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Exploring motivations to seek and undergo prosthodontic care: a cross-sectional study in a Brazilian adult sample

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Antonio Hélio Vieira
Donizete Castro e Silva
Túlio Eduardo Nogueira
Cláudio Rodrigues Leles

Department of Prevention and Oral Rehabilitation, School of Dentistry, Federal University of Goiás, Goiânia, Goiás, Brazil

Abstract: This study explored the influence of individual and social factors regarding intentions and behaviors related to prosthodontic treatment, using the theory of planned behavior (TPB). A cross-sectional study was designed with a sample of 225 individuals with some degree of tooth loss. A questionnaire was used containing factors that would have potential influence on the intentions and behaviors of individuals, as well as clinical and sociodemographic data. Descriptive statistics, internal consistency analysis, chi-square test for trend, and logistic regression were used for data analysis. The TPB components – attitude toward the behavior (ATB), subjective norm (SN), and perceived behavioral control (PBC) – showed good internal consistency (alpha = 0.60–0.78). Intention and behavior were associated with TPB components and the overall scale. Similarly, positive intentions and behaviors were associated with age, upper tooth loss, anterior tooth loss, and higher social status. Multiple logistic regression showed that intention was associated with PBC (OR =1.57; $P<0.016$), while behavior was associated with tooth loss in both arches (OR =9.3; $P<0.001$), anterior tooth loss (OR =5.13; $P<0.001$), higher social status (OR =3.06; $P<0.03$), and PBC (OR =1.38; $P=0.03$). The presence of anterior tooth loss was the most relevant factor for prosthodontic treatment demand and utilization, while socioeconomic status and an individual's perceived ease or difficulty in undergoing treatment played a significant, but secondary, role in behavior toward prosthodontic care.

Keywords: edentulous patient, attitude to health, health services and demand, behavior

Introduction

Although preventive dentistry helps control the risk factors for tooth loss, and there has been a downward trend in edentulism in recent decades, the demand for prosthodontic treatment is expected to rise even in developed countries as a result of the rapid increase in elderly populations and the increasing numbers of adults retaining their natural teeth.[1] This background requires effective strategies from public and private oral health care systems to appropriately treat those with prosthodontics and diminish the existing inequalities in treatment access.

There is sound evidence about the effectiveness of several strategies for treatment of tooth loss using conventional and implant treatments for a wide range of prosthodontic needs and across a broad variety of clinical situations that go from uncomplicated single tooth loss to complex and extensive treatment for complete edentulism. However, there are also significant barriers regarding access to oral health care, which impair overall demand for treatment. These barriers also make the overall demand dependent on available treatment options and resources from both the care provider and society, as well as several social and psychological processes that transform need into demand

Correspondence: Cláudio Rodrigues Leles
Faculdade de Odontologia, Universidade Federal de Goiás, Praça Universitária, s/n, Setor Universitário, Goiânia, Goiás, CEP 74.605-220, Brazil
Tel +55 62 3209 6052
Fax +55 62 3209 6051
Email claudio_leles@ufg.br

and demand into effective utilization. These usually focus on oral reconstruction from a functional and esthetic point of view, rather than dealing with a life-threatening disease or oral condition that requires compulsory intervention.[2,3]

To identify and assess reliable factors that influence individual patterns of health services use, social cognition models and health behavior theories have been applied to oral health care, using concepts from behavioral science research. These models, such as the theory of planned behavior (TPB),[4] attempt to identify and explain how expectations, judgments, beliefs, and intentions lead to various behaviors concerning oral health care.[5,6] A key starting point for the development of social cognition models of health behavior is the observation that although social structural factors such as age, sex, and socioeconomic status are reliably associated with health actions, it is usually difficult and sometimes impossible to modify these factors. Thus, cognition rather than social structure variables may be considered when modeling the determinants of health behaviors.[7]

According to Ajzen,[4] TPB considers three independent determinants of intention, which in turn influence the consequent behavior (Figure 1): (1) attitude toward the behavior (ATB) (ie, the favorable or unfavorable evaluation of the behavior), (2) subjective norm (SN) (ie, the perceived social pressures to perform or not to perform the behavior), and (3) perceived behavior control (PBC) (ie, the perception of the extent to which the behavior is within the individual's control, measured in terms of self-efficacy and controllability in relation to the behavior). In prosthodontics, these factors match a corresponding set of behavior-related beliefs (behavioral, normative, and control beliefs) that reflect the underlying cognitive structure of the TPB, as described elsewhere.[8]

We assumed that consumers of prosthodontic care are rational, make systematic use of information available to them, and consider the implications of their actions before making a decision about their treatment. We also hypothesized that patients' behaviors can be somewhat predicted by the TPB model, but there is scarce systematic and sound information about patients' intentions, attitudes, and behaviors concerning prosthodontic care on which to base predictions of decision-making in oral health. Hence, this study aimed to explore the influence of attitudes, social norms, and control beliefs, as well as clinical and socioeconomic variables, on patients' intentions and behaviors for predicting willingness to undergo prosthodontic care.

Material and methods

This was a cross-sectional study that included a convenience sample of subjects over 18 years of age, with some degree of tooth loss, irrespective of sex, general dental conditions, and treatment needs. No subjects were under current dental treatment. All subjects were residents of two capital cities in the central region of Brazil (Goiania, Goiás and Palmas, Tocantins). Data collection occurred between January 2012 and March 2013. The study protocol was approved by the local ethical research committee.

A questionnaire was created based on 15 predictive factors of the TPB (ATB – n=6, SN – n=5, and PBC – n=4) proposed in a previous study.[8] Subsequently, a set of 42 raw items was created based on the subject's likelihood of a prosthodontic treatment-seeking behavior, with affirmatives concerning attitudes and beliefs about tooth loss and prosthodontic treatment. Responses were measured using a 7-point Likert scale (1= strongly disagree, 2= moderately

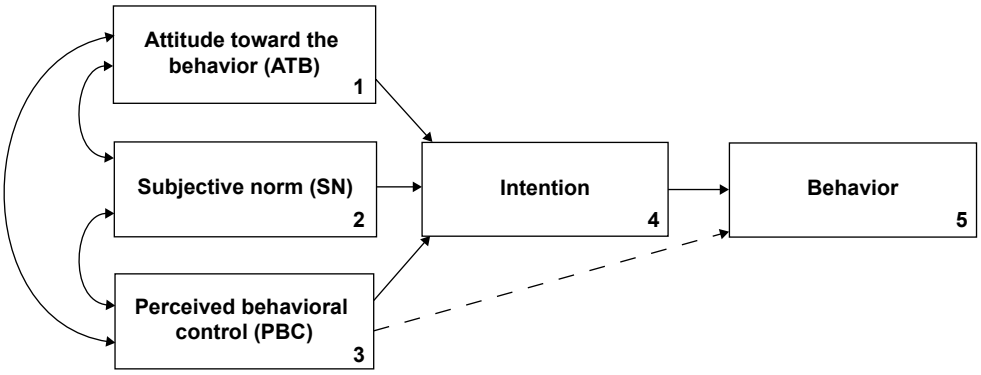

Figure 1 Conceptual framework of the theory of planned behavior.
Notes: Adapted from *Organ Behav Hum Decis Process*, Volume 50(2), Ajzen I, The Theory of Planned Behavior, Pages 179–211, Copyright 1991, with permission from Elsevier. The components of the theory of planned behavior concept are defined as follows: (**1**) ATB: an individual's positive or negative evaluation of self-performance of the particular behavior; (**2**) SN: an individual's perception of social normative pressures or relevant others' beliefs that he or she should or should not perform such behavior; (**3**) PBC: an individual's perceived ease or difficulty in performing the particular behavior, determined by the total set of accessible control beliefs; (**4**) intention: an indication of an individual's readiness to perform a given behavior based on ATB, SN, and PBC, with each predictor weighted for its importance in relation to the behavior and population of interest; and (**5**) behavior: an individual's observable response in a given situation with respect to a given target.
Abbreviations: ATB, attitude toward the behavior; SN, subjective norm; PBC, perceived behavioral control.

disagree, 3= slightly disagree, 4= neutral, 5= slightly agree, 6= moderately agree, and 7= strongly agree). Some items on the scale were reversed to achieve the same meaning from the overall direction of the scale (reversal items), and a mean score was calculated for each TPB component.

Further reliability analysis was performed to assess the properties of the component subscales (ATB, SN, and PBC) and overall scale scores using Cronbach's alpha as a model of internal consistency based on the average inter-item correlation. Values of internal consistency were ATB =0.60, SN =0.71, PBC =0.61, and an overall scale =0.78. The affirmatives that comprise the final instrument used for analysis are listed in Table 1.

The outcome components of TPB (intention and behavior) were also assessed in the questionnaire and regarded as separate dependent variables. The intention to undergo prosthodontic treatment (for substitution, repair, or new treatment) was measured as a response to the question, "If you had a new tooth loss or a problem with your existing prosthesis, would you intend to undergo treatment within 6 months?" Responses were measured using a 7-point Likert scale (1= definitely not, 2= probably not, 3= maybe not, 4= neutral, 5= maybe yes, 6= probably yes, and 7= definitely yes). Afterward, subjects were dichotomized using the median value of the distribution of scores.

Behavior was assessed through direct reporting and clinical examination for identification of replaced missing teeth and untreated edentulous spaces. Individuals were separated into two groups: (1) subjects with replaced missing teeth and no untreated edentulous spaces (positive behavior group) and (2) subjects with at least one untreated edentulous space for at least 6 months (negative behavior group).

ATB, SN, PBC, and the overall TPB scale were used as behavioral predictors of the subjects' intentions and behaviors toward prosthodontic treatment. Additionally, sociodemographic variables were also assessed, such as age, sex, educational level, and socioeconomic status. Stratification of the subject's socioeconomic status was based on the Brazilian government's classification system that classifies its citizens by socioeconomic level (A1, A2, B1, B2, C1, C2, D, and E), where A1 is the highest level and E the lowest level, based on education and ownership of consumer durable goods.[9]

Clinical data included the location of the edentulous spaces (maxillary and/or mandibular arch), site of tooth loss

Table 1 Categories and items used for questionnaire construction, using the components of the TPB construct to explore opinions and attitudes toward prosthodontic treatment

	Category	Scale items	
ATB	1. Consequences of no treatment	1a.	I'm afraid that if I do not get treated, my dental problems will get worse in the future
		1b.	Any tooth loss demands immediate prosthetic reposition to prevent problems in the future
	2/3. Perceived potential benefits/risks	2/3a.	Benefits of prosthodontic treatment are greater than potential risks to health
	4. Dental anxiety	4a.	I avoid undergoing dental treatment because I'm afraid that a problem will occur during treatment
		4b.	I am scared of dentists
	5. Previous experiences	5a.	I have always had good experiences with dentists
		5b.	Bad experiences make me postpone looking for a dentist when I have a problem with my teeth
	6. Interpersonal interaction	6a.	It is essential that I have a good relationship with the dentist to start a treatment
		6b.	The affability of the dental team is very important when I decide to be treated by a dentist
SN	1. Opinion of others	1a.	Good references about a professional motivate me to seek treatment with him/her
	2. Marketing	–	
	3. Normative need	3a.	Any tooth loss demands immediate prosthetic reposition
		3b.	When I have to decide about treatment the opinion that I value most is from my dentist
		3c.	If my dentist tells me that I have a dental problem, I would seek treatment as soon as possible
		3d.	I always try to follow the recommendations of my dentist
	4. Professional skills	4a.	The quality I value most in my dentist is his/her abilities and technical qualifications
		4b.	I prefer to be treated by a specialist rather than a general practitioner
	5. Overall quality of care	5a.	I would return to a prosthodontist if I had positive outcomes in previous treatments
PBC	1. Time availability/opportunity	1a.	If I have no time, I delay dental treatment even if I feel that I need it
		1b.	I try to get treatment as soon as possible, even if treatment is not urgently needed
		1c.	When I perceive any dental need, I look for a dentist as soon as possible
	2. Costs	2a.	If I don't have enough money, I postpone treatment even if I feel I need it
		2b.	I would make every financial effort to have a prosthodontic treatment if I needed it
	3. Subject's perceived need	–	
	4. Accessibility	4a.	I don't look for prosthodontic treatment because it is not covered by the public health system
		4b.	If I have a good dentist, I don't mind if it's hard for me to get there

Abbreviations: TPB, theory of planned behavior; ATB, attitude toward the behavior; SN, subjective norm; PBC, perceived behavioral control.

(anterior and/or posterior), presence and number of untreated and treated edentulous spaces, and types of previous prosthodontic treatment. Additionally, oral health-related quality of life impacts were measured using the Brazilian version of the Oral Health Impact Profile (OHIP-14) instrument.[10]

Descriptive analysis was performed using frequency analysis for nominal variables and central tendency and dispersion measures for continuous variables. Simple and multiple logistic regressions were used to test the association between intention or behavior (dependent variables) and the independent variables (predictive factors of the TPB, clinical status, and socioeconomic status). All statistical analysis was performed using IBM-SPSS 20.0 software.

Results

A sample of 225 subjects completed the questionnaire; 52.0% were female and aged from 18 years to 84 years (mean = 42.8; standard deviation [SD] =13.4). Most of the respondents were classified in the middle-class socioeconomic stratum (classes B and C =82.7%). Table 2 describes characteristics of the sample according to the occurrence of previous prosthodontic treatment. The most common configurations of tooth loss were only posterior edentulous space for both maxilla (45.2%) and mandible (74.6%). Cross-tabulation of upper and lower tooth loss revealed that the most common configurations were combined upper and lower posterior tooth loss (n=47; 21.6%) and lower posterior only (n=42; 19.3%). Only eleven subjects (4.9%) were fully edentulous.

The cumulative frequency distribution of the scores on the ATB, SN, and PBC scales is shown in Figure 2. Participants had positive attitudes, SNs, and self-control toward prosthodontic treatment. Lower scores were found for PBC compared to ATB and SN ($P<0.001$), and significant Pearson's correlation coefficients ($P<0.001$) were found between all scales (ATB–SN =0.57, ATB–PBC =0.39, SN–PBC =0.38).

Table 3 shows descriptive values of the TPB and OHIP scales as well as the results of simple logistic regression for the association between intention/behavior and independent variables. The results showed that intention and behavior were associated with all of the TPB components ($P<0.05$) and the overall TPB scale ($P<0.01$). Similarly, positive intention and behavior were associated with age, upper tooth loss, anterior tooth loss, and higher social status.

Table 2 Distribution of sociodemographic and clinical variables according to the occurrence of previous prosthodontic treatment

Variable	Categories	Previous treatment (positive behavior) – n (%)			
		Untreated (104)	Treated (121)	Total (225)	*P*-value
Sex	Male	53	55	108 (48.0)	0.451
	Female	51	66	117 (52.0)	
Age	<25 years	9	6	15 (6.7)	<0.001*
	25–<45 years	68	50	118 (52.4)	
	45–<65 years	23	54	77 (34.2)	
	65 or more	4	11	15 (6.7)	
Socioeconomic status**	A1–A2	7	8	15 (6.7)	0.042*
	B1–B2	42	67	109 (48.7)	
	C1–C2	43	40	83 (37.1)	
	D–E	11	6	17 (7.6)	
Maxillary tooth loss (n=168)	Posterior only	43	33	76 (45.2)	<0.001*
	Anterior only	9	12	21 (12.5)	
	Anterior and posterior	5	48	53 (31.5)	
	All teeth	0	18	18 (10.7)	
Mandibular tooth loss (n=181)	Posterior only	67	68	135 (74.6)	0.001*
	Anterior only	13	6	19 (10.5)	
	Anterior and posterior	3	13	16 (8.8)	
	All teeth	0	11	11 (6.1)	
Intention	Definitely yes	81	110	191 (84.9)	0.101*
	Probably yes	14	7	21 (9.3)	
	Maybe yes	6	1	7 (3.1)	
	Neutral	1	0	1 (0.4)	
	Maybe not	0	2	2 (0.9)	
	Probably not	2	0	2 (0.9)	
	Definitely not	0	1	1 (0.4)	

Note: *Chi-square for trend. Stratification of the subject's socioeconomic status was based on the Brazilian government's classification system that classifies its citizens by socioeconomic level (A1, A2, B1, B2, C1, C2, D, and E), where A1 is the highest level and E the lowest level, based on education and ownership of consumer durable goods.[9] **Stratification of socioeconomic status (A1, A2, B1, B2, C1, C2, D, and E), where A1 is the highest level and E the lowest level, based on education and ownership of consumer durable goods.[9]

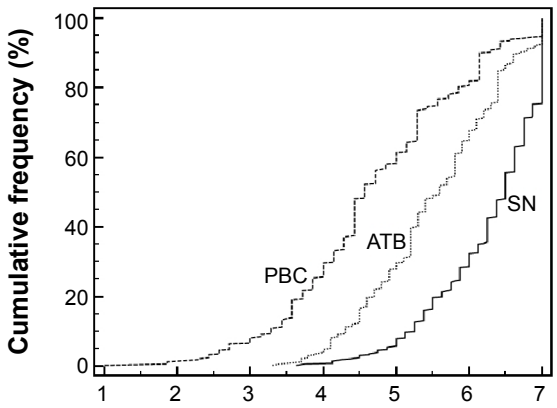

Figure 2 Cumulative frequency distribution of the scores of scales: ATB, SN, and PBC.
Abbreviations: ATB, attitude toward the behavior; SN, subjective norm; PBC, perceived behavioral control.

The final multiple regression models are shown in Table 4. Positive intention was only predicted by PBC (odds ratio [OR] =1.57; 95% confidence interval [CI] =1.09–2.26), while positive behavior was associated with the position of tooth loss (maxillary and anterior tooth loss) ($P<0.001$), higher socioeconomic status (OR =3.06; 95% CI =1.11–8.44), and PBC (OR =1.38; 95% CI =1.03–1.84).

Discussion

This study aimed to investigate how attitudes, SNs, and PBC (as components of the TPB conceptual structure) are shaped and how they could ultimately enable a better understanding of the reasons that individuals demand and utilize prosthodontic care services.[8]

Results revealed that treatment-seeking behavior might not be accurately explained or predicted by the three components of the TPB: ATBs, SN, and PBC. Conversely, behaviors about prosthodontic treatment may be strongly influenced by clinical features (extension and position of edentulous spaces), socioeconomic status, and the individual's PBC, which encompass the ease or difficulty of performing this particular behavior, taking into account aspects such as time availability, management of financial costs, and access to health care services.

Previous evidence shows that the likelihood of demanding and utilizing prosthodontic care depends on the position of the edentulous spaces, since individuals are more likely to replace anterior than posterior missing teeth.[11] There is a positive association between missing tooth position and patient satisfaction with the mouth; also, the presence of an intact anterior sextant and at least three premolars in occlusion is the best predictor of satisfaction.[11,12]

Alternative strategies for the replacement of posterior missing teeth, such as the shortened dental arch concept, assure masticatory function, occlusal support, and dental arch stability for most elderly people.[13] This concept postulates that a dentition with preserved anterior teeth and premolars is sufficient for acceptable levels of satisfaction with appearance, functionality, comfort, improved oral hygiene, and reduced costs;[14,15] and it has been proven that functionally oriented treatment is a more feasible and cost-effective approach for subjects with limited physical and/or financial resources.[16,17] Treatment based on the shortened dental arch concept was 1.84 times more cost effective than conventional removable prostheses in a group of partially dentate older patients.[17] Satisfaction with oral condition is affected by the extent and position of edentulous spaces;[12] the higher the number of lost teeth (and lower occlusal units), the greater the impairment of oral health-related quality of life.[18] However, tooth replacement should not necessarily be regarded as the definitive therapy for posterior bounded edentulous spaces, although more robust

Table 3 Results of simple logistic regression for the association between intention or behavior (dependent variables) and predictive factors of the TPB

TPB component	Mean (SD)	Min–max	Intention		Behavior	
			OR (95% CI)	*P*-value	OR (95% CI)	*P*-value
ATB	5.5 (0.9)	3.3–7.0	1.50 (1.01–2.22)	0.013	1.62 (1.21–2.19)	0.001
SN	6.3 (0.8)	3.6–7.0	1.90 (1.23–2.94)	0.004	1.66 (1.15–2.38)	0.007
PBC	4.6 (1.2)	1.9–7.0	1.68 (1.20–2.35)	0.002	1.27 (1.01–1.61)	0.041
Overall TPB scale	5.4 (0.7)	3.8–6.8	2.34 (1.35–4.05)	0.002	1.88 (1.25–2.82)	0.002
Upper tooth loss	–	–	2.05 (0.95–4.42)	0.066	9.74 (4.45–21.32)	<0.001
Anterior tooth loss	–	–	1.85 (0.87–3.95)	0.107	5.85 (3.27–10.48)	<0.001
Age	42.8 (13.4)	18.0–84.0	1.01 (0.98–1.03)	0.712	1.06 (1.03–1.08)	<0.001
SE status	–	–	3.14 (1.27–7.76)	0.013	2.41 (1.10–5.30)	0.029
OHIP score	7.9 (9.0)	0.0–43.0	0.99 (0.95–1.02)	0.553	0.99 (0.96–1.02)	0.570

Abbreviations: TPB, theory of planned behavior; SD, standard deviation; Min–max, minimum – maximum; OR, odds ratio; CI, confidence interval; ATB, attitude toward the behavior; SN, subjective norm; PBC, perceived behavioral control; SE, socioeconomic; OHIP, Oral Health Impact Profile.

Table 4 Results of multiple logistic regression for factors predicting intention and behavior, including clinical, socioeconomic, and TPB components as independent variables

	Independent variables	Reference category	OR (95% CI)	*P*-value
Intention	PBC	–	1.57 (1.09–2.26)	0.016
	SN	–	1.58 (0.99–2.51)	0.054
	Anterior tooth loss	Posterior tooth loss	2.05 (0.93–4.52)	0.075
Behavior	Upper and lower tooth loss	Lower tooth loss	9.30 (3.91–22.1)	<0.001
	Upper tooth loss	Lower tooth loss	6.15 (2.24–16.9)	<0.001
	Anterior tooth loss	Posterior tooth loss	5.13 (2.57–10.2)	<0.001
	Upper socioeconomic status	Lower SE status	3.06 (1.11–8.44)	0.030
	PBC	–	1.38 (1.03–1.84)	0.031

Abbreviations: TPB, theory of planned behavior; OR, odds ratio; CI, confidence interval; PBC, perceived behavioral control; SN, subjective norm; SE, socioeconomic.

studies are necessary to clarify the long-term effects of non-treatment.[19]

Socioeconomic status such as education level, income, employment status, and place of residence are strong predictors of dental care service utilization.[20] Disadvantaged population groups are also more affected by barriers to accessibility, which increases inequalities regarding access to oral health services and worsens individuals' attitudes toward treatment costs. All of these aforementioned aspects are important predictors of prosthodontic treatment-related behavior for specific population groups.

No previous clinical study used the TPB framework to try to explain the intention and behavior-related factors that influence prosthodontic treatment-seeking. The preliminary results of our study suggest that new investigations with other representative samples may be conducted to improve the validity of these findings. Future studies are also needed to attempt to create reliable and valid questionnaires in order to improve the accuracy of their assessment and evaluation. To increase the consistency of the scales, more related items testing the same concept should be added to the test. In addition, other new explanatory models may be proposed to identify other relevant psychosocial dimensions, since it has been shown that intentions and behaviors toward prosthodontic treatment cannot be fully explained by the TPB components unless clinical and socioeconomic features are included in the model.

Conclusion

The position of the edentulous spaces is the most relevant factor for prosthodontic treatment demand and utilization, while socioeconomic and an individual's perceived ease or difficulty of undergoing treatment may play a significant but secondary role in behavior toward prosthodontic interventions.

Disclosure

The authors report no conflicts of interest in this work.

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