

The significance of motivation in periodontal treatment: Validity and reliability of the motivation assessment scale among patients undergoing periodontal treatment

A. Pac¹, Z. Oruba², I. Olszewska-Czyż² and M. Chomyszyn-Gajewska²

¹Department of Epidemiology and Preventive Medicine, Jagiellonian University Medical College, Cracow, Poland; ²Department of Periodontology and Oral Medicine, Institute of Dentistry, Jagiellonian University Medical College, Cracow, Poland

Objective: The individual evaluation of patients' motivation should be introduced to the protocol of periodontal treatment, as it could impact positively on effective treatment planning and treatment outcomes. However, a standardised tool measuring the extent of periodontal patients' motivation has not yet been proposed in the literature. Thus, the objective of the present study was to determine the validity and reliability of the Żychliński motivation scale adjusted to the needs of periodontology. **Basic research design:** Cross sectional study. **Clinical setting:** Department of Periodontology and Oral Medicine, Dental University Clinic, Jagiellonian University, Krakow, Poland. **Participants:** 199 adult periodontal patients, aged 20–78. **Interventions:** 14-item questionnaire. The items were adopted from the original Żychliński motivation assessment scale. **Main outcome measures:** Validity and reliability of the proposed motivation assessment instrument. **Results:** The assessed Cronbach's alpha of 0.79 indicates the scale is a reliable tool. Principal component analysis revealed a model with three factors, which explained half of the total variance. Those factors represented: the patient's attitude towards treatment and oral hygiene practice; previous experiences during treatment; and the influence of external conditions on the patient's attitude towards treatment. **Conclusion:** The proposed scale proved to be a reliable and accurate tool for the evaluation of periodontal patients' motivation.

Key words: motivation, reliability, validity, periodontal disease

Introduction

Motivation constitutes an important personal characteristic defined as being responsible for the initiation, duration, direction and the strength of the action aimed at achieving a specific goal (Colman, 2009). Motivational processes focus an individual's behaviour on action towards significant personal goals (e.g. a change in the external life conditions, behavioural change, improved health). Two factors are essential for the motivational process to occur: firstly, one's goal must be perceived as valuable; secondly, that goal must be achievable in one's current situation (Żychliński and Żychlińska, 2008). Motivation plays an important role in the treatment process of chronic diseases, the outcome of which relies more on the long-term changes requiring the active participation of the patient (e.g. implementation and maintenance of healthy behaviours, avoidance of harmful habits) rather than on procedures carried out by health professionals (Linden *et al.*, 2010). Clinicians harnessing the motivation of patients can emphasise the positive consequences of achieving a goal, or highlight the negative effects of not adhering to medical advice (Munster-Halvari *et al.*, 2010; Reykowski, 1987).

Within periodontal therapy, patient's motivation determines the degree of cooperation with the dental team, the participation in the treatment process and the extent of compliance with recommendations and with returns for maintenance visits (Jönsson *et al.*, 2006). The key factor in achieving periodontal therapeutic success is not the

treatment in the active phase of treatment but the patients' later adherence to the oral hygiene regimen and maintained cooperation with the dental team (Philippot *et al.*, 2005; Renz *et al.*, 2007). This may be difficult to achieve as periodontitis is a chronic disease often perceived by patients as nonthreatening (Wilson, 1996). Hence, evaluating the patient's motivation should be an element of the periodontal treatment process and of oral healthcare in general. Performing such an evaluation in a standard manner in the course of the treatment would allow tailoring of both the treatment process and the degree of motivation needed to encourage compliance with maintenance regimen. Several studies confirm that interventions designed to elicit individual patient's motivation for their oral hygiene and to develop the sense of self-efficacy are more effective than conventional educational programs (Godard *et al.*, 2011; Philippot *et al.*, 2005). Adding the assessment of patient motivation to the standard treatment protocol may be a step towards achieving better treatment outcomes besides reducing costs through proper compliance and through avoiding repeated advice or treatment. Hence, there is a need for a standard tool to evaluate the extent of periodontal patients' motivation towards treatment. No such scale is yet available in the literature though one might be developed based on the questionnaire constructed according to the Leventhal's Self-Regulation model which consists of five elements of illness representation: illness identity, causes, consequences, time course and controllability (Godard *et al.*, 2011; Philippot *et al.*, 2005).

Application of any new measuring tool requires examining its validity and reliability. The greater the reliability, the more precisely a feature is measured by the test and the smaller estimation error. Validity denotes the scientific utility of a measure in terms of how well it measures what it purports to measure. There are three major aspects of validity: construct validity, measuring psychosocial attributes; predictive validity, establishing the statistical relationship with a particular external criterion, and internal content validity, relevance of included items from a pool of potential content (Brzeziński, 2011; Nunally and Bernstein, 1994). Each new measure should be validated in conditions similar to those in which it is intended to be applied, because its credibility is dependent on the context in which it will be used.

The aim of the study was to determine the validity and reliability of the modified Żychliński motivation scale (Żychliński and Żychlińska, 2008) adjusted to suit periodontal patients.

Methods

The cross-sectional study was conducted at the Department of Periodontology and Oral Medicine of the Jagiellonian University in Cracow according to the STROBE (2007) guidelines, between September 2009 and March 2010 and between August and September 2013. The surveyed population were adult periodontal patients with every fifth patient appearing for follow-up and diagnosed with chronic periodontitis, being invited to take a part in the study. Written, informed consent was obtained from each patient. The study was a part of a

larger questionnaire-based study approved by the Ethical Committee of the Jagiellonian University, Medical College and conducted in accordance with the Declaration of Helsinki.

Żychliński's original motivation assessment scale was designed to evaluate the extent of motivation to take up the rehabilitation following shin-bone fractures and its items were reworded, in Polish, to apply to periodontal patients. The resulting scale has 14 items concerning various aspects of the patients' motivation towards periodontal therapy. Responses to these items were on 5-point scales with two of the items being reverse coded (numbers 3 and 13, Table 1).

Reliability analysis was conducted to assess the scales internal consistency by calculating Cronbach's alpha (Cronbach, 1951) with a value of at least 0.70 required for acceptability (Nunally and Bernstein, 1994). While Cronbach's alpha rates the relationship between the items themselves, Pearson's correlations were computed to assess items correlations with the scale as a whole and therefore the homogeneity of the scale. In addition, for each item, Cronbach's alpha after removal of that item was inspected to find out if the exclusion changed the reliability of the scale.

Factor analysis was used to investigate the variation and covariation among the items. Principal component analysis was aimed at making an initial decision about the number of factors underlying a set of measures. Varimax rotation was used to achieve a simple structure with each item loading on as few dimensions as possible. Factors were extracted according to inspection of a scree plot and having a Kaiser criterion eigenvalue greater than

Table 1. The Żychliński motivation scale adjusted for assessing the motivation among the periodontal patients

<i>Item</i>	<i>Response scale limits, scored 1-5</i>
1. How often do you undergo professional oral hygiene care (scaling)?	never - at least twice a year
2. Did you undergo periodontal treatment willingly?	definitely not - definitely yes
3. Do you find periodontal treatment particularly difficult?	definitely yes - definitely not
4. How many times a week do you perform oral hygiene self-care sessions according to the recommendations given by a dentist?	rarely - daily
5. How much time do you spend on performing one oral hygiene self-care session?	none - long time
6. Do you clean your teeth carefully after professional cleaning (scaling) performed by a dentist or dental hygienist?	definitely not - definitely yes
7. Did you adhere to the recommendations that were supposed to alleviate the symptoms of the periodontal disease?	definitely not - definitely yes
8. Do you think you need periodontal treatment?	definitely not - definitely yes
9. How does periodontal treatment you received so far influence the symptoms of the periodontal disease?	no effects - definitely good effects
10. Do you find professional cleaning and oral hygiene self-care pleasant?	definitely not - definitely yes
11. Does your general health condition allow you to undergo periodontal treatment?	definitely not - definitely yes
12. How do you find the cooperation with the periodontal team?	definitely bad - definitely good
13. Were there any unpleasant incidents in your personal life or in your family during periodontal treatment so far?	definitely yes - definitely not
14. How far from your home is the periodontal practice that you attend?	very long distance - very short distance

Note that items 3 and 13 were reverse coded

one. Eigenvalues indicate the amount of variance of all factors explained by that factor with greater eigenvalues accounting for more of the variance (Brzeziński, 2011; Nunally and Bernstein, 1994). All statistical analyses were performed using SPSS v20.

Results

The study population were 199 patients (mean age 51.4 years, sd 13.7, range 20-78) including 73 males (37%). The motivation scale's Cronbach's alpha of 0.79 indicated the scale was a reliable tool. Correlation of each item with all the remaining items was greater than 0.4 for the nine of the 14 items (numbers 2 to 9 and 11). For item 14, *How far from your home is the periodontal practice that you attend?*, the correlation with the scale was not significant but as removal of this item from the scale resulted in only a small increase of Cronbach's alpha, the item was left in the scale because of the additional information it provides.

Explanatory factor analysis was performed to investigate the factor structure of the scale. Data were first inspected for the possibility to use factor analysis. The analysis of the determinant of the correlation matrix (0.027) and Bartlett's test of sphericity ($\chi^2=398$; df = 91; $p<0.001$) revealed significant correlations between the evaluated positions which form the scale, enabling further analysis. Measure of Sampling Adequacy KMO (Kaiser-Meyer-Olkin) reached a value of 0.81 indicating that the items could be used as a scale and factor analysis applied.

Analysis of the scree plot revealed a model with three factors (Tables 2 and 3) which together explained 50% of the variance. The first factor, accounting for 24% of the variance represented the patient's attitude towards treatment and hygienic practices. High factorial loads have been observed for the following items 7, 4, 6, 5, 12, 2, 8 and 9 besides also item 10 (for item descriptions see Table 1 or 2). The second factor, accounting for 15% of the variance, referred to the patient's previous experiences

Table 2. Characteristics of the scale items from the motivation scale (n=100)

Item	Mean	sd	Item-total correlation (p-value)	Cronbach's Alpha after item removal
1. Frequency of scaling	3.4	1.01	0.334 (<0.001)	0.788
2. Willingness to undergo treatment	4.5	0.73	0.504 (<0.001)	0.773
3. Difficulty of periodontal treatment	4.0	0.88	0.493 (<0.001)	0.772
4. Frequency of oral self-care	4.5	0.75	0.495 (<0.001)	0.773
5. Amount of time spent on oral self-care	3.8	0.96	0.506 (<0.001)	0.771
6. Teeth cleaning after scaling	4.3	0.71	0.591 (<0.001)	0.767
7. Adherence to the recommendations	4.4	0.67	0.565 (<0.001)	0.770
8. Feeling need for periodontal treatment	4.7	0.60	0.445 (<0.001)	0.779
9. Influence of previous treatment	4.2	0.92	0.459 (<0.001)	0.775
10. Initial therapy was pleasant	3.4	1.08	0.374 (<0.001)	0.785
11. General health	4.5	0.60	0.461 (<0.001)	0.778
12. Cooperation with the periodontal team	4.7	0.62	0.399 (<0.001)	0.782
13. Unpleasant incidents during treatment	4.0	1.03	0.289 (<0.001)	0.793
14. Distance from the periodontal practice	3.1	0.92	0.104 (0.144)	0.807

Table 3. Item loadings on the factors of motivation: principal component analysis with Varimax rotation

Item	Factor 1 Oral hygiene practices	Factor 2 Previous experiences	Factor 3 External conditions
7. Adherence to the dental team's recommendations	0.689	0.225	0.067
4. Frequency of oral self-care	0.682	0.044	0.157
6. Teeth cleaning after scaling	0.638	0.250	0.223
5. Amount of time spent on oral self-care	0.633	-0.008	0.436
12. Cooperation with the periodontal team	0.622	0.067	-0.128
2. Willingness to undergo treatment	0.587	0.465	-0.293
8. Feeling need for periodontal treatment	0.573	0.231	-0.096
9. Influence of previous treatment	0.490	0.206	0.220
13. Unpleasant incidents during treatment (reverse coded)	-0.018	0.686	0.087
10. Initial therapy was pleasant	0.108	0.649	0.181
3. Difficulty of periodontal treatment (reverse coded)	0.339	0.642	-0.034
11. General health	0.352	0.565	-0.048
14. Distance travelled to the periodontal practice	-0.123	0.137	0.724
1. Frequency of scaling	0.303	0.002	0.708
Eigenvalue	4.33	1.45	1.19
Variance explained, R ² (%)	24.3	14.8	10.7

with the highest factorial loads observed for items 13, 10, 3, 11 and 2. The third factor, accounting for 11% of the variance, determined the influence of external conditions on the patient's attitude towards treatment with the following items having high loading on this factor 14, 1 and 5.

Discussion

The study showed that the reliability of the motivation assessment scale is sufficient and therefore it may be useful for patients undergoing periodontal treatment.

Factor analysis identified three components influencing motivation: 1, the patient's attitude towards treatment and oral hygiene practices; 2, previous experiences related to the progress of the treatment process and overall health; and, 3, the influence of external conditions on the patient's attitude towards treatment. This scale structure seems to cover the main aspects of the motivational process.

As far as the authors are aware, the proposed scale is the only one evaluating the extent of periodontal patients' motivation. It can be used at any point in the course of periodontal treatment. However, two occasions seem to be optimal from the clinical point of view. Firstly, application between initial periodontal therapy and surgical therapy would enable individual tailoring of the treatment plan where compliance and excellent oral hygiene are essential for long-term treatment success, with the intention of reducing the need for expensive regenerative procedures and implant technology (Rinke *et al.*, 2011). Secondly, motivation should be evaluated at the beginning of the maintenance phase, which may well be life-long. Here, individual scheduling of follow up visits and motivational programs matched to the patient's needs might be based on an evaluation of personal motivation with the intention of maintaining the periodontium in a good condition and retaining natural dentition into later in life. Patients with good compliance are less likely to lose their teeth during periodontal maintenance when compared with erratic compliers (Checci *et al.*, 2002; Wilson *et al.*, 1987).

Some limitations of the study should be noted. First, the study was performed among patients undergoing periodontal treatment in a highly-specialised university clinical unit and it is possible that the patients treated there are generally more motivated than most and that the disease was treated at the later stage. Therefore the usefulness of this motivation scale in other populations should be re-assessed in other settings. Further, this study did not determine criterion validity of the scale because there is currently no other method or instrument available to assess motivation in this context.

Psychometric testing demonstrated that the motivation assessment scale modified for use with periodontal patients is acceptably reliable and accurate. Application of this scale may improve integration of the treatment protocol with motivational support program adequate to the needs of the individual patient. Implementation of effective oral self-care and daily compliance with the hygiene regimen is crucial in maintaining oral health for a wide range of dental patients. The evaluation of motivation might usefully be routinely performed in patients across a wide range of treatments to quantify the extent of motivation for comparisons both between the patients and for individual patients over time.

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