



The Open Dentistry Journal

Content list available at: <https://opendentistryjournal.com>



RESEARCH ARTICLE

Correlation of the Oral Health Scoring-based Pregnant Oral Self-Care – package (POSC-p) Model with the Motivation to Seek Oral Health Treatment in Pregnant Women

Anne Agustina Suwargiani^{1,*} , Dudi Aripin² , Erry Mochamad Arief³ , Nina Djustiana⁴ , Kosterman Usri⁴ , Sri Tjahajawati⁵ , Arief Cahyanto⁴ , Sunardhi Widyaputra⁵ , Sri Susilawati¹  and Rahimah Abdulkadir⁶ 

¹Department of Dental Public Health, Faculty of Dentistry, Universitas Padjadjaran, Indonesia

²Department of Conservative Dentistry, Faculty of Dentistry Universitas Padjadjaran, Indonesia

³Department of Periodontics, School of Dental Sciences Universiti Sains Malaysia, Malaysia

⁴Department of Dental Materials, Science, and Technology, Faculty of Dentistry Universitas Padjadjaran, Indonesia

⁵Department of Oral Biology, Faculty of Dentistry Universitas Padjadjaran, Indonesia

⁶University of Malaya Centre of Addiction Sciences (UMCAS), Malaysia

Abstract:

Background:

Uncomprehensive oral health evaluation instruments and measurement and the low motivation for seeking dental and oral treatment for pregnant women; all require comprehensive measurement instruments that will increase the motivation for seeking oral health treatment for pregnant women. POSC-p model was developed for the Oral Health Scoring (OHS) to assess pregnant women's perceived needs, clinical examination, and salivary state.

Objectives:

The research objective was to analyse the correlation between the POSC-p model with the motivation for seeking oral health care in pregnant women.

Methods:

Cross-sectional research was conducted by a non-probability sampling technique using the consecutive sampling method. The sample size was determined based on the correlation analysis sample size calculation formula. The study variables were POSC-p model built with three dimensions; POSC-p score section 1 was felt needs, POSC-p score section 2 was normative needs, and POSC-p score section 3 was saliva condition. In addition, motivation to seek treatment with intrinsic and extrinsic motivation dimensions. All data were analysed using the Spearman rank correlation test.

Results:

A significant correlation was found between the POSC-p model with intrinsic and a combination of treatment-seeking motivation ($p=0.026$); a combined score of the POSC-p model with intrinsic ($p=0.008$) and a combination of treatment-seeking motivation ($p=0.032$).

Conclusion:

There is a correlation between the POSC-p with motivation for seeking oral health treatment in pregnant women.

Keywords: Pregnant oral self-care – package, Oral health scoring, Intrinsic motivation, Extrinsic motivation, Pregnant women, Treatment.

Article History

Received: July 24, 2021

Revised: November 18, 2021

Accepted: December 28, 2021

1. INTRODUCTION

Oral health problems in pregnancy are fundamental for general health [1]. Many changes occur during pregnancy, such

as the physiological, anatomical, hormonal, normal oral microflora, and immune responses [2, 3]. Pregnancy often causes discomfort, aesthetic problems, and malnutrition. The

changes that occur during pregnancy create an unfavourable environment and worsen pregnant women's oral health [1].

The frequency of oral health problems in pregnant women varies between 30% to 98.8% [1]. It is estimated that 70–80% of pregnant women experience nausea and vomiting during pregnancy [2, 3]. Prolonged vomiting can affect erosion and caries development [3]. Previous research conducted in Indonesia showed that pregnant women experience dental caries with a moderate value of Decay, Missing, and Filled Teeth (DMF-T) index (9.86) [4]. The periodontal health examinations based on the Community Periodontal Index Treatment Needs (CPITN) showed 0% healthy periodontal tissue [5]. Therefore, periodontal tissue treatment is urgently needed in all pregnant women, including 43% of oral hygiene improvement and 56% in oral hygiene improvement and scaling [6].

Another study regarding the PUFA index of pregnant women in Indonesia was suggested that 90.95% of subjects were found with the P component (Pulp disease); 6.38% with the U component (Ulcer); 2.12% with the F component (Fistula); and 0.53% of subjects were found with the A component (Abscess) [7]. Meanwhile, most found oral manifestations of pregnant women in Indonesia were coated tongue (76.85%), followed by the geographic tongue (15.74%), glossitis (4.63%), exfoliative cheilitis (3.70%), and the least found was recurrent aphthous stomatitis (RAS), which was only found in 2.78% of all subjects [5]. Analysis of human factors as a host showed an immune response in the oral cavity due to changes in the microflora [8]. Pregnant women have a special need for oral health due to fluctuations in their estrogen levels [9], which can reach 30 times higher, and progesterone levels, which could also increase ten times during pregnancy than during the menstrual cycle [10].

A preliminary research survey conducted on 347 respondents of pregnant women aged 22 to 63 years from various regions in Indonesia showed the influence of individual environment on oral health services utilisation. The study showed that of the 347 respondents, 62.7% of them never had a dental examination by a dentist for both positive and negative causes, while the percentage of negative causes is 99.04% [11]. Therefore, comprehensive prenatal health care should include an oral health assessment. However, regardless of its importance, prenatal health care is often overlooked [12]. This problem is compounded by the lack of national clinical guidelines for managing oral conditions during pregnancy [12].

Public health analysis from various studies shows that health services have entered the era of service, delivery, and evaluation enhancement, relying on data analysis. This analysis will provide information that can be used to obtain patient-centred treatment, as they are essential in assessing the treatment outcomes and direction [13]. Measurement is the first step that leads to the evaluation and aims for improvement. It will not be easy to understand if a particular matter cannot be measured with confident precision. Lack of understanding will

complicate control and improvement [13]. Patients need to know their overall oral health score, including examination results, diseases, and health conditions. This information helps improve communication with patients to provide information on examination results and involve patients in making treatment decisions [13].

The Oral Health Index (OHX) has been designed to provide a numerical measure of the overall state of a patient's oral health through a series of clinical examinations. The OHX component includes the need to convey what is felt and measure the normative need for oral disease. Self-assessment of perceived needs such as pain, function, and aesthetics is the first part of the index [14]. This index has been agreed to produce an Oral Health Scoring (OHS) [13]. Various studies have measured and intervened oral health of pregnant women in Indonesia, such as their knowledge, attitude, and practices [15, 16], oral hygiene [17], DMFT index and caries status [6, 16], PUFA index [7], and salivary condition [18]. However, there is still no research conducted in Indonesia that combines these measurement values as a scoring system to determine the oral health score of pregnant women.

Motivational interviewing (MI) is a brief counselling approach that focuses on the skills needed to motivate patients [19], to provide strategies and drive patients from inaction to action to increase their awareness of the potential problems, consequences, and risks they face. Motivational interviewing increases intrinsic motivation to change and resolve the duality of solving problems a person faces by directing a more self-centred approach [19, 20]. The above description encourages researchers to research the correlation between the POSC-p model and the motivation to seek oral health care in pregnant women.

2. MATERIALS AND METHODS

This research was a cross-sectional study conducted on 80 pregnant women who met the inclusion and exclusion criteria. The inclusion criteria were pregnant women in the first and second trimesters who had their pregnancy checked at the Cantik Clinics in Bandung Regency; able to communicate, read, and write well. The exclusion criteria were pregnant women who were unable to participate in all stages of the study; suffered from chronic diseases such as diabetes mellitus and hypertension (diagnosed by a doctor or written in the patient's medical record); suffered from infection as seen from five signs of inflammation due to diseases and injuries as observed visually by researchers and respondents, such as redness (*rubor*), swelling (*tumour*), heat (*calor*; only applies to the extremities of the body), pain (*dolor*), and loss of function (*functio laesa*); clinically diagnosed as having influenza, herpes simplex infection, malaria, measles, smallpox, toxoplasmosis, and hepatitis; pregnant women with xerostomia.

The sampling technique was non-probability sampling using consecutive sampling, by taking the entire population that can be accessed during the study period, where the samples were taken sequentially [21]. In this study, the sample size was determined based on type I error (α) 5% for the one-tailed test ($Z\alpha = 1.65$); and type II error (β) 20% ($Z\beta = 0.84$), as well as the magnitude of the correlation coefficient of the

* Address of Correspondence to this author at Department of Dental Public Health, Faculty of Dentistry, Universitas Padjadjaran, Sekeloa Selatan I, Indonesia; Tel: +62 813-2017-1707; E-mail: anne.agustina@fkg.unpad.ac.id

relationship between the POSC-p score and the motivation to seek oral health treatment of pregnant women, which was clinically significant ($r = 0.3$). The formula used for sample size calculation was the correlation analysis [22]. The sample size formula above obtained $n = 67$; adding 10% drop out required a minimum sample size of $1 / (1-0.1) \times 67 = 75$. Therefore, the sample size formula above obtained a minimum sample size of $n = 75$. However, a sample of 80 people was taken.

The research variable consisted of the independent variable of POSC-p, which was assessed through felt needs, normative needs, and salivary conditions. The felt needs were taken using a questionnaire, which consisted of appearance comfort/functionality aesthetics. Normative needs variables were caries, periodontal examination, dentures (if any), tooth erosion, occlusion, soft tissue/mucosa, OHS, and salivary condition (salivary pH, volume, and buffer).

The dependent variable in this study was defined as the motivation to seek oral health treatment for pregnant women, which is considered as the brain process that energises and

directs behaviour, not only goals and conscious decision making, but also includes habit processes, emotional responses, and analytical decision making consisting of extrinsic and intrinsic motivations. This variable was taken using a questionnaire (Table 1).

The oral health score was measured before the motivational score was analysed. Data analysis was conducted using the Kolmogorov-Smirnov test for the normality test, and the correlation test was analysed using the Spearman's Rank with SPSS version 26.0. This research was approved in advance by the Health Research Ethics Commission of Universitas Padjadjaran, whose approval number is 1108/UN6.KEP/EC/2020.

3. RESULTS

The results from 80 respondents showed the characteristics presented in Table 2. The average education level of pregnant women was high school-graduated, found in 50% of all respondents; most of them had no workload outside the home (81.3%). In addition, pregnant women had a higher resting load, 87.5% (Table 2).

Table 1. Operational definition of the variable.

Component	Description	Criteria
Felt Need		
Comfortable	Do you feel comfortable with your oral condition? (there is no pain and tooth sensitivity when eating or drinking hot/cold food/drinks, sour or spicy food.)	Patient report (score 0, 1, 2)
Aesthetic	Are you satisfied with your dental appearance now?	Patient report (score 0, 1, 2)
Function	Can you eat without food restriction with no discomfort in mastication, or do you find any problems?	Patient report (score 0, 1, 2)
Normative Need		
Crown caries	Presence of crown caries lesion	There are or no lesions of caries (score 0, 1, 2, 3, 4)
Root caries	Presence of root caries lesion	There are or no lesions of caries (score 0, 1, 2, 3, 4)
Periodontal condition	The depth of periodontal pockets, gingival <i>inflammation</i> , <i>subgingival calculus</i> , and <i>gingival bleeding</i>	Basic Periodontal Examination (BPE) modification (score 0, 1, 2, 3, 4)
Tooth wear and tear	Loss of enamel, dentin, and cementum; defective dental restoration dimension or integrity	Lesions more than 2 mm deep at the cervical; Thinning of 1/3 of tooth enamel on all surfaces accompanied by exposed dentin; thinning of the enamel on the upper surface of the dental crown (incisal enamel) with a negative dentin contour. (score 0, 1, 2)
Dental occlusion	Opposing teeth (natural or prosthetics); at least ten opposing teeth articulated	Minimum of ten pairs of articulated teeth (score 0, 1)
Mucosal condition	Inflammation/ulceration examination	Operator observation (score 0, 1, 2)
Dentures, if any	Dentures examination; Lack of retention, stability, surface, the presence of wear/tooth decay, and freeway space (interocclusal space) (if any)	Operator observation (score 0, 1)
Plaque	Plaque examination in buccal and lingual surface according to Turesky Index	Turesky Index (score 0, 1, 2, 3, 4)
Salivary State		
pH	the pH of unstimulated saliva	Saliva examination (score 0, 1, 2)

(Table 1) contd....

Component	Description	Criteria
Volume	Normal volume of the five-minute collection of unstimulated saliva	Saliva examination (score 0, 1, 2)
Buffer	Value of saliva buffering capacity test to measure the ability of saliva in minimising acids challenge.	Saliva examination (score 0, 1, 2)
Total score		30

Table 2. Characteristics of pregnant women respondents (n=80).

Respondents' profile	Number	%
1. Education level		
Primary [Elementary School (SD) – Junior High School (SMP)]	14	17.5
Secondary [Senior High School (SMA)]	40	50.0
Tertiary (Academy/College)	26	32.5
2. Workload outside the home		
Yes	65	81.3
No	15	18.7
3. More workload than the resting load		
Yes	70	87.5
No	10	12.5
4. High risk of pregnancy		
Yes	Yes	Yes
No	No	No
5. Age (years)		
<20 and >35	67	83.8
20 – 34	13	16.2
6. Number of children in the family		
One	61	76.3
Two	16	20.0
≥ Three	3	3.7
7. How many pregnancies?		
One	21	26.3
Two	32	40.0
Three	27	33.8
8. Miscarriage history		
Yes	67	83.8
No	13	16.3
9. History of abortion		
Yes	0	0
No	80	100
10. Access to the health services		
Difficult	4	5.0
Easy	76	95.0
11. Income level		
At and above the regional minimum wage (UMR)	48	60.0
Below the regional minimum wage (UMR)	32	40.0
12. Social security		
Have	49	61.3
Do not have	31	38.2
13. Homeownership		
Self/family/husband-owned	72	90.0
Annual rent	2	2.5
Monthly rent	6	7.5

On average, pregnant women were between 20-34 years (83.8%); most of them having one child (76.3%). In addition,

pregnant women with a low risk of pregnancy were found in as much as 60% of the respondents; most of them had accessible health services (95%); average income was mainly above the regional minimum wage (UMR) (60%); most of them had social security (61.3%) and also the homeowners (90%). All of these respondents' characteristics are presented in Table 2.

The results presented in Table 3 show the distribution of the frequency and percentage of each POSC-p component. The POSC-p component relates to the perceived need suggested generally, pregnant women feel uncomfortable with their oral conditions, aesthetic, and functioning problems.

Table 3. Description POSC-p component (n=80).

POSC-p component	Answer	Number (%)
I. Felt need		
1. Feel comfortable with oral conditions	0 = very uncomfortable	26 (32.5)
	1 = uncomfortable	49 (61.3)
	2 = very comfortable	5 (6.2)
2. Feel satisfied with the present dental appearance	0 = dissatisfied with dental appearance	20 (25.0)
	1 = few problems with dental appearance	41 (51.2)
	2 = satisfied with dental appearance	19 (23.8)
3. The mouth can be used to eat any food	0 = very troubled	37 (46.3)
	1 = troubled	37 (46.3)
	2 = not troubled	6 (7.4)
II. Normative need		
1. Crown caries	0 = 24 – 32 decayed teeth	17 (21.3)
	1 = 16 – 23 decayed teeth	29 (36.3)
	2 = 8 – 15 decayed teeth	21 (26.2)
	3 = 1 – 7 decayed teeth	13 (16.2)
	4 = sound teeth	0 (0.0)
2. Root caries	0 = 24 – 32 decayed teeth	0 (0.0)
	1 = 16 – 23 decayed teeth	0 (0.0)
	2 = 8 – 15 decayed teeth	2 (2.4)
	3 = 1 – 7 decayed teeth	39 (48.8)
	4 = sound teeth	39 (48.8)
3. Periodontal condition	0 = BPE score of 577 – 768	2 (2.5)
	1 = BPE score of 385 – 576	4 (5.0)
	2 = BPE score of 193 – 384	34 (42.5)
	3 = BPE score of 1 – 192	40 (50.0)
	4 = Healthy periodontal	0 (0.0)
4. Tooth erosion	0 = Dentinal erosion (1 – 32 teeth)	17 (21.2)
	1 = Enamel erosion (1 – 32 teeth)	63 (78.8)
	2 = No sign of erosion	0 (0.0)
5. Denture condition	0 = Low denture retention/stability, poor denture surface, tooth erosion/damage/Freeway space (interocclusal distance)	0 (0.0)
	1 = Good denture condition	0 (0.0)
6. Dental occlusion	0 = Not found more than ten articulated teeth	43 (53.8)
	1 = Found more than ten articulated teeth	37 (46.2)
7. Soft tissue	0 = Found inflammations and ulcers	4 (5.0)
	1 = Found only inflammations/ulcers	73 (91.3)
	2 = Not found any inflammations/ulcers	3 (3.7)
8. Dental plaque	0 = Total plaque score of 241 – 320	1 (1.2)
	1 = Total plaque score of 161 – 240	37 (46.3)
	2 = Total plaque score of 81 – 160	36 (45.0)
	3 = Total plaque score of 0 – 80	6 (7.5)
III. Saliva condition		

(Table 3) contd.....

POSC-p component	Answer	Number (%)
1. Salivary pH	0 = <6.7 or >7.3	73 (91.3)
	2 = 6.7 – 7.3	7 (8.7)
2. Salivary volume	0 = <1.5ml	22 (27.5)
	1 = >1.5ml	25 (31.2)
	2 = 1.5 – 2.5ml	33 (41.3)
3. Salivary buffer capacity	0 = Very low (buffer capacity of 0 – 5)	6 (7.5)
	1 = Low (buffer capacity of 6 – 9)	28 (35.0)
	2 = High (buffer capacity of 10 – 12)	46 (57.5)

Table 4. Motivation for seeking oral health treatment score in pregnant women (n=80).

Motivation aspects (Scale of 100)	Statistical value			Data normality test (P-value*)
	Mean (SD)	Median	Range	
1. Intrinsic motivation	84.64 (8.52)	82.86	62.86 – 100	0.022
2. Extrinsic motivation	84.32 (11.13)	85.71	42.86 – 100	0.001
3. Combined (intrinsic-extrinsic) motivation	84.48 (9.24)	84.26	52.86 - 100	0.200

Notes: * based on Kolmogorov-Smirnov test results

Table 5. Correlation of POSC-p score with the motivation for seeking oral health treatment score in pregnant women (n=80).

POSC-p score	Intrinsic motivation		Extrinsic motivation		Combined motivation	
	r	P-value	r	P-value	r	P-value
POSC-p score section 1: felt needs	0.042	0.712	-0.081	0.475	-0.026	0.819
POSC-p score section 2: normative needs	0.249	0.026*	0.166	0.141	0.218	0.026*
POSC-p score section 3: saliva condition	0.101	0.372	0.034	0.761	0.063	0.577
POSC-p scores (Combined all section)	0.295	0.008*	0.117	0.303	0.208	0.032*

Notes: r = Spearman's Correlation Rank
* = significant p-value

The clinical examination results (Table 3) also showed that none of the pregnant women had healthy tooth crowns, roots, and periodontal tissues; they had no missing teeth; none of them used dentures. At the same time, the salivary conditions of pregnant women had an average pH of acid and base, normal salivary volume, and high buffer capacity.

The motivation for seeking oral health treatment score in pregnant women related to the intrinsic motivation ranged between 62.86 –100, higher than the extrinsic motivation (42.86-100) —the median value of both motivation scores was 84.64 and 84.32, respectively. The combined motivation intrinsic and extrinsic was between 52.86–100, with an average of 84.48 and a median of 84.26 (Table 4).

Table 5 shows no significant correlation between the POSC-p score in section 1 (felt needs) and the intrinsic, extrinsic, and combined intrinsic-extrinsic motivation for seeking oral health treatment score. However, there was a significant correlation between the POSC-p in section 2 (normative needs) regarding the clinical examination and combined intrinsic-extrinsic motivation for seeking oral health treatment scores. On the contrary, there was no significant correlation between the POSC-p score in section 2 (normative needs) and the extrinsic motivation score. Table 5 also suggests no significant correlation between the POSC-p score section 3 (salivary state) and the motivation for seeking oral health treatment score in pregnant women, although a correlation was

found between the combined POSC-p scores and the motivation for seeking oral health treatment score in pregnant women.

4. DISCUSSION

It was reported that 61.3% of pregnant women feel uncomfortable with their oral condition. Discomfort is one form of oral health awareness. Awareness of oral health during pregnancy is fundamental in protecting the oral health of mothers and infants. Mothers' access to oral care, especially before and during pregnancy, and their oral care habits affect not only their oral and general health but also their child's [23].

The data stated that 51.2% of pregnant women were satisfied with their oral appearance. This result was slightly different from the study of Ferreira et al. [24], which stated that 30.9% of pregnant women rated their oral health as well. Good oral hygiene during pregnancy helps to reduce the chance of *Streptococcus mutans* transmission. Pregnant women had a high risk of transferring cariogenic bacteria to their infants. This condition increases the opportunities for preventive intervention [23].

It was indicated that 46.3% of pregnant women feel oral problems. This result was almost similar to Soegyanto et al. [16], where 32% of pregnant women in their study reported problems in their oral cavity. Awareness and behaviour related

to oral health care during pregnancy are essential for women to take care of themselves and their children. During pregnancy, oral health care is safe and should be recommended to improve women's oral and general health. Improving women's oral health can decrease the transmission of cariogenic bacteria to infants, thus reducing their future children's caries risk [16].

However, 7.8% of pregnant women felt no oral problem. This result was different from the research conducted by Suwargiani *et al.* [11], which stated that as many as 72.5% of pregnant women in their study felt no oral problems. Pregnant women should have oral examinations because oral health care for pregnant women is considered an important aspect. It is recommended to assess the patient's current oral health status and educate them regarding what changes to expect during pregnancy that can help to avoid their pain and distress. In addition, oral examination and treatment will not harm the foetus (during the second and third trimesters) compared to left untreated [9].

Pregnant women in the present study had root and crown caries, and none of them had healthy periodontal. Most of them experienced tooth erosion, mainly enamel erosion, followed by dentinal erosion. None of the respondents used dentures, even though they had missing teeth. In addition, there were found inflammations/ulcers in 91.3% of the respondents, and the most plaque score was 193-384, which was found in 37.5% of all respondents (Table 3). These results were found to be similar to the research of Naseem *et al.* [9], Ferreira *et al.* [24], Yenen *et al.* [25], and also the Committee Opinion from the American College of Obstetricians and Gynecologists [26]. These previous studies suggested that in addition to tooth decay, pregnant women also experience gingival problems during pregnancy.

The pregnancy period may lead to poor oral health, which results in gingival tissue ulceration, granulomas of pregnancy, gingivitis, pregnancy tumours (*epulis gravidarum*), tooth loss, dry mouth, and tooth erosion. In addition, changes in hormone levels during pregnancy directly affect gum problems and indirectly affect tooth decay problems; therefore, pregnant women can experience premature labour, low birth weight babies, and preeclampsia [9, 24 - 26].

The salivary examination showed that most (91.3%) salivary pH was below 6.7 and above 7.3. The low salivary pH found in pregnant women was similar to what was found in the research conducted by Karnik *et al.* [27], which stated that the saliva pH of pregnant women is low, at 6.56 ± 0.35 [27, 28]. This condition might happen because, during pregnancy, there are physiological changes due to hormones. Therefore, pregnancy changes the salivary flow rate, pH, and biochemical composition, whereas salivary composition is essential for preventing caries incidence [27]. Furthermore, an inverse relationship was found between salivary pH and caries prevalence, where the lower the pH level, the higher the caries level [27, 28]. These results provide input for pregnant women that they have a high caries risk.

The motivation for seeking oral health treatment score in pregnant women related to intrinsic motivation ranged between 62.86-100, which was higher than extrinsic motivation, which

was only ranged between 42.86-100, with the median values for both motivation scores were 84.64 and 84.32, respectively (Table 3). These two different values might occur because, as stated by Salikun *et al.* [29], there is no relationship between intrinsic and extrinsic motivation.

The intrinsic motivation, which was higher than extrinsic motivation, was similar to Nagarajan *et al.* [30]. According to the health belief model theory, health as part of intrinsic motivation will only encourage someone to take health-related actions if the recommended actions can help avoid adverse health conditions. In the present study, although the subjects relied on both intrinsic and extrinsic motivation factors for their treatment-seeking behaviour, the intrinsic motivation scored higher [30]. In this case, intrinsic motivation was defined as the patient's belief that they are responsible for their health. This condition is also similar to the study conducted by Pac *et al.* [31], which shows that the more motivated the patients, the better their oral health will be.

The intrinsic motivation score in the present study ranged between 62.86-100, following the research of Halvari *et al.* [32], which also found a similar intrinsic motivation score in the range of 89-90. Furthermore, positive verbal feedback regarding performance has increased intrinsic motivation and reduced negative feedback [33]. Thus, it should be used more often to increase intrinsic motivation in the oral health context. Motivation comprises reasons to initiate, continue, and particular direct behaviour [33].

Extrinsic motivation score was in the range of 42 from 86-100, with an average value of 84.64 and SD of 8.52. This result differed slightly from Nagarajan *et al.* [30], where the extrinsic motivation score obtained is higher, around 186.88. Extrinsic variables that play an essential role in behavioural treatment seeking are pressure, professional advice, social acceptance, and peer opinions [30]. In addition, extrinsic motivation involves doing an activity to achieve some outcome, such as reward, peer approval, or punishment avoidance [34].

Extrinsically motivated behaviour will be more autonomous by internalizing the values and rules associated with the behaviour [34]. Internalisation is the process of adapting a value or regulation as a personal [34]. When functioning optimally, the internalisation process of an individual will change extrinsic motivation from external to internal regulated motivation by integrating its regulation and value into their sense of self [34].

In the present study, the combined intrinsic-extrinsic motivation scored between 52.86-100, with an average of 84.48 and a median of 84.26 (Table 3). Legault [35] proposed that intrinsic motivation increases when the social context supports autonomy by enhancing the perceived internal locus of causalities, such as behaviour resulting from personal choices and internal causes rather than external pressure. Conversely, intrinsic motivation will be damaged when the social environment ignores or hinders autonomy by increasing the externally perceived locus of causality (*e.g.*, offering extrinsic rewards or making demands) [35].

Table 4, which presents the correlation of the POSC-p

score with the motivation for seeking oral health treatment score in pregnant women, shows that the only significant score was found in the package of the clinical examination score, namely the POSC-p score (Score 2) with intrinsic motivation and combined motivation (intrinsic and extrinsic motivation). These results aligned with the study conducted by Halvari *et al.* [36], which showed that autonomic motivation for oral health care is significantly and positively related to the assessment of oral care follow-up. Therefore, professional advice plays an essential role in treatment-seeking behaviour [30].

The motivation score for seeking oral health treatment in pregnant women showed a significant score package for clinical examination scores, between the POSC-p score (Score 2) and combined motivation (intrinsic + extrinsic). This condition was in line with what has been suggested by Brenning *et al.* [37], that psychological need satisfaction is an explanatory mechanism underlying this association. In addition, this study indicated that the intensity and quality of motivation are related directly or indirectly to the satisfaction of psychological needs with women's personal well-being during pregnancy [37].

The clinical examination results obtained from pregnant women are expected to meet their psychological needs and welfare. The research conducted by Gao *et al.* [38], which assessed the effect of motivational interviewing (MI) on improving oral health, found four studies that reported a positive effect of MI on oral health outcomes.

CONCLUSION

There is a correlation between the POSC-p with motivation for seeking oral health treatment in pregnant women.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study has been approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia, with the approval number 1108/UN6.KEP/EC/2020.

HUMAN AND ANIMAL RIGHTS

The subject of this research is humans. No animals were used in this research. Every procedure and ethical aspects involving human subjects were entirely under the World Medical Association Declaration of Helsinki.

CONSENT FOR PUBLICATION

Informed consent was taken from the participants to be involved in this study.

STANDARDS OF REPORTING

STROBE guidelines and methodology were followed.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the article's findings are available from the corresponding author on reasonable request to [A.A.S].

FUNDING

This current research was partly funded through the Academic Leadership Grant (ALG) research program of Universitas Padjadjaran with grant number 1427/UN6.3.1/LT/2020.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Acknowledgement addressed to Universitas Padjadjaran, Bandung, Indonesia.

REFERENCES

- [1] Kirca N. The importance of oral - Dental health in pregnancy. *Adv Dent Oral Heal* 2018; 7(2): 21-3.
- [2] Lee NM, Saha S. Nausea and vomiting of pregnancy. *Gastroenterol Clin N Am* 2011; 40: 309-4. [<http://dx.doi.org/10.1016/j.gtc.2011.03.009>]
- [3] Sari EY, Saddki N, Yusoff A. Association between perceived oral symptoms and presence of clinically diagnosed oral diseases in a sample of pregnant women in Malaysia. *Int Envir Res Public Health* 2020; 17: 7337.
- [4] Rahmayanti AW, Suryanti N, Suwargiani AA. Caries experience, periodontal condition, and quality of life of pregnant women. *J Ked Gi Univ Padjadjaran* 2020; 32(3): 212-9. [<http://dx.doi.org/10.24198/jkg.v32i3.29404>]
- [5] Hidayat W, Pribadi IMS, Zakiawati D, Suwargiani AA. Profile of oral manifestations, oral hygiene, and nutritional status in pregnant women. *Padjadjaran J Dent* 2019; 31(3): 215. [<http://dx.doi.org/10.24198/pjd.vol31no3.23792>]
- [6] Suwargiani AA, Mustika I, Pribadi S, Hidayat W, Wardani R, Jasrin TA, *et al.* Caries experience, periodontal health, and oral treatment needs of pregnant women. *J Ked Gi Univ Padjadjaran* 2018; 30(1): 20-5. [<http://dx.doi.org/10.24198/jkg.v30i1.16282>]
- [7] Raynuary N, Agustina A, Suryanti N. PUFA index of pregnant women who came to the Puter Community Health Centre, Bandung, Indonesia. *J Ked Gi Univ Padjadjaran* 2017; 29(2): 99-105.
- [8] Patil SR. Oral changes in pregnant and nonpregnant women: A case-control study. *J Orofac Sci* 2013; 5(2): 118-22. [<http://dx.doi.org/10.4103/0975-8844.124257>]
- [9] Naseem M, Khurshid Z, Khan HA, Niazi F, Zohaib S, Zafar MS. Oral health challenges in pregnant women: Recommendations for dental care professionals. *Saudi J Dent Res [Internet]* 2016; 7(2): 138-46. [<http://dx.doi.org/10.1016/j.sjdr.2015.11.002>]
- [10] Gambhir RS, Nirola A, Gupta T, Sekhon TS, Anand S. Oral health knowledge and awareness among pregnant women in India: A systematic review. *J Indian Soc Periodontol* 2015; 19(6): 612-7. [<http://dx.doi.org/10.4103/0972-124X.162196>] [PMID: 26941509]
- [11] Suwargiani AA, Arief EM, Aripin D, Widyaputra S, Susilawati S. Oral health care practice of women with pregnancy experience. *Padjadjaran J Dent* 2020; 32(3): 197. [<http://dx.doi.org/10.24198/pjd.vol32no3.30312>]
- [12] Marchi KS, Rinki C, Shah M, *et al.* Medical provider promotion of oral health and women's receipt of dental care during pregnancy. *Matern Child Health J* 2019; 23(7): 890-902. [<http://dx.doi.org/10.1007/s10995-018-02714-z>] [PMID: 30649662]
- [13] Burke FJT, Chapple L, Busby M. Measuring oral health: From simple scoring to a combined risk-assessment approach. *Dent Update* 2020; 47(10): 855-65. [<http://dx.doi.org/10.12968/denu.2020.47.10.855>]
- [14] Tom K, Peng NS, Lakshmanan S, Gundavarapu KC, Devaprakash DD, Ramli R. Use of Oral Health Index (OHX) in a community screening campaign. *Int Poster J Dent Oral Med* 2013; 3: 718.
- [15] Gustabella MI, Wardani R, Suwargiani AA. Knowledge and practice of oral health maintenance in mothers with under 3-years-old children. *J Ked Gi Univ Padjadjaran* 2017; 29(1): 30-4.
- [16] Soegyanto AI, Larasati RN, Wimardhani YS, Özen B. Mother's knowledge and behaviour towards oral health during pregnancy.

- Pesqui Bras Odontopediatria Clin Integr 2020; 20(e5647): 1-8.
[http://dx.doi.org/10.1590/pboci.2020.113]
- [17] Tasyakuranti MN, Linati PA, Azkiyah F, *et al.* Promoting dental check-up for pregnant women. *Indones J Dent Med* 2020; 2(1): 13.
[http://dx.doi.org/10.20473/ijdm.v2i1.2019.13-15]
- [18] Shaila M, Pai GP, Shetty P. Salivary protein concentration, flow rate, buffer capacity and pH estimation: A comparative study among young and elderly subjects, both normal and with gingivitis and periodontitis. *J Indian Soc Periodontol* 2013; 17(1): 42-6.
[http://dx.doi.org/10.4103/0972-124X.107473] [PMID: 23633771]
- [19] Jiang S, McGrath C, Lo EC, Ho SM, Gao X. Motivational interviewing to prevent early childhood caries: A randomized controlled trial. *J Dent* 2020; 97: 103349.
[http://dx.doi.org/10.1016/j.jdent.2020.103349] [PMID: 32330548]
- [20] Cartes-Velasquez R, Araya C, Flores R, Luengo L, Castillo F, Bustos A. A motivational interview intervention delivered at home to improve the oral health literacy and reduce the morbidity of Chilean disadvantaged families: a study protocol for a community trial. *BMJ Open* 2017; 7(7): e011819.
[http://dx.doi.org/10.1136/bmjopen-2016-011819] [PMID: 28710202]
- [21] Reis LO, Gon LM, Celegatto IB, Bocos RG, Gorin MA. Basics of biomarker development and interpretation.
- [22] Negida A. Sample size calculation guide - Part 7: How to calculate the sample size based on a correlation 2020.
- [23] Paglia L, Colombo S. Perinatal oral health: Focus on the mother. *Eur J Paediatr Dent* 2019; 20(3): 209-13.
[PMID: 31489820]
- [24] Ferreira A, Oliveira C, Silva L, Santiago M, Veiga N. The importance of oral health during pregnancy and among the newborn. *Matern Pediatr Nutr J* 2018; 4(1): 2017-8.
- [25] Yenen Z, Ataç T. Oral care in pregnancy. *J Turk Ger Gynecol Assoc* 2019; 20(4): 264-8.
[http://dx.doi.org/10.4274/jtgga.galenos.2018.2018.0139] [PMID: 30556662]
- [26] Oral health care during pregnancy and through the life span. Committee Opinion No. 569. *Obstet Gynecol* 2013; 122(2): 417-22.
[http://dx.doi.org/10.1097/01.AOG.0000433007.16843.10]
- [27] Karnik AA, Pagare SS, Krishnamurthy V, Vahanwala SP, Waghmare M. Determination of salivary flow rate, pH, and dental caries during pregnancy: A study. *J Indian Acad Oral Med Radiol* 2015; 27(3): 372-6.
[http://dx.doi.org/10.4103/0972-1363.170454]
- [28] Lasisi TJ, Abdus-Salam RA. Pattern of oral health among a population of pregnant women in Southwestern Nigeria. *Arch Basic Appl Med* 2018; 6: 99-103.
[PMID: 30035209]
- [29] Salikun, R AP, Miko H, Saleh M. Salikun, Anisa Puspita R, Hadiyat Miko MS. The relationship between intrinsic and extrinsic motivation in tooth brushing against Index Debris scores on students at SDN Sendangmulyo 02, Semarang City. *Int J Eng Adv Technol* 2019; 9(2): 2228-30.
[http://dx.doi.org/10.35940/ijeat.B3047.129219]
- [30] Nagarajan S, Reddy C, Chandra RV. Motivation in periodontal therapy: Assessment using novel dental treatment motivation scale. *DTMS* 2014.
- [31] Pac A, Oruba Z, Olszewska-Czyż I, Chomyszyn-Gajewska M. The significance of motivation in periodontal treatment: validity and reliability of the motivation assessment scale among patients undergoing periodontal treatment. *Community Dent Health* 2014; 31(1): 53-6.
[PMID: 24741895]
- [32] Halvari AEM, Halvari H, Bjørnebekk G, Deci EL. Motivation for dental home care: Testing a self-determination theory model. *J Appl Soc Psychol* 2012; 42(1): 1-39.
[http://dx.doi.org/10.1111/j.1559-1816.2011.00867.x]
- [33] Kumar PS, Doshi D, Kulkarni S, Reddy P, Reddy S, Srilatha A. Effect of motivation on oral hygiene and caries status among young adults in Hyderabad City. *Indian J Dent Res* 2019; 30(1): 15-20.
[PMID: 30900650]
- [34] Deci EL, Ryan RM. Self-determination theory. *Handbook of Theories of Social Psychology*. SAGE Publications Inc. 2012; Vol. 1: pp. 416-37.
[http://dx.doi.org/10.4135/9781446249215.n21]
- [35] Legault L. *Encyclopedia of Personality and Individual Differences*. 2020.
- [36] Halvari AEM, Halvari H, Bjørnebekk G, Deci EL. Oral health and dental well-being: Testing a self-determination theory model. *J Appl Soc Psychol* 2013; 43(2): 275-92.
[http://dx.doi.org/10.1111/j.1559-1816.2012.00996.x]
- [37] Brenning K, Soenens B, Vansteenkiste M. What's your motivation to be pregnant? Relations between motives for parenthood and women's prenatal functioning. *J Fam Psychol* 2015; 29(5): 755-65.
[http://dx.doi.org/10.1037/fam0000110] [PMID: 26147933]
- [38] Gao X, Lo ECM, Kot SCC, Chan KCW. Motivational interviewing in improving oral health: a systematic review of randomized controlled trials. *J Periodontol* 2014; 85(3): 426-37.
[http://dx.doi.org/10.1902/jop.2013.130205] [PMID: 23805818]

