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The Impact of Procrastination and Psychosocial Factors on Dental Attendance and Oral Health Status

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Aim: The aim of the study is to explore the relationship between procrastination and dental attendance, focusing on delay in seeking dental care, in spite of having a low self-reported oral health status. In addition, the study includes a survey based investigation on the reasons of delay in dental care.

Objective: Dental attendance is important to determine oral health, and regular dental visits positively influence people's quality of life. Regular dental check-ups are preventive measures to assess oral health status and progression of oral disease. Thus, delay in oral examination and treatment can be assumed to affect oral health negatively.

Dental anxiety has often been referred to be one of the reasons for avoidance or delay in dental care. Studies show the relation between dental anxiety and delay of dental visits, where high levels of anxiety predicts the length of delay.

However, delay in dental care could also be due to various other reasons. Such as, expenses of the treatment, time consuming or not necessary without any acute symptoms.

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Procrastination is the failure to initiate or complete a task. It is one of the leading demerits of the present scenario, this article highlights how this can lead to delayed dental care that in turn impairs oral health. It is also associated with health outcomes like stress and treatment delay, thus increasing procrastination decreases health status. Dental patients might delay treatment for conditions that are perceived not be very serious, acute or with no or low intensity symptoms because undergoing clinical examination might be unpleasant in itself.

Therefore, delaying seeking dental care or avoiding treatment is a problem for dental public health. Procrastination can be an important construct regarding oral health, affecting the delay of dental care among patients.

Materials and Methods: The residents of the city of Muradnagar in the Ghaziabad district of Uttar Pradesh who attended the oral health camps held by the ITS-CDSR Muradnagar campus in various nearby communities were the subjects of the study. In April and May of 2023, data were gathered through convenience sampling with a paper-based questionnaire.

Results: Most participants were middle class, with 60.7% attending regular dental visits, though 93.4% reported delays in care. High dental anxiety, stress, and procrastination were significantly linked to poor oral health and delayed visits. Those with better self-reported oral health and regular visits had lower anxiety and procrastination. Delays were strongly influenced by cost, stress, fear, and perceived necessity, with necessity being the strongest factor. Poor oral health and higher dental anxiety were associated with a willingness to attend future visits. Overall, psychometric factors significantly impacted oral health behaviours, highlighting the need for strategies to address psychological barriers to improve dental care access.

Conclusion: This study found a significant relationship between procrastination, psychometric scales and delay of dental care. The delay is majorly due to lack of knowledge amongst the participants as a significant group believed that there is no need for a dental visit without any acute symptoms.

Keywords: Dental care; public health dentistry; procrastination; psychometric scales; oral health; Kuppuswamy's socio economic status scale; dental anxiety; oral health behaviour; delivery of dental care.

1. INTRODUCTION

Regular dental attendance is a key oral health behaviour [1]. The National Institute of Health and Care Excellence (NICE) recommends that all adults should have dental screening between 3 months and 2 years based on their oral health risks [2]. A regular dental attenders is someone who attends for routine dental recalls regardless of their dental needs. Non regular dental attenders are the people who go for dental visits when they have a dental problem. Non regular dental attendance is associated with poorer oral health compared with those who do regularly attend [3]. Regular dental check-ups and scheduled appointments are preventive measures by which oral health problems and oral disease progression are assessed. This is important as various oral diseases lacks symptoms in early phases. Delaying an oral examination or treatment is therefore thought to have a negative impact on oral health [4].

Dental anxiety or negative dental treatment experience has often been referred to as a foundation for much avoidance behaviour [5]. Studies shows relation between dental anxiety and avoidance of dental visits, with high level of dental anxiety is proportional to length of avoidance [6]. Delaying dental attendance could also be due to various other reasons, such as the patient might think that treatment or dental examination is overly expensive, time consuming or it is unnecessary without any acute symptoms [7].

Socio-economic status has a long held interest for its effects on general and oral health. Evidence indicates that the socio-economic inequalities are associated with oral health status weather subjectively (self rated oral health) or objectively (clinically diagnosed oral health status) determined [8]. Education and income are most common indicators used in epidemiology for socio- economic status measurement [9] and can be measured by Modified Kuppuswamy's Socio-Economic Status Scale. Studies have shown that oral health and dental diseases are negatively correlated with socioeconomic status [10], higher socioeconomic status means better oral health perception and lesser delay in dental care.

Procrastination is a form of self regulatory failure that describes failure to initiate or complete tasks [11]. It is associated with less favourable health outcomes like stress, anxiety and treatment delay. Thus, increasing procrastination decreases health status [12]. Task avoidance has been identified as a strong procrastination predictor [13]. Dental patients might tend to delay treatment for conditions that are perceived not to be serious, acute or presents with low intensity symptoms [4]. Although delay in dental visits might have consequences, such as when patient delay seeking treatment or examination for symptoms related to oral cancer [14] or periodontal disease [15]. Therefore, delaying seeking dental care or avoiding treatment is a problem for dental public health and procrastination can be an important aspect in health behaviour affecting the delay of delay care among patients [4,16,17].

The purpose of this study is to investigate the link between procrastination and dental attendance, with a particular emphasis on the delay in seeking dental care while having poor oral health according to self-report. In addition the study also includes a survey based investigation on reasons of delay in dental care.

2. MATERIALS AND METHODS

The residents of the city of Muradnagar in the Ghaziabad district of Uttar Pradesh who attended the oral health camps held by the ITS-CDSR Muradnagar campus in various nearby communities were the subjects of the study. In April and May of 2023, data were gathered through convenience sampling with a paper-based questionnaire.

A pilot study was also conducted prior to the main study on 30 participants of similar community to assess the feasibility of the study and to determine the sample size. It was revealed from pilot study that the correlation coefficient of delay with other variable is 0.162. Therefore using the following formula the sample size is 297.

(The standard normal deviate for α = Z_α = 1.9600 for 95% confidence interval and α 5%
The standard normal deviate for β = Z_β = 0.8416 for power 80% and β 20%
C = 0.5 * ln[(1+r)/(1-r)] = 0.1634
Total sample size = N = $[(Z_\alpha+Z_\beta)/C]^2$ + 3 = 297) [18]

In the camps organised by ITS-CDSR, the questionnaire was distributed to 374 patients, of whom 300 completed the survey. The majority of participants were female, with a mean age of 26 to 50 years. All participants actively consented to participate before accessing the questionnaire, and responses were anonymous. The questionnaire consisted of questions regarding oral health dental attendance or oral health behaviour, Kuppuswamy's Socio-Economic Status Scale in addition to 3 psychometric scales, which are Modified Dental Anxiety Scale (MDAS), Perceived Stress Scale (PSS), Irrational Procrastination Scale (IPS).

2.1 Questionnaire

Age and gender and socio-economic status were the socio demographic characteristics included in the study. According to Kuppuswamy's Socio-Economic Scale, participants were asked about the head of the family's education, income, and profession. On a scale from 1 to 5, where 1 is stated to be very poor and 5 is very good for the former question, and 1 is stated to be very dissatisfied and 5 is very satisfied for the latter, participants were asked how they perceived their oral health and how satisfied they were with their oral health status. By asking participants about their regular, previous, and upcoming dental appointments, it was possible to assess their dental attendance. The Kuppuswamy's Socio-economic Scale had a Cronbach's alpha level of 1.

Participant's regular dental visits were assessed by asking, "Do you go to the dentist regularly?", past dental visits were assessed by asking, "When did you last went to the dentist?" and future dental visits were assessed by asking, "Would you want to go to the dentist regularly?". The various response options for the frequency of dental visits were available to participants. Similarly, delay in dental care is assessed by asking, "Do you ever delay in dental treatment or examination by the dentist?". There were four responses available to participants: "never," "sometimes," "often," and "always; where response 1-2 indicated little or no delay, indicated moderate to high delay in dental care.

The question, "What Is the reason behind postponing dental care?, "was used to evaluate the potential causes of delay. Where articulations connected with the classifications Stress, Fear, Cost, Time and Need were given. The assertions

were stated as “Getting dental treatment or assessments by dental specialists are … … … “, finished with the accompanying portrayal ‘distressing’, ‘scary’, ‘excessively expensive’, ‘excessively time consuming’ and ‘not necessary without symptoms’. On a likert scale from 0 (doesn’t describe me at all), 1 (seldom describes me), 2 (describes me occasionally), 3 (describes me often), and 4 (describes me well), each participant was required to indicate how accurately the statements described them. In the examination, the responses were summed up, showing how frequently the reasons were expressive for the defer in dental consideration.

Dental anxiety in the participants was evaluated by using the Modified Dental Anxiety Scale (MDAS). MDAS consists of 5 statements and participants responds to them using likert scale 1-5 and is used by summarizing the scores of all the statements. This scale differentiate participants between low (5-10), moderate (11-18) and severe (>18). The MDAS had a Cronbach’s alpha level of 1.

Stress levels in the participants was evaluated using the Perceived Stress Scale (PSS). PSS is a global measure of stress and requires 10 statements about stressful situations in last month. Participants responds to them on a likert scale of 0-4 and was used by summarizing score of the items. Higher scores indicates more perceived stress. The PSS had a Cronbach’s alpha level of 1.

Table 1. Descriptive overview of demographics, socio economic status, self reported oral health and variables of dental visits

Variable	Category	Participants n (%)	Male n (%)	Female n (%)
Total		300 (100%)	141 (47%)	159 (53%)
Age	18-25	83 (27.7%)	32 (38.5%)	51 (61.5%)
	26-40	126 (42%)	66 (52.4%)	60 (47.6%)
	>40	91 (30.3%)	43 (47.8%)	48 (52.8%)
Socio-Economic Status	Upper	23 (7.7%)	10 (7.1%)	13 (8.2%)
	Upper middle	98 (32.6%)	48 (34.1%)	50 (31.4%)
	Lower middle	101 (33.7%)	47 (33.3%)	54 (34%)
	Upper lower	50 (16.7%)	25 (17.7%)	25 (15.7%)
	Lower	28 (9.3%)	11 (7.8%)	17 (10.7%)
Self reported oral health	Very poor	22 (7.3%)	11 (7.8%)	11 (7%)
	Poor	82 (27.4%)	38 (27%)	44 (27.7%)
	Neutral	131 (43.7%)	67 (47.5%)	64 (40.2%)
	Good	58 (19.3%)	23 (16.3%)	35 (22%)
	Very good	7 (2.3%)	2 (1.4%)	5 (3.1%)
Regular dental visits	Never	22 (7.3%)	10 (7.1%)	12 (7.5%)
	Acute only	96 (32%)	48 (34%)	48 (30.2%)
	Every second year	98 (32.7%)	45 (32%)	53 (33.4%)
	Once a year	63 (21%)	25 (17.7%)	38 (23.9%)
	>Once a year	21 (7%)	13 (9.2%)	8 (5%)
Future dental visits	Never	4 (1.3%)	1 (0.7%)	3 (1.9%)
	Acute only	45 (15%)	20 (14.2%)	25 (15.7%)
	Every second year	79 (26.3%)	40 (28.3%)	39 (24.5%)
	Once a year	146 (48.7%)	65 (46.1%)	81 (51%)
	>Once a year	26 (8.7%)	15 (10.6%)	11 (6.9%)
Past dental visits	Never	30 (10%)	13 (9.2%)	17 (10.7%)
	1-6 months back	68 (22.6%)	33 (23.4%)	35 (22%)
	1 year back	95 (31.7%)	42 (29.8%)	53 (33.3%)
	2 years back	74 (24.7%)	33 (23.4%)	41 (25.8%)
	>2 years back	33 (11%)	20 (14.2%)	13 (8.2%)
Delay in dental care	Never	20 (6.6%)	11 (7.8%)	9 (5.7%)
	Sometimes	93 (31%)	51 (36.2%)	42 (26.4%)
	Often	119 (39.7%)	45 (31.9%)	74 (46.5%)
	Always	68 (22.7%)	34 (24.1%)	34 (21.4%)

Table 2. Descriptive overview of the variables of psychometric scales

Psychometric Scales (variables)	Category	Participants n (100%)	Male n (100%)	Female n (100%)
Total		300 (100%)	141 (47%)	159 (53%)
MDAS	Mild (5-10)	41 (13.7%)	18 (12.8%)	23 (14.5%)
	Moderate (11-18)	153 (51%)	76 (53.9%)	77 (48.4%)
	High (>18)	106 (35.3%)	47 (33.3%)	59 (37.1%)
PSS	Low (0-13)	66 (22%)	35 (24.8%)	31 (19.5%)
	Moderate (14-26)	165 (55%)	77 (54.6%)	88 (55.3%)
	High (27-40)	69 (23%)	29 (20.6%)	40 (25.2%)
IPS	Low (<19)	63 (21%)	35 (24.9%)	28 (17.6%)
	Moderate (19-37)	144 (48%)	66 (46.8%)	78 (49%)
	High (>37)	93 (31%)	40 (28.3%)	53 (33.3%)

Procrastination was measured using the Irrational Procrastination Scale (IPS). IPS is a 9 statements scale where responses to the statements were made on a likert scale from 1-5 to indicate that the statements describes the, well (5) or not (1). The statements used were situation based where postponement of tasks affected the participants. The scale is used by summarizing scores of the statements. Higher the score, higher is the procrastination tendency. The IPS had a Cronbach's alpha level of 1.

2.2 Statistical Analysis

The collected survey data were compiled in a Microsoft Excel Sheet, and SPSS version 24 was used for statistical analysis. The reliability of the scales used in this study—the MDAS, PSS, IPS, and Kuppuswamy's Socio-Economic Status Scale—was examined using reliability analysis.

The sample's dental attendance was investigated using non-parametric exploratory analysis. Using spearman's correlation analysis, the bivariate association was evaluated. A correlation score of 0.2-0.4 is regarded as weak, 0.4-0.6 as moderate, and 0.6-0.8 as strong.

Descriptive statistics including mean median standard deviation and interquartile range were arranged for the psychometric scales.

3. RESULTS

3.1 Socio Economic Status, Self Reported Oral Health and Dental Visits

Table 1 displays demographics and other variables. Among the members larger part of the population were in the middle class as per Kuppuswamy's Socio-Economic Status Scale, 33.7% were of lower middle and 32.6% were of upper middle class. Only 43.7%, 19.3%, and 2.3% of participants, respectively, reported having neural, good, or very good oral health status as self-reported by them. A total of 60.7% of members had customary dental visits consistently year or on a more regular basis. 7.3% of participants said they did not go to the dentist on a regular basis, while 32% said they only went to the dentist when they had acute symptoms. A large portion of the members that is 83.7% wanted regular dental visit in future. A total of 93.4 percent of participants reported experiencing delays in dental care sometimes, often and always.

3.2 Psychometric Scales

The median and mean values of the psychometric scales and the spearman's correlation among them in this study are shown in Table 4.

Descriptive statistics in Table 2 show that 51% of the population experiences moderate dental anxiety of dental procedures and examinations, with males having more anxiety. About 35.3% of all participants suffered from severe dental anxiety, and females were affected more often than males. Only 13.7% of participants had a mild dental anxiety, with a similar distribution for males and females.

Survey data also show that 55% of participants experienced moderate levels of stress, regardless of gender. Approximately 23% and 22% of participants reported high and low stress levels, which were more common in females and males, respectively. Similarly, when procrastination tendency was calculated, the data showed that approximately 48% of the participants exhibited moderate procrastination tendency. Among them, there were more

females than males. Low levels of procrastination were predominant in male participants, only 21% of the population, while 31% of the population exhibited high levels of procrastination, more females.

The data in Table 3 show that the median values for MDAS, PSS, and IPS were 19, 21.5, and 26, respectively Indicating that 50% of the data had values above the median and the remaining 50% had values below the median. The IQR scores were also calculated to measure data variability, with scores of 6.5 and 4.5 on the psychometric scales MDAS, PSS, and IPS, respectively. Mean scores on the psychometric scale were calculated by measuring the actual mean of the data and indicated that, on average, the population had moderate dental anxiety, perceived stress and procrastination tendencies. To measure the spread of data, the mean standard deviation was calculated, which was 3.7, 4.5, and 3.94 for MDAS, PSS, and IPS, respectively.

The spearman's correlation analysis revealed a positive and significant correlation between MDAS and PSS, MDAS and IPS, and PSS and IPS, for which the correlation coefficients were (r = 0.45: *P*<.01), (r = 0.28: *P*<.01) and (r = 0.37: *P*<.01). Indicating that the participants with high levels of perceived stress had greater anxiety about dental treatments and examinations and were more likely to procrastinate dental visits whereas participants with lower levels of perceived stress had less anxiety and were less likely to procrastinate dental visits.

A correlation analysis was performed to further examine the relationship between psychometric scales and oral health status. It showed a negative relationship of dental anxiety and procrastination with the participants' self reported oral health, implying that low dental anxiety and procrastination was related to high self reported oral health and showed a positive relationship between DMFT scores and psychometric scales, indicating that low dental anxiety, perceived stress and procrastination was related to low DMFT scores which means good oral health status.

3.3 Delay in Dental Care

The correlation analysis revealed a positive and significant correlation between delay in dental care and age and DMFT score, respectively, (age; r = 0.22) (DMFT; r =0.33) indicating that delaying dental care is more frequent among older participants and the one with high DMFT scores which showed poor oral health in the study, but no significant relationship was seen between gender, socio-economic status and delay in dental care. Further, correlation analysis showed significant negative association between the delay in dental care and self reported oral health and future dental visits, respectively. These associations indicated that the participants with poor self reported oral health and those who doesn't want to go for regular dental visits in future were more likely to delay dental care.

In order to check for the effects of psychometric scales on the delay in dental care, correlations showed that all three psychometric scales had positive and significant relationship with the delay in dental care, indicating that participants with high dental anxiety, perceived stress and procrastination tendencies tend to delay dental care more.

3.4 Reasons for Delay in Dental Care

A correlation analysis showed that the delay in dental care is associated positively and significantly with all the potential reasons provided in the questionnaire (Table 5), and the strongest association was found between the delay in dental care and necessity (r = 0.53).

Table 6 shows that IPS is correlated significantly and positively with all the reasons for the delay in dental care, but the strongest correlation was found with necessity. Indicating that mostly participants delay dental care because they feel that dental visits are not necessary without acute symptoms. MDAS is associated significantly and positively with stress and fear and PSS is associated with significantly with stress, fear, time and necessity. Both MDAS and PSS are associated strongly with stress.

3.5 Oral Health Status, Dental Attendance and Psychometric Scales

It was found that participants with more regular dental visits reported less perceived stress and procrastination tendency as the are negatively but significantly associated with regular dental visits (PSS: r= -0.14*, IPS: r = -0.2**) but no significant association with MDAS (r= -0.5) was found (Table 7).

Age, DMFT scores and MDAS shows positively significant association with the past dental visits,

indicating that participants last dental visit were frequent as with increasing age, dental anxiety and DMFT score also increases resulting in poor oral health status and therefore need for dental visit increases.

Also, DMFT scores and MDAS shows positive correlation with future dental visits, indicating that participants with higher dental anxiety were reported to have poor oral health i.e. high DMFT scores, but they agreed for more frequent dental visits in future.

4. DISCUSSION

The primary goal of dental visits is to find problems early, various oral diseases can be managed if caught early. Treating problems early keeps oral diseases from getting worse and costs less than later treatment would take. In our study, the larger part of participants were middle class. The result shows strong relationship between procrastination, dental anxiety and stress. Also all the psychometric scales are also strongly related with the delay in dental care. This indicates that participants with dental anxiety and stress tends to procrastinate and therefore they end up delaying the dental care. There is negative association between regular dental visits and procrastination, but no significant association with past and future dental visits.

In this sample the past dental visits shows association with age, oral health status and dental attendance stating that in past as the age of the participant increase the frequency of dental visits increase, which might be because of the increasing poor oral health with age which may lead to increasing dental attendance.

Table 3. Psychometric scales properties and spearman's correlations

	Median (IQR)	Mean (SD)	MDAS	PSS	IPS
MDAS	19 (6)	17.4 (3.7)	1.00	0.45**	0.28**
PSS	21.5 (5)	22.7 (4.5)	0.45**	1.00	0.37**
IPS	26 (4.5)	26 (3.9)	0.28**	0.37**	1.00

*P-value <.05 * and <.01 **, IQR = interquartile range, SD = standard deviation*

Table 4. Spearman's correlation of psychometric scales with oral health status

	MDAS	PSS	IPS
Self reported oral health	-0.19**	0.91	-0.17**
DMFT scores	0.34**	0.25**	0.37**

*P-value <.05 * and <.01 **

Table 5. Spearman's between the delay in dental care, demographics, reasons for the delay, oral health and attendance and psychometric scales

Variables	Scales	Delay in dental care
Demographics	Age	0.22**
	Gender	0.69
	Socio-Economic Status	0.95
Reasons for delay in dental care	Cost	0.20**
	Stress	0.35**
	Fear	0.34**
	Time	0.15**
	Necessity	0.53**
Oral health and dental attendance	Self reported oral health	-2.59**
	DMFT score	0.33**
	Regular dental visits	-0.54
	Future dental visits	-0.17**
	Past dental visits	0.12*
Psychometric scales	MDAS	0.31**
	PSS	0.29**
	IPS	0.45**

*P-value <.05 * and <.01 **

Table 6. Spearman's correlation between reasons for delay in dental care and psychometric scales

Reasons for delay in dental care	MDAS	PSS	IPS
Cost	0.58	0.52	0.25**
Stress	0.4**	0.35**	0.29**
Fear	0.31**	0.29**	0.21**
Time	0.72	0.15**	0.12*
Necessity	0.72	0.28**	0.38**

*P-value <.05 * and <.01 ***

Table 7. Spearman's correlation between dental attendance variables, age, dental health and psychometric scales

Variables	Category	Regular dental visits	Past dental visits	Future dental visits
Demographics	Age	0.71	0.17**	0.035
Oral health	Self reported oral health	0.58	-0.04	-0.045
	DMFT score	-0.05	0.29**	0.29**
Psychometric scales	MDAS	-0.52	0.15**	0.15**
	PSS	-0.14*	0.07	0.79
	IPS	-0.20**	0.05	0.58

*P-value <.05 * and <.01 ***

Therefore, past dental visits might be a better measure of actual attendance because the data is solely based on self reported measures: whereas regular dental visits are likely to be inquired by previously learned behaviour and might be affected by social norms.

Procrastination is lack of execution of a task. A large proportion of participants in this sample expressed desire for regular dental attendance in future which indicate the intention to visit dentist is present. However approximately more than 90 percent of participants stated that they delayed dental care to varying degrees which shows problem of execution related to dental visits rather than lack of intention. A research has demonstrated a negative relationship between overall health behaviours and procrastination [12], which indicates that procrastinators tend to practice less health promoting behaviours. This, procrastination might still be an important factor in determining oral health behaviour and oral health status.

As the study shows significant association between procrastination and delayed dental care, there are various reasons for the delay. The most frequent and most significantly associated response when asked various reasons behind the delay in dental care, was the necessity. Showing that the population in the sample, believe that it is not necessary to go for dental examination or treatment without any acute symptoms.

In contrast to this study, a comparable exploratory investigation on university students at The Arctic University of Norway revealed no significant relationship between procrastination and delay in dental treatment but a positive association was found between psychometric scales (MDAS, PSS) and the delay. The perceived expense of the dental examination or treatment was the cause of dental care delays among university students in over half of the cases [9].

5. CONCLUSION

This study found a significant relationship between procrastination, psychometric scales and delay of dental care. Procrastination had different relation to past, present and future dental attendance and could play important role in oral health behaviour. In view of study the delay is majorly due to lack of knowledge amongst the participants as a significant group of participants believed that there is no need for a dental visit without any acute symptoms.

Further this exploration is likewise helpful in understanding the behavioural patterns of the patients, and carrying out mediations and working on the public dental consideration.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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