria by PRISMA (53)**

There is a lack of exploration on the psychological obstacles faced during forensic activities by odontologists. The last study on this topic was carried out in 2002, and therefore there is a huge interval resulting into lack of research materials till now. Details can be seen in **Table 3**.

**Table 3: Characteristics of eligible study**

<b>Title</b>	The Emotional and Psychological Impact of Mass Casualty incidents on forensic odontologists
<b>Year of publishing</b>	2002

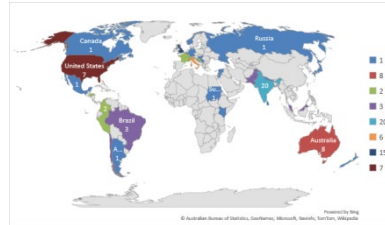
<b>Type of paper</b>	Survey based (Quantitative and Qualitative)
<b>Included subjects (Total, M/F*)</b>	Total=38, Masculine=34/Feminine=4 (95% response rate)
<b>Age range</b>	50-64 years (50% respondents)
<b>Geographic location</b>	United States and Canada
<b>Area of forensic activity</b>	Mass fatality incidents (airplane crash, vehicle accidents, natural disasters, fire. (Average of nine incidents attended).
<b>Conclusion</b>	Quantitative findings (one third respondents were upset, distressed or irritable, while the rest of them had a positive experience. Qualitative findings (Positive- mutual trust and friendship and sense of achievement, Negative- victims, politics and working conditions).
<b>Possible recommendations</b>	Preparedness among forensic odontologists have to be systematically studied and its potential psychometric properties must be explored.

Part II, 101 participants (50 males and 51 females) completed the survey being 75 forensic odontologists and 26 students from over 35 countries as seen in **Table 4** and **Figure 2**.

**Table 4: Breakdown of number of countries and participants**

<b>Countries</b>	<b>No. of participants</b>
India	20
United Kingdom	15
Australia	8
United States	7
Italy	6
Brazil, Chile, Malaysia, Pakistan	3 each
Bosnia Herzegovina, Colombia, Croatia, France, Honduras, Peru and Switzerland	2 each
Argentina, Belgium, Canada, Germany, Hungary, Israel, Japan, Jordan, Kenya, Kosovo, Mexico, Nepal,	1 each

New Zealand,  
Norway, Russian  
Federation,  
Serbia, Sri Lanka,  
Sudan and Syria



**Figure 2: Breakdown of 35 countries participated in the survey.**

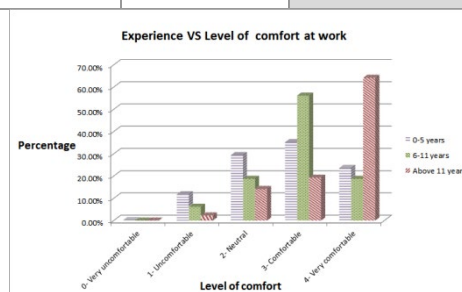
Students with no experience constituted about 20.79% (n= 21), followed by current students with experience 4.95% (n= 5), Professionals were of 0-5 years of professional experience 16.83% (n= 17), 6-10years of experience 15.84% (n= 16) and above 11 years of experience 41.58% (n= 42).

### Forensic Odontologist's opinions

In this study, 45.33% (n= 34) were very comfortable in dealing with the forensic activities marking it to be the highest. 18.67% (n= 14) had neutral experience, whereas 30.67% (n= 23) were comfortable. Only 5.33% (n= 4) were uncomfortable and no one mentioned to be very uncomfortable. **Table 5** and **Figure 3** demonstrates that, on comparing the experience of forensic odontologists with level of psychological and emotional comfort at work, the level of psychological and emotional comfort while dealing with forensic activities increases along with their professional experience.

**Table 5: Experience VS Level of psychological comfort at work**

Level of comfortability	0-5 years	6-11 years	Above 11 years
0-Very uncomfortable	0.0%	0.0%	0.0%
1-Uncomfortable	11.8%	6.2%	2.3%
2-Neutral	29.4%	18.8%	14.2%
3-Comfortable	35.2%	56.2%	19.3%
4-Very comfortable	23.6%	18.8%	64.2%

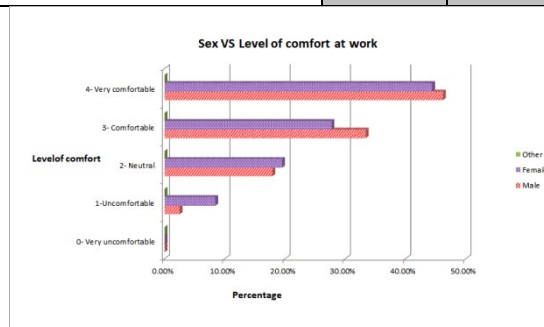


**Figure 3: Illustration of the graph between experience and level of comfort at work.**

On comparison between sex and level of psychological and emotional comfort at work, **Table 6** and **Figure 4** show that males are more comfortable than women in dealing with forensic activities.

**Table 6: Sex VS Level of psychological and emotional comfort at work (only male and female considered because the option 'other' was not chosen by any participant)**

Level of comfort	Male	Female
<b>0-Very uncomfortable</b>	0.0%	0.0%
<b>1-Uncomfortable</b>	2.5%	8.4%
<b>2-Neutral</b>	17.9%	19.5%
<b>3-Comfortable</b>	33.4%	27.7%
<b>4-Very comfortable</b>	46.2%	44.4%

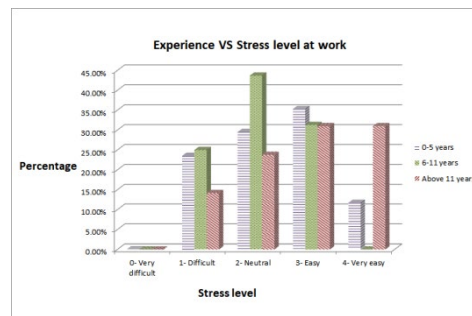


**Figure 4: Illustration of the comparison between sex and level of comfort dealing with forensic activities.**

Majority of the participants i.e., 32% (n= 24) were of the opinion that it is easy and 20% (n= 15) found it very easy to deal with the stress at work. None of the participants considered to be very difficult to deal with the stress level in their profession. 18.67% (n= 14) found the level of stress to be difficult. On the other hand, 29.33% (n= 22) felt that it is neither difficult nor easy. As per **Table 7** and **Figure 5**, on comparing experience and stress level, results show that the level of stress reduces along with an increase in experience.

**Table 7: Experience VS Stress level at work**

Stress level	0-5 years	6- 11 years	Above 11 years
<b>0- Very difficult</b>	0.0%	0.0%	0.0%
<b>1-Difficult</b>	23.5%	25.0%	14.2%
<b>2-Neutral</b>	29.5%	43.7%	23.8%
<b>3-Easy</b>	35.3%	31.3%	31.0%
<b>4- Very easy</b>	11.7%	0.0%	31.0%

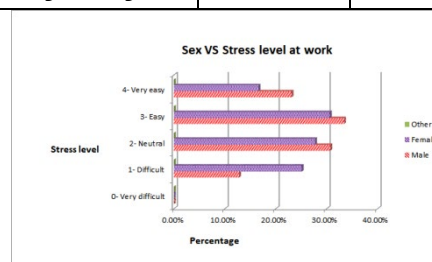


**Figure 5: Illustration of the comparison between experience and stress level at work**

**Table 8** and **Figure 6** demonstrates that, on comparing two sexes and stress level, males handle stress more easily when compared to females.

**Table 8: Sex VS Stress level at work (only male and female considered because the option 'other' was not chosen by any participant)**

Stress level	Male	Female
<b>0- Very difficult</b>	0.0%	0.0%
<b>1-Difficult</b>	12.8%	25.1%
<b>2-Neutral</b>	30.7%	27.7%
<b>3-Easy</b>	33.4%	30.6%
<b>4- Very easy</b>	23.1%	16.6%



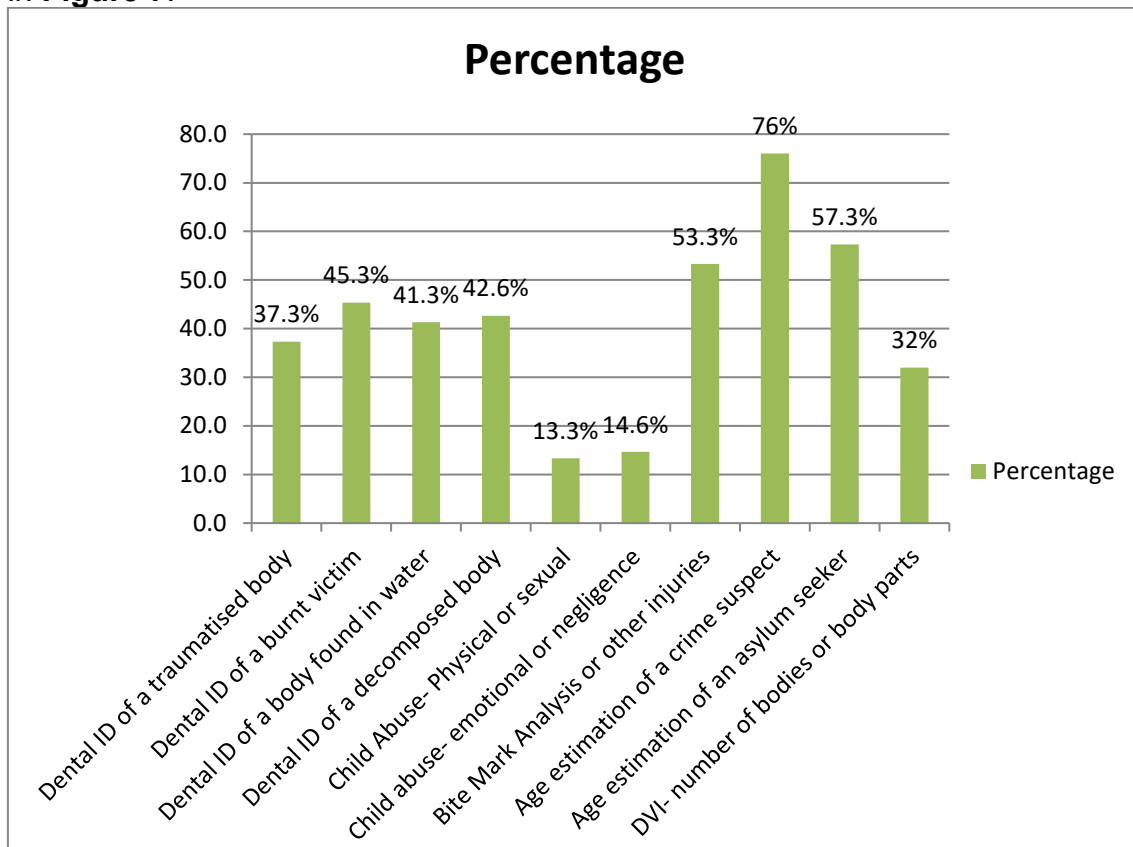
**Figure 6: Illustration of the comparison between sex and stress level at work.**

The psychological aspects of DVI were more challenging to the 28% (n= 21) of participants, whereas 17.3% (n= 13) participants felt the logistical aspect of work to be of a concern. 8% (n= 6) of the participants had other concerns such as lack of resources, dealing with child victims in DVI and relatives, also the authorities not following a standardised '*International Criminal Police Organization*' (INTERPOL) protocol and depending on local procedures making it difficult for the forensic odontologists to perform the best of their jobs.

Considering challenges in bite mark analysis, 26.6% (n= 20) considered the practical work more challenging than the psychological state with only 4% (n= 3). 5.3% (n= 4) raised concerns such as 1) adoption of standardised protocols, 2) preparation to be an expert witness in court and 3) interdisciplinary communications.

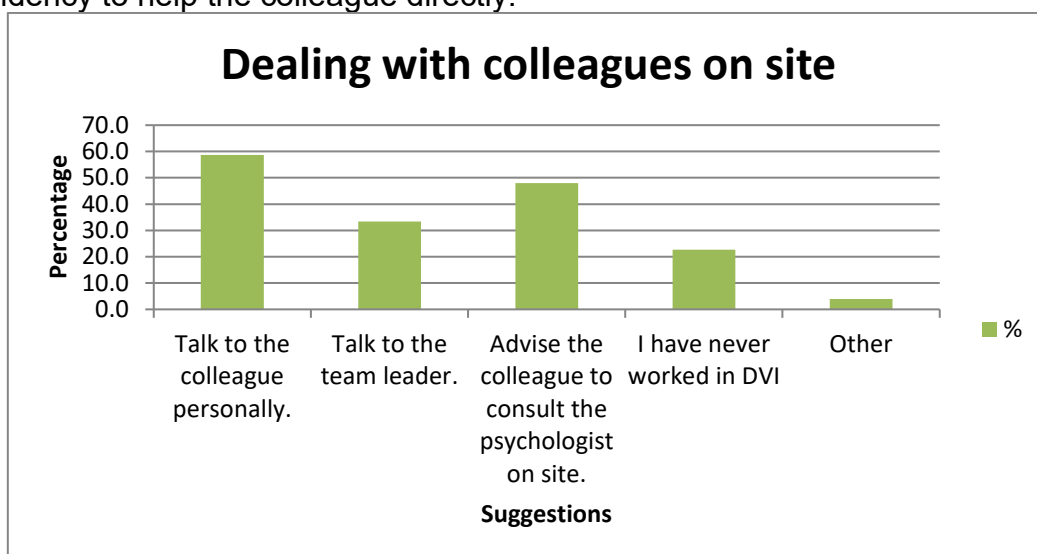
Most of the professionals admitted that they are not psychologically or emotionally affected in the areas of investigation such as the age estimation of a crime suspect with the highest percentage of 76% (n= 57). The professionals seemed to be most affected by child abuse- emotional or negligence with 14.6%

(n= 11), followed by physical or sexual child abuse with 13.3% (n= 10) as seen in **Figure 7**.



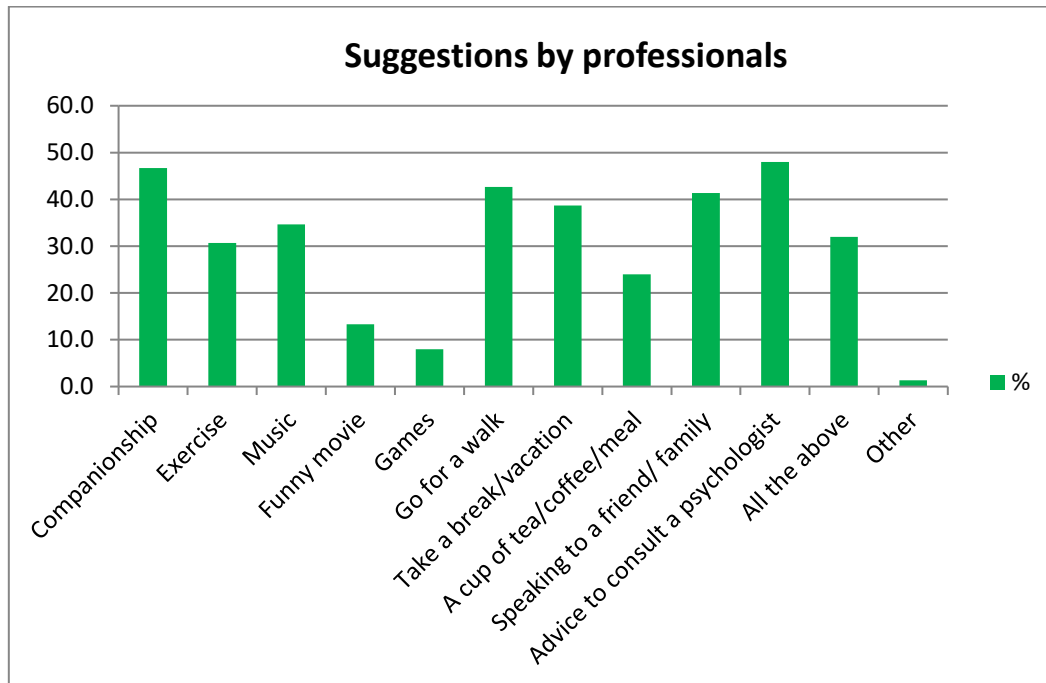
**Figure 7: Distribution of areas of investigation least affecting forensic odontologists (X axis= Areas of investigation; Y axis= Percentage of participants affected by respective investigation)**

When dealing with work colleagues distressed by DVI operations, forensic odontologists mostly agreed to *'to talk to the colleague personally'*, followed by *'to advise the colleague to consult the psychologist'* and *'to talk to the team leader'* as seen in **Figure 8**. The first two preferred options indicated the tendency to help the colleague directly.



**Figure 8: Suggestions to deal with colleagues on site.**

The main suggestions given by professionals for stress relief included: a) advice to consult a psychologist, b) companionship, c) go for a walk, d) speaking to a friend or family, e) taking a break or vacation and f) music. A distribution of suggestions according to popularity is shown in **Figure 9**.



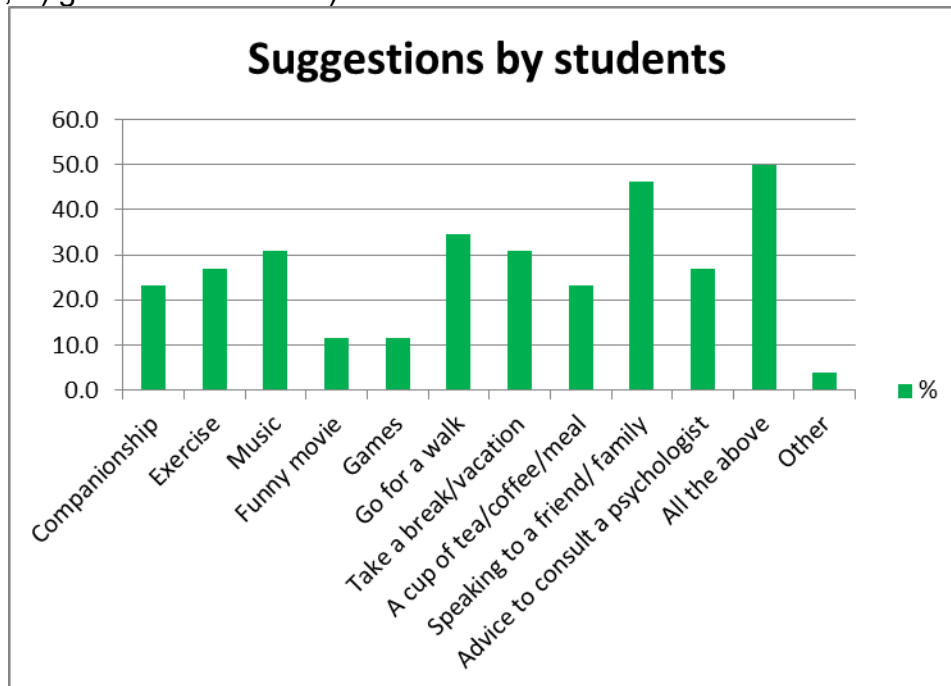
**Figure 9: Suggestions by professionals for stress relief.**

### Students' opinions

All 26 students were aware that a visit to the mortuary could be part of the training; however, 23.08% (n= 6) students have never been to a mortuary before or during the course. About 19.2% (n= 5) of the students were aware of the fact that their classmate had been distressed due to condition or decomposition of the body and feeling dizzy on opening the body bag. 38.4% (n= 10) have never faced any such incidents. 15.3% (n= 4) are unaware of any such incidents if happened, while 26.9% (n= 7) have never been to any mortuary yet.

80.77% (n= 21) never had any behavioural changes but 11.54% (n= 3) ended up avoiding conversations, thoughts, places, or people which triggered them. 7.69% (n= 2) were unable to sleep and 3.85% (n= 1) was unable to concentrate. None of them had any issues such as anger or irritability.

A distribution of suggestions given by students for stress relief according to popularity is shown in **Figure 10**, and included: a) speaking to a friend or family, b) go for a walk and c) music.



**Figure 10: Suggestions by students for stress relief.**

### Opinions of all

None of the professionals and students disagreed to the inclusion of a module in psychological or stress management in forensic odontology. Majority of the students agreed to a psychologist being part of the Forensic Odontology programme.

It has been observed in this study that, 68 participants out of 101, including both professionals and students contributed to making a list of similar suggestions to maintain mental health: yoga, meditation and sleep, training and drills of probable work situations, inclusion of Psychology module in trainings, reflective logs and debriefing following mortuary sessions, mental health assessments 2-3 times a year, tourism or vacations, inculcating hobbies and practicing normal dentistry were mentioned.

### Discussion

Dentists contribute to the society in their most efficient ways and in return it brings them rewards and a chance to help the society. Therefore, people may choose dentistry as a profession because of the reputation and honour the degree offers or the dedication towards health care or serving the society through their profession. (15).

Forensic odontology has been into existence as a specialist discipline for a long time and for people who do not belong to the field of forensics; it is usually remembered as a tool for human identification. However, forensic odontology is broader than this. Forensic odontologists are asked to give opinion on age estimation in living and deceased persons, injuries related to child abuse and neglect, identification and analysis of bite marks (although the forensic value of this evidence is highly challenged) and civil cases which involve malpractice and fraud. Forensic dentists should have a wide knowledge about dentistry, a



systematic and an organised way of approaching cases in a patient and meticulous manner. Personal probity and emotional stability are essential too (2).

On performing integrative review, it was observed that, there was a vast research gap on psychological impacts faced by professional forensic odontologists and students of Forensic Odontology, as the last paper published was in the year 2002. It is worth pointing out that, there has been a scarcity of research that addresses psychological issues in the field of Forensic Odontology. In the recent times, extreme efforts have been taken to strengthen mental health during the pandemic. Interventions like emergency psychological crisis treatment, 24-hour hotline assistance, online counselling services, mental health courses are given more attention(16).

According to William Nicholson- *“Experience: that most brutal of teachers. But you learn, my God do you learn.”* (17). The results of this study reveal that, the experience of the forensic odontologists increases the level of comfort dealing with forensic activities. It is presumed that experts are trained aptly, and they then progressively gather knowledge over extensive periods through their experience. However, qualifications and experience are not good indicators of performance because their worth is dependent on the features of the task setting in which they are attained (18). Experienced forensic odontologists may face their first case of child abuse, for instance, later in their career; or may not have training experience with this subtopic of forensic odontology in their early education. It should be further investigated that experience and qualifications are necessary but does the features of a particular task and the working environment influence one’s ability to work, need to be explored. A study published in 2019, 38.9% of the forensic odontologists who work as lecturers have 2 and 5 years of experience in teaching (3). It is important that the academic staff must have a good scientific background and a good amount of practical experience. More importantly, the teaching experience should be challenged with the experience as a forensic odontologist. This is to say that a forensic odontologist that is experiencing psychological issues in practice may reflect the negative impact of these issues on studies, while working as lecturer. This study revealed that, males are more comfortable than women in dealing with forensic activities. In an illustrative study (19), it was mentioned that emotional experience faced by men and women are alike to an extent, but women are more expressive with emotions such as fear, love, and sadness than men, whereas males express anger more frequently than females. It was found that, stereotypes based on adults’ gender-emotion were based on a deficit model, which believed that men do not express what they feel (19-21). Also, in the educational field of Forensic Odontology, male lecturers are predominant as compared to female lecturers (3). But on the contrary, Forensic Science has managed to attract many females to the field (22). In a Brazilian dental website, it is noticed that the females working in Forensic Odontology accounted for 474 and as opposed to 341 males (23). In a 2019 study, all 10 females who participated in the survey were postgraduates in the field of Forensic Odontology (3). This was assumed that they were not encouraged in this field, and they expressed their interests in the evolving course options in Forensic Odontology.

According to this study, males found it easier in handling stress than females while dealing with forensic activities. On assessing males and females with

stress responsiveness, the actions of the Hypothalamic-Pituitary-Adrenal (HPA) axis such as cortisol and sympathetic nervous system (heart rate, blood pressure) plays an enormous role (24). The HPA axis is a centrally controlled and regulated system that connects the central nervous system (CNS) with the hormonal system. (25) However, female sex organs shrink the effect of HPA response. Therefore, the cortisol feedback on the brain is decelerated and leads to less or late stress response. Depression is more likely to be developed in females because of the compromised reaction of cortisol. (24) Between puberty and menopause, HPA-axis and autonomic responses is lower in females than males of the same age. Also, sex differences before puberty, after menopause, use of oral contraceptives and pregnancy influences the physiology of the HPA axis too. (26) Some women are stressed because of the lack of motivation and encouragement from co-workers and superiors. However, the number of women working in forensics is large because of their maternal nature and maturity. (27) According to (psycho) sociological literature, "sex" defines the physiological and genetic differences between men and women, whereas "gender" refers to the experiences being a man or a woman. Women who work have more problems related to physical and mental health when contrasted to women who do not work. In different cultures, women are expected to take the role of a caregiver (28), particularly to family members and to toddlers which sometimes take a negative toll on bodily and mental health. As women are considered caregivers when compared to men, the risk of exposure to such pressure is higher influencing their health (29). It needs to be investigated if a man is the only caregiver of the house in the absence of a woman in the family, will it change the perceptive of men towards work or will it influence his mental and physical health. It has been argued that, when men and women work under similar work conditions, there is no difference in the release of the stress hormones, stress experience or heart rate (30). On accounting age, education and marital status, the work-related stress in women disappears when compared to men (31).

It is observed in the results of this study that 80.77% students never had any behavioural changes, but a few manifested minor behavioural changes following mortuary sessions. Not only can the experience in the mortuary but also the graphic images shown during lectures or practical activities have adverse effects. In previous surveys, examinations or assignments and grades expected to become perfectionist, increased stress levels in students with limited time for extra-curricular activities. Also, students living away from home were more stressed than the ones living with parents and vice versa. Lack of entertainment facilities within the accommodation developed more stress among males. Personal factors such as financial or family problems, time constraints, less time for relaxation, reduced holidays and language barrier can also play a vital role (32, 33). Lack of confidence can lead to many unwanted errors which is highly unacceptable especially dealing with people who are not trained in forensics. Stress responses are also influenced by one's approach of beliefs, culture and attitude, another area that encourages further investigation (32).

A full-time psychologist should be hired in the forensic department, for the students to be provided with counselling to help them manage any source of stress and its effect. An emotional intelligence test (34) and personality inventories (35) can be suggested for student selection for the admission of this

course (32). Stress management in education system is the key to avoid a substantial number of issues for future forensic odontologists. Stress for odontologists could be because of the gradual exposure or followed by any critical incident. Counselling facilities along with a Critical Incident Stress Management (CISM) program should be made available to the students by the odontology coordinator. Debriefing sessions such as Critical Incident Stress Debriefing (CISD) should be encouraged and combined with services supporting crisis such as crisis management for individuals, family support services, referring to professional care and also education programs after incidents. This could be well conjugated with the help of police and other emergency services (2).

Tools to maintain mental well-being should be discussed. In a study related to Cochrane systematic reviews, exercising or yoga can improve mental well-being for both medically compromised patients and healthy individuals (36). Listening to music, talking to your best friend, watching movies, playing video games and controlled caffeine intake maybe contribute to improving one`s mental health (37-41).

Future studies in the upcoming years are encouraged to obtain unbiased answers, as it is a sensitive topic and mental well-being is still a taboo in the society. Fear of discussing the topic, survey fatigue, time constraint due to busy schedule or issues with internet connections could have affected the wiliness to answer to the survey and quality of the responses. Questions on sensitive topic such as death must be explored.

Finally, the results of this study encouraged the addition of sessions on Psychology in the MSc Forensic dentistry and MFOdont Forensic Odontology programmes of Centre for Forensic Medicine and Dentistry, University of Dundee, Dundee, Scotland, UK. The sessions cover: a) Psychology and death; b) Cognitive bias; c) Psychological aspects of giving evidence in court; and d) Mental health disorders and stress relief in Forensic Odontology; Dr Giselle Mânica delivers the lectures and simulated case scenarios for group discussions since the academic year 2021-22. The feedback from the students was extremely positive and the experience could be replicated by other courses.

## Conclusion

It is believed that professionals working in forensics are trained to work under pressure and are resilient under a stress situation but, sometimes, pressure and stress take a toll on professionals and students who invest their time, money and sometimes resettle to another location across countries. Consulting a psychologist or counsellor for these reasons or having a personal conversation with someone on mental health is still taboo in society. A concern of being judged by the community still harbours in the minds of everyone; however, a psychologist can help with improving the decision-making of the people in need, or stress management and behaviour based on understanding the past behaviour which can help in predicting the future behaviour. It is recommended that we must also help people who face psychological issues, treat mental health-related problems, improve the education system, behaviour in the workplace and relationships.

The importance of psychology should be understood and inculcated during the training period itself. This could be done by appointing a psychologist for the department during the training period. Many forensic dentists might have struggled and suffered silently in the past. The mental health of students away from academic work is vital and it must function in a balanced manner. Yoga, exercise or other leisure activities must be encouraged at an individual level. Encouragement should be given to talk about the problems more than the solutions, interact with people from all age groups to understand human nature, watch psychological interviews, read more regarding the positivity towards life, express gratitude and feel grateful for the little things in life. As the mental well-being of forensic odontologists is dependent on the successful management of professional strains, this topic deserves more attention than it has received so far, especially in training programmes in Forensic Odontology.

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## References

1. A Dictionary of Psychology [Internet]. Oxford University Press. 2014. Available from: <https://www.oxfordreference.com/view/10.1093/acref/9780199534067.001.0001/acref-9780199534067-e-6827?rskey=fwJMxs&result=7081>.
2. Taylor J, Kieser J. Forensic odontology: principles and practice. Chichester: John Wiley & Sons Incorporated; 2016.
3. Mânica S, Gorza L. Forensic odontology in the 21st century - Identifying the opinions of those behind the teaching. *J Forensic Leg Med*. 2019;64:7-13. <https://doi.org/10.1016/j.jflm.2019.03.006>
4. Ho Chan WC, Tin AF. Beyond knowledge and skills: self-competence in working with death, dying, and bereavement. *Death studies*. 2012;36:899-913. <https://doi.org/10.1080/07481187.2011.604465>
5. Bradley N. Suicide and dentistry: An unwanted link. *BDJ In Pract*. 2020;33:20-1. <https://doi.org/10.1038%2Fs41404-020-0526-1>
6. Cambridge Advanced Learner's Dictionary & Thesaurus 4th ed. Cambridge: Cambridge University Press; 2013.
7. Dror IE, McCormack BM, Epstein J. Cognitive bias and its impact on expert witnesses and the court. *Judges J*. 2015;54:8-19.
8. Harvey AG, Bryant RA. Acute stress disorder: a synthesis and critique. *Psychol Bull*. 2002;128:886-902. <https://doi.org/10.1037/0033-2909.128.6.886>
9. Barber BA, Barber BA, Kohl KL, Kohl KL, Kassam-Adams N, Kassam-Adams N, et al. Acute stress, depression, and anxiety symptoms among english and spanish speaking children with recent trauma exposure. *J ClinPsychol Med Settings*. 2014;21:66-71. <https://doi.org/10.1007/s10880-013-9382-z>
10. Silva JA, Derecho DV, Leong GB, Weinstock R, Ferrari MM. A classification of psychological factors leading to violent behavior in posttraumatic stress disorder. *J Forensic Sci*. 2001;46:309-16.
11. Almazrouei MA, Dror IE, Morgan RM. Organizational and human factors affecting forensic decision-making: workplace stress and feedback. *J Forensic Sci*. 2020;65:1968-77. <https://doi.org/10.1111/1556-4029.14542>
12. McCarroll JE, Fullerton CS, Ursano RJ, Hermsen JM. Posttraumatic stress symptoms following forensic dental identification: Mt Carmel, Waco, Texas. *Am J Psychiatry*. 1996;153:778-82. <https://doi.org/10.1176/ajp.153.6.778>
13. Wai-Man Liu , Liz Forbat, Anderson K. Death of a close friend: Short and long-term impacts on physical, psychological and social well-being. *PLOS ONE*. 2019;14:1-17. <https://doi.org/10.1371/journal.pone.0218026>
14. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*. 2009;339:b2700. <https://doi.org/10.1371/journal.pmed.1000100>
15. Garla B. Career aspirations and reasons for choosing dentistry as a career; A survey of dental students in gandhi dental college and hospital, Bhubaneswar. *Ann Essen Dent*. 2011;3:108-10. <https://doi.org/10.5368/aedj.2011.3.2.5.1>
16. Lestari R, Setyawan FEB. Mental health policy: protecting community mental health during the Covid-19 pandemic. *J Publ Health Res*. 2021;10:2231. <https://doi.org/10.4081/jphr.2021.2231>
17. BrainyQuote.com. William Nicholson Quotes. 2021 [updated June 16]. Available from: [https://www.brainyquote.com/quotes/william\\_nicholson\\_103466](https://www.brainyquote.com/quotes/william_nicholson_103466).
18. Perera AJ, Drew CA, Johnson CJ. Expert knowledge and its application in landscape ecology. New York: Springer; 2012. <https://doi.org/10.1007/978-1-4614-1034-8>

19. Plant EA, Hyde JS, Keltner D, Devine PG. The gender stereotyping of emotions. *Psychol Women Quart.* 2000;24:81-92. <https://doi.org/10.1111/j.1471-6402.2000.tb01024.x>
20. Fabes RA, Martin CL. Gender and age stereotypes of emotionality. *Personal Soc Psychol Bull.* 1991;17:532-40. <https://doi.org/10.1177/0146167291175008>
21. Fischer AH, Kret ME, Broekens DJ. Gender differences in emotion perception and self-reported emotional intelligence: A test of the emotion sensitivity hypothesis. *PLOS ONE.* 2018;13:e0190712-e. <https://doi.org/10.1371/journal.pone.0190712>
22. Houck MM. Is Forensic science a gateway for women in science? *Forensic Sci Policy Manag: Int J.* 2009;1:65-9. <https://doi.org/10.1080/19409040802629744>
23. Quantidade geral de cirurgiões-dentistas especialistas [Internet]. Available from: <https://website.cfo.org.br/estatisticas/quantidade-geral-de-cirurgioes-dentistas-especialistas/>.
24. Verma R, Balhara YPS, Gupta CS. Gender differences in stress response: Role of developmental and biological determinants. *Industr Psychiatry J.* 2011;20:4-10. <https://doi.org/10.4103%2F0972-6748.98407>
25. Kudielka BM, Kirschbaum C. Sex differences in HPA axis responses to stress: a review. *Biol Psychol.* 2005;69:113-32. <https://doi.org/10.1016/j.biopsycho.2004.11.009>
26. Kajantie E, Phillips DIW. The effects of sex and hormonal status on the physiological response to acute psychosocial stress. *Psychoneuroendocrinol.* 2006;31:151-78. <https://doi.org/10.1016/j.psyneuen.2005.07.002>
27. Barbaro A. women in forensics: An international overview. *Forensic Sci Int: Synergy.* 2019;1:137-9. <https://doi.org/10.1016/j.fsisyn.2019.06.047>
28. Schulz R, Beach SR. Caregiving as a risk factor for mortality: the caregiver health effects study. *JAMA.* 1999;282:2215-9. <https://doi.org/10.1001/jama.282.23.2215>
29. Mayor E. Gender roles and traits in stress and health. *Front Psychol.* 2015;6:779. <https://doi.org/10.3389/fpsyg.2015.00779>
30. Persson R, Hansen AM, Ohlsson K, Balogh I, Nordander C, Orbaek P. Physiological and psychological reactions to work in men and women with identical job tasks. *Eur J Appl Physiol.* 2009;105:595-606. <https://doi.org/10.1007/s00421-008-0939-8>
31. Michael G, Anastasios S, Helen K, Catherine K, Christine K. Gender differences in experiencing occupational stress: the role of age, education and marital status. *Stress Health.* 2009;16:397-404. <https://doi.org/10.1002/smi.1248>
32. Alzahem AM, van der Molen HT, Alaujan AH, Schmidt HG, Zamakhshary MH. Stress amongst dental students: a systematic review. *Eur J Dental Educ.* 2011;15:8-18. <https://doi.org/10.1111/j.1600-0579.2010.00640.x>
33. Elani HW, Allison PJ, Kumar RA, Mancini L, Lambrou A, Bedos C. A Systematic Review of Stress in dental Students. *J Dental Educ.* 2014;78:226-42. <https://doi.org/10.1002/j.0022-0337.2014.78.2.tb05673.x>
34. Pau A, Rowland ML, Naidoo S, AbdulKadir R, Makrynika E, Moraru R, et al. Emotional intelligence and perceived stress in dental undergraduates: A multinational survey. *J Dental Educ.* 2007;71:197-204. <https://doi.org/10.1002/j.0022-0337.2007.71.2.tb04266.x>
35. Mozer JE, Lloyd C, Puente ES. The relationship of Bi/Polar personality patterns with self-esteem, stress, and satisfaction in dental school. *J Dent Educ.* 1990;54:153-7. <https://doi.org/10.1002/j.0022-0337.1990.54.2.tb02393.x>
36. Posadzki P, Pieper D, Bajpai R, Makaruk H, Könsgen N, Neuhaus AL, Semwal M.. Exercise/physical activity and health outcomes: an overview of Cochrane systematic reviews. *BMC Publ health* 2020;20:1724. <https://doi.org/10.1186/s12889-020-09855-3>
37. Thoma MV, La Marca R, Brönnimann R, Finkel L, Ehlert U, Nater UM, et al. The effect of music on the human stress response. *PLOS ONE.* 2013;8:e71056. <https://doi.org/10.1371%2Fjournal.pone.0070156>
38. Ybarra O, Winkielman P, Yeh I, Burnstein E, Kavanagh L. Friends (and sometimes enemies) with cognitive benefits: what types of social interactions boost executive functioning? *Soc Psychol Personal Sci.* 2011;2:253-61. <https://doi.org/10.1177/1948550610386808>



39. Bennett MP, Zeller JM, Rosenberg L, McCann J. The effect of mirthful laughter on stress and natural killer cell activity. *Altern Ther Health Med*. 2003;9:38-45.
40. Zimmer T. Four Ways Movies Can Relieve Stress [Internet]. 2017. Available from: <https://mental-health-matters.com/four-ways-movies-can-relieve-stress/>.
41. Jarvis MJ. Does caffeine intake enhance absolute levels of cognitive performance? *Psychopharmacology (Berl)*. 1993;110:45-52.