DEVELOPMENT AND TESTING OF A QUESTIONNAIRE EXPLORING DENTISTS' INTENTION TO USE CLINICAL PRACTICE GUIDELINES ON SMOKING CESSATION IN QUEBEC: A MIXED METHODS STUDY

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ABSTRACT:

Background: Tobacco use leads to harmful effects on general and oral health. Oral health providers are recommended to promote smoking cessation in clinical practice and to adopt clinical practice guidelines. **Objective:** This study was carried out to develop and test the psychometric properties of a questionnaire based on the Theory of Interpersonal Behavior (TIB) exploring the determinants of Quebec dentists' intention to use the Canadian clinical practice guidelines on smoking cessation. **Methods:** A mixed-methods exploratory sequential design where a quantitative questionnaire was developed from the results of a qualitative study and was based on the TIB. Confirmatory factor analysis was carried out to assess if items supported the predefined basis of TIB-constructs. Finally, reliability analyses including internal consistency and test-retest analysis were performed. **Results:** The final version of the questionnaire has 40 items measuring psychosocial constructs. Confirmatory factor analysis corroborates the theory. Reliability analyses indicate good results with standardized Cronbach alpha ranging from 0.74 to 0.94 and temporal stability coefficients from 0.69 to 0.94. **Conclusion:** The process of initial validation of the measurement instrument is interesting however the small sample size. Moreover, the theoretical basis and the methodological approach adopted for the present study could be used for other health behaviors, among other health care professionals or in others settings.
Keywords: Smoking cessation, clinical practice guidelines, intention, measurement instrument, theoretical framework.

INTRODUCTION:

Variation in clinical practice undoubtedly affects the quality of services and care received by patients.[1] To mitigate and promote the standardization of supply of services and care, clinical practice guidelines have been proposed. [2] The Canadian Action Network for the Advancement, Dissemination and Adoption of Practices-informed Tobacco Treatment (CANADAPTT), established in 2008, produced the Canadian smoking cessation clinical guidelines (CSCCG) based on clinical experience in the Canadian context. [3] Five major statements are offered to healthcare professionals: Ask-Advise-Assess-Assist-Arrange (5As). Overall, it is recommended to health care professionals that they inquire about the smoking status of every patient, advise smokers to quit smoking, assess their willingness to start treatment for quitting, offer assistance to smokers according to their degree of motivation

by validated means and ensure smokers follow-up sessions to avoid relapses, and also to refer smokers to specialized resources.

In fact, tobacco is a major public health concern with several harmful effect on general and oral health [4] As healthcare professionals, oral health providers are viewed as a credible and reliable source of health information and are recommended to promote smoking cessation in their clinical practice. [5] In this context, dental visits can be an opportunity to promote cessation counseling brief interventions. Oral health providers' counseling can contribute to increased quitting attempts and abstinence rates. [5] Despite these results, dentists' involvement in counseling and their adoption of clinical practice guidelines in smoking cessation remain a challenge. In the province of Quebec (Canada), a study has shown that dentists' beliefs about their role in smoking cessation, their self-efficacy to intervene with smokers and barriers to counseling had not changed between 2005 and 2010. [6] Factors including lack of knowledge, lack of training, lack of reimbursement, lack of time, lack of coordination between dentistry and cessation services, low success rate, low patient acceptance, feeling that counseling is not their role, lack of referral resources, and lack of educational material impede dentists from offering this service to patients. [7-9]

To the best of our knowledge, the factors that may contribute to predicting Quebec dentists' intention to engage in behaviors related to Canadian smoking cessation guidelines have not yet to be studied. There is a consensus in the literature about the use of a theoretical underpinning to understand a behavior and its underlying mechanisms [10] in order to increase the development of effective interventions. A first step in this approach will be to have a valid and reliable measurement instrument.

This study aimed to develop and test the psychometric properties of a questionnaire based on a modified version of the Theory of Interpersonal Behavior [11] exploring the determinants of Quebec dentists' intention to use the Canadian clinical practice guidelines on smoking cessation.

MATERIALS AND METHODS:

Conceptual framework

The Theory of Interpersonal Behavior (TIB) proposed by Triandis (1980) is considered one of the most relevant to capture underlying determinants of healthcare professionals' intention. [12] The TIB has a wider scope including cultural, social, and moral factors not accounted for in other theories and examines how intention, facilitating conditions, and habit combine to predict behavior. [11, 13]

The measure of intention is a valid proxy for health professionals' behavior. [14] Behavioral intention refers to the individual's motivation regarding the performance of a given behavior. The TIB

highlights that the variables contributing to predict behavioral intention are attitudinal, normative and identity beliefs. [11, 13] The TIB incorporates two different normative dimensions: social and personal norms. Social norms include self-identity beliefs, role beliefs and professional norms [11, 13] The other normative component of the TIB is the personal normative belief. [11, 13]

Besides direct variables from the TIB, Godin's integrative model suggests including control beliefs to study behaviors of healthcare professionals. [15] Control beliefs are antecedents of perceived behavioral control in the Theory of Planned Behavior (TPB) and are similar to facilitating factors in the TIB. They include barriers and facilitating factors. Another borrowed determinant from the TPB is normative beliefs. [16] The theoretical framework adopted in this study is presented in Appendix.

Ethics statement

Ethical approval of the doctoral project was obtained by the Research Ethics Committee of Laval University (CERUL) (approval number 2014/111 R-1). There were no financial incentives offered to participants. Participant's consent was implicit to their participation to the study.

Participants and recruitment

The inclusion criteria for participating in the study were being a dentist member of the Professional Order of Dentists of Quebec (PODQ), working in private practice, engaging with patients and speaking French. A list of names and phone numbers was obtained from the PODQ. This list was kept confidential and names were known only to the student researcher.

Study design

This study is part of a larger project which used a sequential mixed-methods approach to explore environmental and psychosocial determinants of the uptake of the Canadian smoking cessation guidelines in private dental practice in Quebec. The exploratory qualitative phase aimed to understand structural, contextual, economic and institutional factors influencing the adoption of Canadian smoking cessation guidelines in dental offices, as well as to elicit salient beliefs of dentists' intention to use these smoking cessation guidelines. Building from the results of the qualitative phase and drawn from the TIB, the quantitative phase of the study began with the development and the validation of a questionnaire. This validated questionnaire will be used in a large survey to determine psychosocial factors influencing dentists' intention to adopt the Canadian smoking cessation guidelines .

The targeted behavior in the questionnaire was to apply at least one of the 5As of the Canadian smoking cessation guidelines by private practice dentists in the province of Quebec. According to the Theory of Planned Behavior (TPB), the definition of

behavior of interest is measured using the principle: Target, Action, Context and Time. [17]

Definition of the behavior was:

Action: to use

Target: Canadian clinical practice guidelines on smoking cessation

Context and time: every time an adult smoker visits your primary dental office.

Data collection

Qualitative phase: Data collection procedure

Drawing on organizational frameworks [18-21] , an interview guide was developed and validated by five dentists and experts in organizational research. Questions about beliefs were developed based on the Theory of Interpersonal Behavior [11] and the Theory of Planned Behavior. [16] Questions about indirect constructs from TBP included: (1) the advantages and disadvantages of adopting the behavior (behavioral beliefs), (2) influential people (referents) who would approve or disapprove the participant's adoption of the behavior (normative beliefs), (3) barriers and facilitators to the adoption of the behavior (control beliefs). There was only one indirect construct from TIB, which was: (4) perception of characteristics that dentists associate with adoption of smoking cessation clinical practice guidelines (identity beliefs).

PODQ produced a list of dental offices responding to following criteria: to be private dental practices and French was the main spoken language of the owner. From this list, a sample of private dental practices was randomly selected. Dental offices were contacted by phone to ask the willingness of a key informant to participate in an interview. For volunteer dentists, an appointment was made based on their availability. Interviews were conducted via phone, video conference (Skype) or in the dental office at the discretion of the participants.

Initially, a sample of 30 participants was targeted, as recommended in the literature.[17] However, saturation was reached before this benchmark, meaning that additional information did not bring any new understanding to the study topic. [22] In sum, 20 dentists in private practice participated in the qualitative study. Each interview was digitally recorded and transcribed without mention of the names of participants.

Quantitative phase

The quantitative phase followed Gagné and Godin's approach (2012) [17] comprising three steps: (1) selection of relevant items and direct variables, and developing the questionnaire, (2) pre-experimentation of the questionnaire, and (3) test-retest of the adjusted questionnaire.

Questionnaire format

The first version of the questionnaire included sociodemographic and

professional information questions, and questions measuring the target behavior, direct and indirect psychosocial constructs. The original pool was formed of 49 theoretical items and 14 sociodemographic and professional characteristic.

Each construct was measured using at least three items. [23] All questions but one was assessed on a 7-point Likert scale, for instance 1 = strongly disagree and 7 = strongly agree. One item measuring intention referred to the five statements of Canadian smoking cessation guidelines and was worded: "On a scale of 0% to 100%, with what percentage of adult smokers visiting your primary workplace do you intend to use each of following statements of the Canadian smoking cessation guidelines?". For negatively worded items, the scale scores were reversed.

Content analysis of the questionnaire

The draft questionnaire was sent to a convenience sample of five dentists and experts in health behavior research in Quebec who were contacted by e-mail. They provided opinions about comprehension, relevance and clarity of questions, length of questionnaire, and the duration to complete the questionnaire. This feedback helped to modify certain questions and develop the final version of the questionnaire.

Test-retest procedure

Once adjustments based on the judges' comments were made, a test-retest study of the revised questionnaire was done with a convenience sample of 27 dentists working in private practice in the province of Quebec. These dentists completed the same version of the questionnaire on two occasions, maintaining a two-week interval between test and retest.

Survey administration proceeded as follows: a first call to dental offices was made to obtain their email address. Then, an email with the information about the project, the consent form and a link to access to the questionnaire was sent to dentists. One survey item requested the email address of the respondent in order to contact him or her a second time for the retest. All completed questionnaires were manually entered in a spreadsheet.

Characteristics of participants

The following demographic and professional attributes of dentists were assessed: birth year, gender, dental specialty, ownership of a dental clinic, number of years of clinical experience, type of practice, work status, previous knowledge of Canadian smoking cessation guidelines, beliefs regarding reimbursement for smoking cessation counseling, perception of the role of dental specialists in comparison to general dental practitioners, perception of the role reinforcement by dentists of dental hygienists' counseling, role of PODQ in smoking cessation counseling, interest to have a training on the best practices to help smokers to quit,

interest in prescribing of nicotine replacement therapies, and perception of counseling as a team endeavor.

Data analysis

Qualitative phase: Descriptive and content analyses

Firstly, simple descriptive statistics were used to determine sociodemographic characteristics of participants in this elicitation phase. Secondly, content analysis was performed following the approach proposed by Gagné and Godin [17]. A number was given to each recording. One member of the research team listened to the content of all recorded interviews. Another person independently analyzed five recorded interviews. The two summaries were compared and all discrepancies were resolved with a third person. Each summary identified dentists' salient beliefs. Answers were classified into themes as recommended by Gagné and Godin [17]. The number corresponding to the participant's interview was assigned to each theme. Within each theme, beliefs were compared to see whether they were unique. Themes expressing the same idea were grouped and their frequency calculated. Then, the themes were ordered from the most to the least frequently mentioned. Finally, from participants' feedback, the cumulative total number of mentions of each belief was divided by the total number of mentions of all beliefs in this category. The top 75 percent of beliefs in each

category were retained as the salient beliefs [17].

Quantitative phase

Simple descriptive statistics were used to determine sociodemographics and professional characteristics of participants in the test-retest. For psychosocial variables, normality analysis was performed.

Face and content validity were assessed by dentists and experts in the psychosocial domain. Reliability of the questionnaire or the internal consistency of the constructs (the tendency of answers within a group of constructs) was measured using the Cronbach alpha coefficient [24]. To estimate stability over time, the intraclass correlation coefficient (ICC) was used [25]. We used criteria published by Nunally (1994) [26] to determine the level of consistency and the criteria of Fermanian (1984) [27] were used to assess the reproducibility of items. For the extraction criteria, the cut off of eigenvalues should be ≥ 1 with a cumulative proportion higher than 70%. Individual items were selected when the factor loading was greater than or equal to 0.60 and the statistical significance at $p < 0.05$. Conversely, all items with an eigenvalue smaller than 0.6 or lack of consistency were removed from the analysis as recommended by Sharma. [28] Statistical analysis was performed by a biostatistician using SAS version 9.3. [29]

RESULTS

Qualitative phase: Sociodemographics characteristics of participants

Table 1 presents the characteristics of the 20 participants in the qualitative study.

Forty-five percent (n=9, 45%) of participants were women. The majority of participants worked in a group practice (n=17, 85%), received 45 patients or more weekly (n=10, 50%) and was owners of their dental office (n=13, 65%). Salient beliefs were identified using deductive content analysis.

Quantitative phase

Descriptive analysis

Sociodemographic and professional characteristics of the 27 participants in the quantitative phase are summarized in Table 2. Among participants in the test-retest, 52% (n=14) were men. Their experience varied from 3 to 43 years and 37% (n=10) were owners of their dental offices. Nearly a third of the test-retest participants were aware of the Canadian smoking cessation guidelines before this study (n=6, 22.2%).

Table 3 presents the perception of dentists about the environmental factors that can influence their smoking cessation activities. Regarding reimbursement, 70% (n=17) of participants would like to receive a monetary incentive for smoking cessation counseling. A slightly higher percentage (74%, n=20), were interested to prescribe nicotine replacement therapies. Almost all respondents (96%, n=26) thought that dentists should complement dental hygienists's counseling, and would like to receive training on the appropriate strategies to help smokers to quit. All respondents reported that smoking cessation counseling involves teamwork (n=27).

Table 4 provides descriptive statistics for the psychosocial variables. Given that some of these variables did not follow a normal distribution, all statistics have been presented. In this table, median values of psychosocial constructs at two time intervals were presented. Tests performed were bivariate tests which are the difference between constructs at two time t1 (test) and t2 (retest). Reported p-values were from non-parametric Wilcoxon Mann-Whitney test.

Psychometric properties

The psychometric properties of the questionnaire are summarized in Table 5. We can find also details about the number of items. Internal consistency and temporal stability for each individual item are presented. Based on the confirmatory factor analysis, several items were removed from the questionnaire. We performed confirmatory factor analyses using principal component analysis method separately for each construct defined a priori just to check if the items fitted to one corresponding factor. Thus, constructs were formed by 3-7 items (4

to 9 participants by one item) and we recognize that this is a small sample even for a pilot study. However, according to Mundfrom et coll. (2005) [30], 27 cases can be acceptable for one factorial analysis.

Based on Nunally's criteria [26], the internal consistency after these changes was high (Cronbach alpha >0.8) for seven constructs (role beliefs, identity beliefs, control beliefs, behavioral beliefs, normative beliefs, professional norms and attitude towards the behavior), and substantial (Cronbach alpha = 0.6-0.8) for two constructs (behavioral intention and moral norm). Attitude toward the behavior had two dimensions, confirming Triandis' distinction between the constructs *affect* and *perceived consequences*. [11]

All items were considered with a good stability over time (ICC >0.7), except for the items measuring identity beliefs (ICC=0.69) which were moderately stable based on Fermanian's criteria. [27] Given that there was only one construct with a moderate stability, our choice was to keep all items related to identify beliefs in the questionnaire.

Final version of the questionnaire

Minor modifications were made to the first version of the questionnaire following feedback from test-retest participants. One question was added about the smoking status of participants. Thus, the terminology of items was clarified to make the questionnaire easier to complete.

The final questionnaire has 40 items measuring psychosocial constructs and 17 sociodemographic and professional questions. The questionnaire developed is available in French and in English (Questionnaires are available upon request). The questionnaire takes approximately 15 minutes to complete

DISCUSSION:

The objectives of this study were to develop a questionnaire exploring the determinants of private dentists' intention to use the Canadian smoking cessation guidelines in the province of Quebec and to test its psychometric properties. After the analysis procedures, the proposed questionnaire has an adequate validity and reliability for large surveys. Results from the assessment led us to the following observations.

Firstly, to our knowledge, this questionnaire is among the first to be developed to understand how to implement a smoking cessation intervention in dental healthcare. In fact, concerning research about smoking cessation, authors in dental healthcare settings have currently used a questionnaire developed in a medical setting [31], which has been piloted and adjusted in several others studies. [32, 33] Others questionnaires were developed without the presentation of an explicit rigorous research methodology.[7] In contrast, we developed and validated our questionnaire with dentists by rigorously following the methodology

proposed by Gagné and Godin (2012) [17] and included all both direct and indirect constructs. It is a measurement instrument developed with dentists, which took into account of the singularities and culture of dental practice, such as private practice. With the same questionnaire, an overview of determinants influencing the implementation of the best practices in health care settings can be captured as well. This study represents a contribution to the advancement of research in the dental medicine field regarding the development of a psychosocial questionnaire.

Secondly, the inclusion of a range of view points in the pilot steps of a questionnaire should promote the content validity of the scale [34]. This approach has been adopted in the case of the development of our questionnaire as dentists and experts in psychosocial research contributed its elaboration.

Thirdly, in accordance with lack of education and lack of environmental support and resources identified as the most important factors explaining the difficulty in implementing counseling in the dental setting [9] , the broadly context including social, economic and organizational factors that could influence dentists' intention to use Canadian smoking cessation guidelines has been considered in this questionnaire. As a result, this questionnaire can be used to identify which psychosocial and environmental

determinants should be targeted when developing a theory-based intervention.

Finally, the test-retest approach in the development of our questionnaire with an interval of two weeks is relevant to assess the temporal stability of different social cognitive variables. [17] Reliability test-retest can be influenced by several variables associated to the researcher or others events met by the participants during the length of retest interval. In this case, we choose a short interval as recommended for measures regarding behaviors. [35] Good reliable coefficients from data analyses illustrate the weakness of influences from these potential factors, and that measures have not changed between successive measures occasions. [35]

This study has some limitations. Firstly, this questionnaire has been developed with Quebec dentists. The great advantage is using a theoretical basis and a rigorous methodological approach, which can be adopted for other health behaviors, and settings, and among other health care professionals. However, to be used in others contexts, this questionnaire should be adapted and validated. Besides, prior to using this questionnaire in an even broader population of health providers, this survey instrument should be translated to other target languages and validated using cross-cultural adaptation of the self-report measures. [36] For instance, although an English version of the questionnaire is available, it should be validated with a population of English-

speaking dentists before being used in large surveys.

Secondly, based on factor analysis, certain items relevant to the theoretical framework were removed from the questionnaire. For example, the final version of the questionnaire includes only one dimension of some salient beliefs, as we studied only the advantages, barriers and social norms related to dental-practice context. However, Krosnik [37] reported that valid information is produced from shorter questionnaires. Shortening the questionnaire also likely lowers its administration time, and reduces participant's fatigue.

Thirdly, particular factors related to the studied population did not allow us to achieve the desired number of participants. In fact, this test-retest study recruited 27 participants and not 30 as recommended in the literature. [38] Dentists have a dual role both as healthcare providers and business people [39] and time constraints can be a central barrier for health promotion activities. Then, it is possible that other values underlie dental practice and that participation in research activities is not a priority for the private practice dentists. Other factors which could have limited sample size might be lack of motivation, test-retest format requiring participation at two distinct time points, as well as the summer season for survey administration. Despite this sample size, relevant results regarding reliability and temporal stability have been obtained.

Analysis of sociodemographics factors has shown the heterogeneity of participants, which could explain the high levels of standardized alphas of Cronbach or internal consistency.[40] However, the small size of participants is a major limit to this study. Then, results from this study can be considered as an initial validation process of a measurement instrument.

The next step of the project is to use this questionnaire in a larger population of private practice dentists in the province of Quebec in order to pursuit the validation of the questionnaire and identify psychosocial characteristics of dentists that influence the evidence-based practices on smoking cessation counseling in Quebec. Identifying the key determinants of behavior relative to individual characteristics, contexts, and activities is the first step in designing appropriate interventions. [10]

CONCLUSION:

We developed and initially validated a theory-based questionnaire to measure private dentists' intention to use the Canadian smoking cessation guidelines. This instrument has demonstrated adequate validity and reliability for use in a large survey. In the long run, this will help develop theory-based interventions for promoting the implementation of best practices in dental and other healthcare settings. Further studies are recommended to investigate other types of validity such as divergent validity and criterion-related validity.

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TABLES:

Table 1: Participants' characteristics: qualitative phase

Variables (n=20)	Frequency (n)	Range or percentage (%)
Gender		
Female	9	45
Male	11	55
Years of experience in the current dental clinic		10 months - 40 years
Years of experience in dentistry		1.5 years - 47 years
Familiarity to Canadian smoking cessation guidelines		
Yes	13	65
No	7	35
Ownership of dental clinic		
Yes	7	35
No	13	65
Type of practice		
Solo	3	15
Group practice	17	85
Number of patients received by week		
16-29	6	30
30-44	4	20
45 and more	10	50

Table 2: Participants' characteristics: quantitative phase

Variables (n=27)	Frequency (n)	Range or percentage (%)
Age ~~group~~ (years of births)		1947-1987
Gender		
Female	13	48
Male	14	52
Years of experience		
3 to 15	15	55.6
16 to 28	5	18.5
More than 28	7	25.9
Ownership of dental clinic		
Yes	10	37
Non	17	63
Type of practice		
Solo	6	22.2
Group practice	21	77.8
Work status		
Dentist solo	8	29.6
Associated dentist	18	66.7
Dentist at location	1	3.7
General dental practitioner		
Yes	26	96.3
No	1	3.7
Previous knowledge of Canadian smoking cessation guidelines before this study		
Yes	6	22.2
No	21	77.8

Table 3 Participants' perceptions about the environmental factors: quantitative phase

Variables (n=27)	Frequency (n)	Percentage (%)
Would like to receive a reimbursement for smoking cessation counseling		
Yes	17	70
No	10	30
Belief about more important role of specialist dental in smoking cessation counseling		
Yes	7	25.9

No	20	74.1	
Belief about the major role of Professional Order of Dentists of Quebec (PODQ) in smoking cessation counseling			
Yes	26	96.3	
No	1	3.7	
Perception of reinforcement by any dentists of dental hygienists' smoking cessation counseling			
Yes	26	96.3	
No	1	3.7	
Perception of smoking cessation counseling as a teamwork			
Yes	27	100	
No	0	0	
Would like to prescribe the nicotine replacement therapies			
Yes	20	74.1	
No	7	25.9	
Would like to have a training about appropriate strategies to help smokers to quit			
Yes	25	92.6	
No	2	7.4	

Table 4: Differences for the psychosocial variables between test and retest: quantitative phase

Variables (n=27)	Test-retest	Mean (SD)	Median (Interquartile range)	P_values*
Intention	1	5.36 (1.28)	5.3 (4.90-6.25)	
	2	5.34 (1.31)	5.7 (4.35-6.30)	0.90
Attitude	1	5.1 (1.07)	5 (4-6)	
	2	5.03 (1.01)	5 (4.33-6)	0.81
Behavioral beliefs	1	5.78 (1.11)	6.14 (5.29-6.43)	
	2	5.92 (1.12)	6.14 (5.86-6.57)	0.65
Normative beliefs	1	6.08 (0.94)	6 (5.25-7)	
	2	6.26 (0.81)	6.5 (5.75-7)	0.46
Control beliefs	1	2.78 (1.23)	2.6 (1.60-3.4)	
	2	2.72 (1.26)	2.6 (1.60-3.4)	0.86
Identity beliefs	1	6.3 (0.72)	6.5 (6-7)	0.75

	2	6.36 (0.75)	6.75 (6-7)	
Role beliefs	1	5.62 (1.08)	6 (5.33-6)	
	2	5.48 (1.24)	5.33 (5-6.67)	0.56
Moral norm	1	5.27 (1.19)	5.67 (5-6)	
	2	5.32 (1.18)	5.67 (4.67-6.33)	0.88
Professional norm	1	5.54 (1.2)	5.75 (5.25-6.25)	
	2	5.4 (1.33)	5.75 (5-6)	0.72

* P-values from Wilcoxon Mann Whitney test

Table 5: Overall psychometric properties of the questionnaire

Variables		Number of items	Standardized Cronbach alpha	Intraclass correlation coefficients
Behavior	Intention (4 items)	3 1	0.74	0.91
Direct constructs	Attitude (6 items)	6	0.83	0.89
	Social role beliefs (3 items)	3	0.82	0.91
	Moral norm (3 items)	3	0.79	0.90
	Professional norm (4 items)	4	0.92	0.93
Indirect constructs	Behavioral beliefs (7 items)	8	0.94	0.94
	Normative beliefs (4 items)	8	0.88	0.83
	Control beliefs (5 items)	8	0.82	0.88
	Identity beliefs (4 items)	5	0.85	0.69