

Judicial Vulnerability on the Exercise of Orthodontics: Construction and Validation of a Questionnaire

Cleverson Raymundo Sbarzi Guedes¹, Isabel Cristina Gonçalves Leite², Felipe de Almeida Pinheiro³, Marcio José da Silva Campos³, Sergio Luiz Mota Júnior³, Matheus Melo Phiton⁴, Robert Willer Farinazzo Vitral³

¹Department of Public Law, Juiz de Fora Federal University, Juiz de Fora, MG, Brazil.

²Department of Collective Health, Juiz de Fora Federal University, Juiz de Fora, MG, Brazil.

³Department of Orthodontics, Juiz de Fora Federal University, Juiz de Fora, MG, Brazil.

⁴Department of Orthodontics, Southwest Bahia State University, Jequié, Bahia, Brazil.

Correspondence: Sergio Luiz Mota Júnior, Rua Santo Antônio 609/704, Juiz de Fora MG, Brazil. 36015-000. **E-mail:** sergiomotajr_orto@yahoo.com.br

Academic Editor: Lucianne Cople Maia

Received: 23 June 2021 / **Review:** 13 October 2021 / **Accepted:** 12 December 2021

How to cite: Guedes CRS, Leite ICG, Pinheiro FA, Campos MJS, Mota Júnior SL, Phiton MM, et al. Judicial vulnerability on the exercise of orthodontics: construction and validation of a questionnaire. *Pesqui Bras Odontopediatria Clín Integr.* 2022; 22:e210123. <https://doi.org/10.1590/pboci.2022.047>

ABSTRACT

Objective: To develop and validate a questionnaire to measure the vulnerability of orthodontists, measuring the risks of being involved in civil liability lawsuits. **Material and Methods:** In-depth interviews were performed with three groups: G1- law professionals, G2 – orthodontists, and G3 – orthodontic patients. From the analysis of the content of Bardin, domains for the construction of the first version of the 53-question questionnaire were identified. The questionnaire was submitted to experts for validation, inclusion and exclusion of questions, but maintaining the 53-question format. It was submitted to the test-retest phases and verification of internal consistency. **Results:** 247 professionals answered the final version of the questionnaire. The intraclass correlation coefficient was 88.8%. Cronbach's alpha was 0.946, with high internal consistency. The Kaiser-Meyer-Olkin and Bartlett's tests confirmed internal consistency showing the values of 0.909 and significance of <0.001, respectively. From the total score and factorial analysis, the sample was divided into three groups of judicial vulnerability. **Conclusion:** The results of this study demonstrated that the questionnaire is a valid tool to measure the risks of involvement in civil liability lawsuits by orthodontists. It presented a multidimensional character and might be applied as well as face to face or online, without prejudice to quality.

Keywords: Validation Study; Compensation and Redress; Social Vulnerability; Surveys and Questionnaires.

Introduction

Civil liability is the obligation reserved for the dentist to repair any harm caused to the patient as a result of malpractice. The number of civil lawsuits associated with compensatory damages in which these professionals are involved has increased lately, and so has a fear of involvement and its repercussions, as well as the exposure of the professional name and financial situation facing possible legal compensations [1-3].

In Brazil, this is a result of the major access of the population to information and justice, whether through the judicial system (assisted by lawyers or not) or the action of consumer protection organizations, especially since the promulgation of the Federal Law n. 8078 from 11th September 1990, which created the Brazilian Consumer Defence Code (CDC) [3,4].

The Consumer Defence Code equated the relationship between dentists and patients with other commercial relationships: with the professional being characterized as a service provider and the patient as a consumer. Therefore, in cases of civil actions from alleged harms, the judge could rule reversal of the burden of proof, which is the interpretation that the consumer is the hyposufficient part of the relation, with the professional being responsible for demonstrating the absence of a causal nexus between the treatment and the alleged harm [5].

For that reason, dental records and treatment documentation are the main defense resources for the professional, as they register the dentist's conduct during dental treatment. Adequate elaboration of such consists of clinical records describing the procedures and archival of every document that might be considered relevant for treatment, such as complementary exams, reports, prescriptions and a free and informed consent term [6]. According to the CDC, failure on information duties can also result in indemnity if leading or is associated with any harm to the patient.

Among dental specialties, orthodontics has been one of the fields with the greatest amounts of judicial demands on account of the long duration of treatments and high costs associated with it, along with it involving aesthetics and being subjected to the patient's satisfaction with the results. A study on the demands of the Court of Justice of Espírito Santo (Brazil) pointed out that cases related to dental prosthetics and orthodontics had the highest number of lawsuits between 2009 and 2017 [7,8].

Thus it is necessary to establish the vulnerable spots of dentists aiming to prevent such demands, from the personal treatment of the patients and an agreement on a safe contract on the phases of orthodontic treatment to its conclusion and post-treatment follow-up [9-11].

Despite the subject's relevance, there is no register in the literature of an instrument capable of measuring the risks of involvement in lawsuits to which orthodontists are exposed. And, if the lawsuit is inevitable when orthodontists are faced with the rights of dissatisfied clients, also capable of preparing and guiding orthodontists on how to exercise a technical defence to minimize the effects of judicial decisions [12].

Therefore, the objective of the study was to elaborate and validate a questionnaire capable of measuring the vulnerability of orthodontists measuring the risks of being involved in civil liability lawsuits.

Material and Methods

Ethical Clearance and Study Design

The research project was submitted to and approved by the Ethics and Research Committee (Protocol number 1.403.552). On the first, qualitative stage, in-depth interviews were done with the intent of elaborating the instrument to evaluate the risks of being involved in lawsuits to which orthodontists are exposed [9]. On

the second, quantitative stage, the questionnaire was applied to a group of orthodontists, aiming to validate the instrument.

In-depth Interviews

Three groups were formed for the in-depth interviews: G1) law professionals; G2) orthodontists; G3) patients of orthodontic treatment. The interviews were done directly by the researcher, with 13, 11 and 9 participants in each group, respectively. The interviews were analysed using Bardin's content analysis technique (qualitative phase) and the results generated 7 domains for the elaboration of the instrument [9].

First Version of the Questionnaire

After identifying the domains, the first version of the questionnaire was elaborated, with 53 questions comprising all the seven domains: patient-orthodontist relationship; formation and capacitation of the orthodontist; orthodontists' awareness about juridical repercussions of their professional obligations; contractual relationship for service provider; organization and maintenance of orthodontic records; follow-up of treatment phases; post-treatment follow-up [9,13].

Face Validity

The first version was presented to a committee of specialists, which consisted of 2 law professionals with over 15 years of professional experience and notable knowledge of civil liability, as well as 2 orthodontists with over 15 years of professional and academic experience, aiming to guarantee an accurate comprehension of the language used in the questions, avoid legal technicalities and eventual repetitions of items in the domains [14]. The second version of the instrument was elaborated with the adaptations needed, also with 53 questions.

Test-retest Phase

The instrument was administered to a group of 10 orthodontists and readministered after an interval of 12 to 15 days to evaluate temporal stability through the intraclass correlation coefficient [15,16].

Questionnaire Administration

One hundred eighty-four questionnaires were administered in face-to-face visits made directly by the researcher responsible for the study. An online version was also available on Google Forms®, and the access link was sent to mailing lists of orthodontists, which provided 63 answers. The sample for validation consisted of 247 answered questionnaires.

The answers were tabulated in an Excel (Microsoft Corp., Redmond, USA) sheet, with the points scored in each questionnaire polled, assigning from 1 to 5 points on the Likert scale. The lowest score (1) was assigned to answers that indicated higher vulnerability of the professionals, whereas the highest score was assigned to answers associated to lower legal vulnerability when facing lawsuits. A descriptive analysis of the sample was also performed [17].

Factor Analysis: Reliability and Consistency of the Instrument

The validity of the content was established by assessing Cronbach's alpha coefficient for the instrument and for the questions, with a minimum acceptable value of 0.70 [18].

The analysis of the correlation between the items in the questionnaire, using the Kaiser-Meyer-Olkin (KMO) test [19], had 0.6 as the minimum acceptable value associated to Bartlett's test of sphericity, with a significance level of <0.01. The exploratory factor analysis allowed evaluating the interdependence level to synthesize the relationship between variables, searching for common factors (latent dimensions). A Varimax rotation was applied to the matrix after factor extraction, aiming to reduce the variability between questions [15,20].

Score Construction for the Instrument (Clusters or Groups)

Through a cluster analysis, it was possible to rank the respondents from the points they got from the answers in a way that the individuals within a group were as similar as possible and as different as possible from the other groups, which allowed the classification in 3 scores of judicial vulnerability: low, moderate and high risk of getting involved in lawsuits [21].

Results

Profile of the Respondents for the Questionnaire

The questionnaire (Table 1) had 247 respondents, who were divided into nominal variables (postgraduate or not) and quantitative variables (time since graduation, time since postgraduation and time in the exercise of orthodontics) (Table 2). There was no difference in respondents' profiles for both ways of answers, face-to-face or online.

Table 1. Questionnaire to measure judicial vulnerability on the exercise of orthodontics.

Guidelines for Application:
1. Domains and corresponding questions: Orthodontist-patient relationship: Questions 1 to 8, 47. Professional training and development: Questions 9 to 12 Knowledge of legal repercussions: Questions 13 to 28 Contractual relationship: Questions 29 to 36 Orthodontic documentation: Questions 37 to 42 Monitoring of treatment stages: Questions 43 to 46 Post-treatment follow-up: Questions 48 to 53
2. There should be only one response per question
3. Results To determine the results of each respondent, 5 points should be given to each answer (a); 4 to each answer (b); 3 to each answer (c); 2 to each answer (d) and 1 to each answer (e)
4. When applying the questionnaire, the alternatives for the answers could be inverted to avoid bias.
5. The questionnaires can be administered face-to-face or online
Questionnaire:
1. It is important to acknowledge the patients' (or their parents/legal guardians) LEVEL OF INSTRUCTION. (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
2. It is important to acknowledge the patients' (or their parents/legal guardians) OCCUPATION. (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
3. It is important to acknowledge the patients' (or their parents/legal guardians) FINANCIAL STATUS. (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
4. For the ORTHODONTIC TREATMENT to start, it is indispensable to provide the patient (or their parents/legal guardians) with a written alert about the possibility of EXCLUSIVELY FUNCTIONAL IMPROVEMENT of the patient. (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
5. In MY PROFESSIONAL PRACTICE of ORTHODONTICS, at the start of treatment, I provide the patient (or their parents/legal guardians) with a written alert about the possibility of EXCLUSIVELY FUNCTIONAL IMPROVEMENT of the patient, collecting their written CONSENT.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

6. For the ORTHODONTIC TREATMENT to start, it is indispensable to provide the patient (or their parents/legal guardians) with a written alert about the possibility of EXCLUSIVELY AESTHETIC IMPROVEMENT of the patient.

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

7. In MY PROFESSIONAL PRACTICE of ORTHODONTICS, at the start of treatment, I provide the patient (or their parents/legal guardians) with a written alert about the possibility of EXCLUSIVELY AESTHETIC IMPROVEMENT of the patient, collecting their written CONSENT.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

8. In MY PROFESSIONAL PRACTICE of ORTHODONTICS, to elaborate an orthodontic treatment plan, I do a CLINICAL EVALUATION prior to the start of treatment.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

9. In my UNDERGRADUATE STUDIES in DENTISTRY, enough guidance was given on the risks of the PROFESSIONAL PRACTICE OF DENTISTS (IN GENERAL) regarding the possibility of involvement in lawsuits.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

10. In MY ACADEMIC JOURNEY (undergraduate, graduate or continuing studies), enough guidance was given on the risks of the PROFESSIONAL PRACTICE OF ORTHODONTICS regarding the possibility of involvement in lawsuits.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

11. IN MY OPINION, in order to work as an ORTHODONTIST, it is important for the professional to have an ORTHODONTICS postgraduate degree.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

12. The registration as an ORTHODONTIST in the Regional or Federal Council of Dentistry is important in order to work as an orthodontist

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

13. in MY ACTIVITY I ADVERTISE (in any media or communication vehicle) to promote my practice and professional results in ORTHODONTICS

(a) Never (b) Seldom (c) Sometimes (d) Often (e) Always

14. In MY ACTIVITY, if there is a need of EVALUATION BY ANOTHER HEALTHCARE PROFESSIONAL prior to the start of orthodontic treatment, I make a written register by the professional, with a written acknowledgment statement by the patient (or their parents/legal guardians)

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

15. In MY ACTIVITY, in case of JOINT PRACTICE of more than one professional in the treatment of the same patient, I have a written record of the procedures and responsibility of each of the professionals involved, written acknowledgment statement by the patient (or their parents/legal guardians)

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

16. In MY ACTIVITY, I have support/guidance of A SPECIALIZED LAW PROFESSIONAL to elaborate a contract of service provision,

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

17. In MY ACTIVITY, I have SUPPORT OF A LAW PROFESSIONAL with specific knowledge for the routine in my clinic during the period of treatment of my patients.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

18. In MY ACTIVITY, I comprehend that the practice of ORTHODONTICS INVOLVES an OBLIGATION OF RESULTS (guarantee of reaching the final objective intended in treatment) regarding the expectations of the patient.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

19. The activity of ORTHODONTIST involves a professional practice legally regulated by the CONSUMER DEFENSE CODE

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

20. During the professional practice of ORTHODONTICS, it is possible for the professional to be CRIMINALLY CHARGED for eventual bodily injuries caused to the patient during treatment.

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

21. During the professional practice of ORTHODONTICS, it is possible for the professional to be HELD CIVILLY RESPONSIBLE (indemnity payment) for eventual harms caused to the patient through legal actions presented by dissatisfied patients.

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

22. IN MY ACTIVITY, if I received a notice for attendance at the CONSUMER PROTECTION AGENCY facing dissatisfaction of one of my patients to try an amicable settlement, would I attend at the CONSUMER PROTECTION AGENCY?

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

23. In MY ACTIVITY, if I received a notice for attendance at a LAW FIRM, MEDIATION, CONCILIATION OR ARBITRATION CENTER facing a complaint of dissatisfaction of one of my patients to try an amicable settlement, would I attend?

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

24. If an orthodontist is involved in a lawsuit concerning the practice of ORTHODONTICS, the OBLIGATION OF PROVING THE GUILT LIES ON THE DISSATISFIED PATIENT, who will have the onus of proving the orthodontist acted in a guilty manner.

(a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

25. In MY ACTIVITY, when faced with an eventual lawsuit with a dissatisfied patient of an orthodontic treatment, I WOULD HAVE DOCUMENTARY EVIDENCE TO SHOW THAT THE PATIENT HAS NO REASON facing the alleged facts.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

26. In MY ACTIVITY, in the event of being legally charged by a dissatisfied patient, would I be WORRIED ABOUT THE EXPOSITION OF MY NAME (as an orthodontics professional)?

(a) Extremely worried (b) Very worried (c) Moderately worried (d) Slightly worried (e) Not at all worried

27. In MY ACTIVITY, in the event of being legally charged by a dissatisfied patient, would I be WORRIED ABOUT A POTENTIALLY HIGH COST INDEMNITY PAYMENT?

(a) Extremely worried (b) Very worried (c) Moderately worried (d) Slightly worried (e) Not at all worried

28. In MY ACTIVITY, in the event of being legally charged by a dissatisfied patient, would I be WORRIED WITH THE STRESS caused by my involvement in a lawsuit?

(a) Extremely worried (b) Very worried (c) Moderately worried (d) Slightly worried (e) Not at all

29. In MY ACTIVITY, I conclude A WRITTEN CONTRACT OF ORTHODONTIC SERVICE PROVISION with the patient (or parent/legal guardian).

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

30. In MY ACTIVITY, the contracts of orthodontic service provision of my patients are INDIVIDUALIZED, with specific clauses about the situation and personal needs of the patients.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

31. In MY ACTIVITY, the contracts of orthodontic service provision include a fixed deadline to end the treatment, and I explain to my patient (or parents/legal guardian) about the AVERAGE DURATION of treatment, collecting a written acknowledgment.

(a) Never (b) Seldom (c) Sometimes (d) Often (e) Always

32. In MY ACTIVITY, the contracts of orthodontic service provision include a fixed cost for the treatment (initial, maintenance, extra costs when required), collecting a written acknowledgment from the patient (or parents/legal guardian)

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

33. In MY ACTIVITY, I explain directly to the patient (or parents/legal guardian) the contract of orthodontic service provision, so it is PERFECTLY COMPREHENDED in all its clauses, collecting a written acknowledgment from the patient (or parents/legal guardian)

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

34. In MY ACTIVITY, the contract of orthodontic service provision registers THE TECHNIQUE USED FOR THE ORTHODONTIC TREATMENT, in every phase of the treatment plan.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

35. In MY ACTIVITY, the contracts of orthodontic service provision are SIGNED BY 2 (TWO) WITNESSES

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

36. In MY ACTIVITY, I PURCHASE INSURANCE as a precaution against the possibility of eventual claims for compensation by clients dissatisfied with the orthodontic treatment.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

37. In MY ACTIVITY, prior to the START OF ORTHODONTIC TREATMENT, I require ORTHODONTIC DOCUMENTATION

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

38. In MY ACTIVITY, prior to the START OF ORTHODONTIC TREATMENT, I require a MODEL as a complementary exam for diagnosis, planning and conformation of orthodontic documentation.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

39. In MY ACTIVITY, prior to the START OF ORTHODONTIC TREATMENT, I require a CAPHALOMETRIC X-RAY as a complementary exam for diagnosis, planning and conformation of orthodontic documentation.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

40. In MY ACTIVITY, prior to the START OF ORTHODONTIC TREATMENT, I require PERIAPICAL X-RAYS OR RADIOGRAPHIC EXAMINATIONS as a complementary exam for diagnosis, planning and conformation of orthodontic documentation.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

41. In MY ACTIVITY, I file and store ORTHODONTIC DOCUMENTATION in an ADEQUATE AND ORGANIZED place.

(a) Always (b) Often (c) Sometimes (d) Seldom (e) Never

42. A SCANNING PROCESS is important as STORING GUARANTEE of the documents that constitute the orthodontic documentation.
 (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
43. In MY ACTIVITY, I explain to the patient (or parents/legal guardians) THE NEED OF COOPERATION (participation) from the patient for the success of orthodontic treatment, collecting a written acknowledgment from the patient (or parents/legal guardians)
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
44. In MY ACTIVITY, I provide the patient (or parents/legal guardians) with the NECESSARY ORIENTATION to guarantee a complete understanding of the REQUIRED ATTITUDES FOR COOPERATION from the patient for the success of orthodontic treatment, collecting a written acknowledgement from the patient (or parents/legal guardians)
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
45. In MY ACTIVITY, when there is a need of using RETENTIONS, EXTRA ORAL APPLIANCES OR AUXILIARY METHODS, I provide patient (or parents/legal guardians) with EXTRA ORIENTATION ABOUT CORRECT USE AND HANDLING, collecting a written acknowledgement from the patient (or parents/legal guardians).
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
46. In MY ACTIVITY, DURING ORTHODONTIC TREATMENT, I have a written register of attendance of the patient to consultations, visits or periodic follow-ups.
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
47. DURING TREATMENT, it is important for the patient (or parents/legal guardians) to keep in contact with or have direct access to the ORTHODONTIST by phone, e-mail, mobile, WhatsApp or any other means other than the consultations to ensure full monitoring of the treatment.
 (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree
48. In MY ACTIVITY, at THE END OF ORTHODONTIC TREATMENT, I have a written record of the level of satisfaction of the patient concerning the success of orthodontic treatment, collecting a written acknowledgement from the patient (or parents/legal guardians).
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
49. In MY ACTIVITY, at THE END OF ORTHODONTIC TREATMENT, I file all the evidences (photographs, x-rays...) related to the end of treatment compared to those of the start of treatment.
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
50. In MY ACTIVITY, at THE END OF ORTHODONTIC TREATMENT, I provide written guidance to the patients regarding procedures and conducts in the post-treatment phase, collecting a receipt from the patient (or parents/legal guardians).
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
51. In MY ACTIVITY, I keep a SCHEDULE OF CONSULTATION AND MONITORING of my patients in a POST-ORTHODONTIC TREATMENT phase.
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
52. In MY ACTIVITY, at THE END OF ORTHODONTIC TREATMENT, I inform the patient (or parents/legal guardians) in writing about the need of the patient returning to consultation, aiming to verify the maintenance of the conditions verified at the end of treatment.
 (a) Always (b) Often (c) Sometimes (d) Seldom (e) Never
53. In the professional practice of orthodontics, if the patient does not return to the clinic IN UP TO 5 (FIVE) YEARS AFTER THE END OF TREATMENT, it is important that they are contacted in the last address given for consultation, aiming to verify the maintenance of the conditions verified at the end of treatment.
 (a) Strongly agree (b) Somewhat agree (c) Neither agree nor disagree (d) Somewhat disagree (e) Strongly disagree

Table 2. Description of the profile of dentist respondents.

Variables	N (%)
Orthodontics Postgraduation	
Yes	153 (61.9)
No	94 (38.1)
Quantitative Variables (μ years \pm SD)	
Time since graduation	13.68 (10.79)
Time since postgraduation	11.33 (8.58)
Time in the exercise of orthodontics	9.68 (8.82)

SD: Standard Deviation.

After the test-retest phase, an intraclass correlation coefficient of 0.88 (CI 95% 0.774–0.965) was calculated, which translates as excellent stability and reproducibility, with a variation of 68% (question 51 – moderate correlation) to 100% (47% of total questions). This result suggested that a wording adjustment was needed on question 51, generating the final version of the questionnaire, with 53 questions.

Reliability and Internal Consistency of the Instrument

The analysis of the answers given by the 247 respondents to the 53 questions had a Cronbach’s alpha coefficient of 0.946, which indicates an effective reliability of the questionnaire to its proposed goal of measuring the vulnerability and risks to which orthodontists face of being involved in civil liability lawsuits or being exposed to unnecessary or avoidable risks. Furthermore, the coefficient analysis, when excluding any of the 53 questions, indicated that they are all equally explanatory of the phenomenon (coefficient variation from 0.944 to 0.948).

Factor Analysis

The KMO test had a result of 0.909, and Bartlett’s sphericity had $p < 0.01$, confirming the feasibility of the exploratory factor analysis. It was possible to verify that the way in which the questions were grouped, simulated by a rearrangement of the questions in the factor analysis, indicates that the first two components correspond to 39.68% of the variation of the different combinations of answers, which suggests the possibility of using other grouping methods. Table 3 shows the eigenvalues of the questionnaire.

Table 3. Percentage of total variance of the questionnaire by the components.

Component	Total	Initial Eigenvalues	
		% of Variance	Cumulative (%)
1	16.095	30.368	30.368
2	4.936	9.313	39.680
3	2.093	3.950	43.630
4	1.853	3.497	47.127
5	1.748	3.298	50.425
6	1.682	3.173	53.598
7	1.484	2.800	56.397
8	1.434	2.707	59.104
9	1.377	2.599	61.703
10	1.154	2.177	63.880
...			
...			
50	0.141	0.266	99.430
51	0.124	0.234	99.664
52	0.092	0.173	99.837
53	0.086	0.163	100.000

The factor analysis is presented in Figure 1 to demonstrate the arrangement of every combination tested for the 53 questions, indicating how much of the variance of the answers to the questionnaire is given by the first two components. It can be noted that from the fourth component, the variation is minimum.

Table 4 indicates the structure of the questionnaire based on the two main components. It should be highlighted that every question had loadings higher than 0.33. The table comprises only the two most relevant components.

The cluster analysis classified the respondents into 3 groups according to the level of judicial vulnerability (low, moderate, high). Table 5 indicates the variation of points for each of the scores by k-means

in the present sample. In this questionnaire, the higher the score, the lower the vulnerability. Face-to-face and online did not present a difference in the respondents' profiles for Cluster's limits. Figure 2 shows the flowchart of questionnaire development.

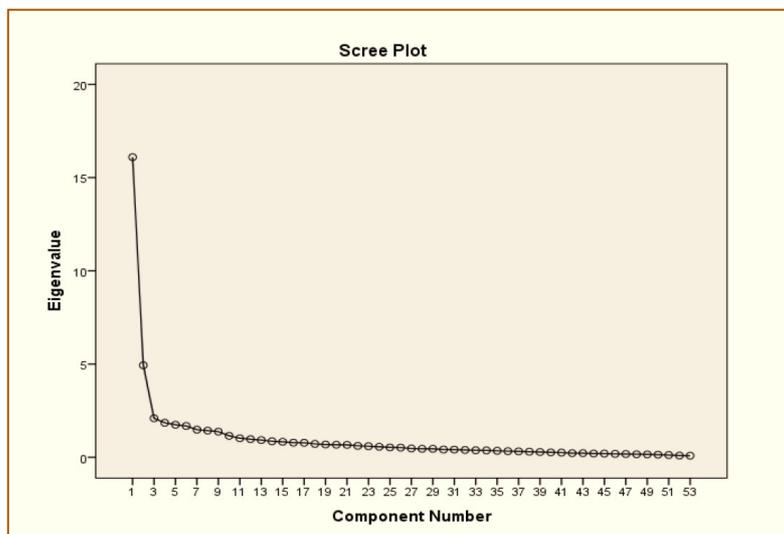


Figure 1. Screen plot from the factor analysis.

Table 4. Component extraction matrix (varimax method with kaiser normalization) with loadings of the two main components.

Rotated Component Matrix	Component		Rotated Component Matrix	Component	
	1	2		1	2
Q1	0.330		Q28	0.553	
Q2			Q29		0.750
Q3	0.491		Q30		0.658
Q4			Q31		0.610
Q5		0.664	Q32		0.765
Q6			Q33		0.777
Q7		0.530	Q34		0.558
Q8	0.699		Q35		0.421
Q9			Q36		
Q10			Q37	0.886	
Q11	0.708		Q38	0.744	
Q12	0.379		Q39	0.800	
Q13	0.619		Q40	0.468	
Q14	0.396		Q41	0.742	
Q15			Q42	0.445	
Q16			Q43		0.742
Q17			Q44		0.694
Q18			Q45		0.635
Q19	0.464		Q46	0.747	
Q20	0.424		Q47	0.434	
Q21			Q48		
Q22	0.652		Q49	0.457	
Q23	0.754		Q50		0.552
Q24	0.359		Q51	0.641	
Q25	0.578		Q52		0.510
Q26	0.363		Q53	0.465	
Q27					

Table 5. Score ranking according to the level of judicial vulnerability.

Total Points	Score
53-141 Points	High Risk
142-194 Points	Moderate Risk
195-265 Points	Low Risk

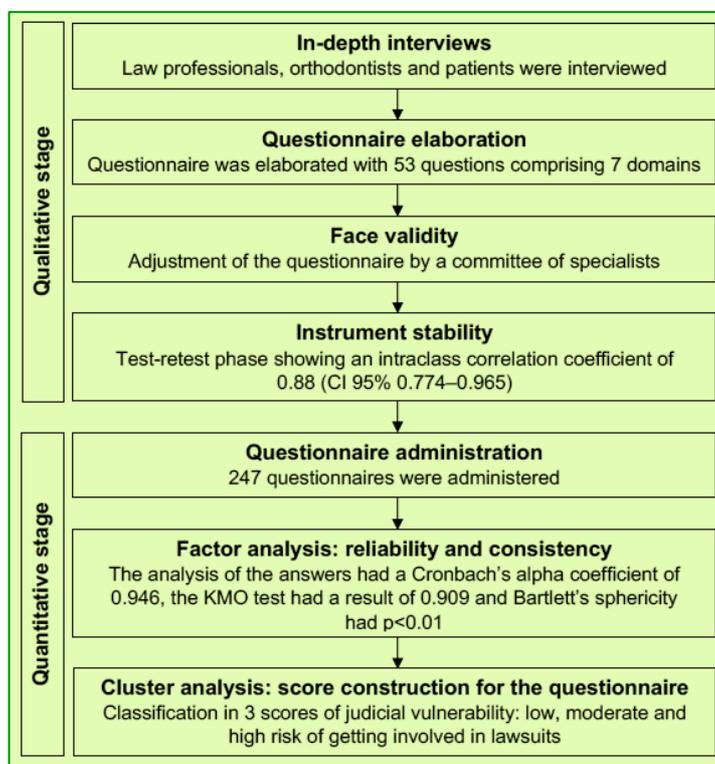


Figure 2. Flowchart of questionnaire development.

Discussion

Lawsuits can bring severe consequences for the professional, whether personal, domestic or social, possibly even compromising the continuity of their professional activity. Therefore, the best technical training and continued professional development are imperative for dentists, without neglecting some practices and cautions that could prevent them from the judicial risks involved with professional practice [9].

It is expected that liberal professionals, especially orthodontists, can always work with legal security. However, up until the moment, there was no available instrument capable of measuring the eventual risks of orthodontists in Brazil of getting involved in lawsuits associated with compensatory damages, even though this dental specialty is highly demanded in courts [10,12].

The construction of the questionnaire cared to elaborate, in the simplest and most accessible manner, questions capable of reaching the complete universe of orthodontists, including specialist and non-specialist respondents, and with more or less experience. Moreover, the score calculation allowed classifying the professional respondents in groups of low, moderate and high risks of being involved in lawsuits.

The domains identified in the in-depth interviews were crucial for the elaboration of the items in the questionnaire, as they indicate professional practices more susceptible to risks, and are frequently used as a base to lawsuits contrary to the interests of orthodontists [9].

The patient-orthodontist relationship, one of the domains of the questionnaire, is currently fragile. The commercialization of dentistry as a consumption product neglects orientation on the risks, goals and costs of treatment, which can result in patient dissatisfaction with the final result and, consequently, in lawsuits. On the other hand, a good relationship, motivation and cooperation are indicators of trust between the parties and enable the resolution of any intercurrentence that might appear during treatment [5,22].

Patient satisfaction with orthodontic treatment, as well as the chances of judicial claims by them, are unpredictable, increasing the risk of orthodontists getting involved in lawsuits [5]. However, it is important that the surgeon does not raise expectations that exceed the scope of orthodontic treatment, as the results are conditioned to the patient's collaboration and biological response. Therefore, effective communication is crucial for a good professional-patient relationship [22].

According to Oliveira et al. [23], improper professional training and development can motivate judicial resolutions for treatment issues. The analysis of judicial decisions against dentists in the state of Pará (Brazil) from 2003 to 2009 showed that there is a lack of knowledge around the ethical and legal aspects of professional practice, which makes professionals vulnerable in litigations. Training, professional development and awareness of judicial repercussions were contemplated in this instrument.

Contractual issues must also be contemplated in this risk analysis, as the written contract elaboration is a responsible move that favours judicial defence when needed. The written contract associated with the informed consent form is the basis for a safe professional practice, as it elucidates the patient's service and agreement with the proposed conditions [5]. Ferreira et al. [3] researched the motivating reasons for lawsuits in the state of São Paulo (Brazil) between 1996 and 2014, and among the cases analysed, the contract was one of the main motivating factors.

Concerning the knowledge on orthodontic documents, a study on the elaboration by Brazilian orthodontists found that these professionals neglect the elaboration of such documents under the required legal basis. The authors listed five aspects that should be considered on document elaboration, such as initial and final registration, copies of the patients' original documents, signed dental record, consent to treatment and acknowledgment of the importance of the CDC on services. The study found that none of the 1469 orthodontists who participated on the study considers all of these factors simultaneously when elaborating the documents, which poses as a vulnerability when faced with litigation from the patients [24].

The Brazilian Dentistry Code of Ethics, CFO Resolution no. 118/2012, establishes the documentation and update of dental records as a professional obligation. Article 6 of the CDC states that the patient has a right to access adequate and clear information regarding any aspects of the treatment. Thus the need of elaborating a free and informed consent term as a means for the professional to prove in court that the patient was granted every information regarding diagnostics, treatment options, costs and associated risks, along with the recommendations for the treatment success [25].

It is also essential to document the patient's collaboration regarding consultation attendance and compliance with the dentist's recommendations, as it institutes co-responsibility for treatment decisions when associated with consent for treatment [22]. Although it does not exempt the professional from responding for their actions, the establishment of a mutual agreement is documented and provable.

The questionnaire can become an instrument of preventive action at first, to try to avoid civil liability lawsuits against orthodontists, and of defensive action in a second moment, as a strategy to minimize the consequences of exposure to lawsuits. It can also be used on graduate and postgraduate courses to teach about

the legal implications of professional practice and the cautions that must be taken by orthodontists to work with legal security.

Conclusion

The questionnaire is valid and reliable to measure vulnerability on the exercise of orthodontics to lawsuits associated with compensatory damages, whether in a preventive or defensive manner, when dealing with such situations. In addition, the questionnaire presented a multidimensional character and might be applied as well as face-to-face or online, without prejudice to quality.

Authors' Contributions

CRSG 	https://orcid.org/0000-0003-4710-8556	Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft and Writing - Review and Editing.
ICGL 	https://orcid.org/0000-0003-1258-7331	Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft and Writing - Review and Editing.
FAP 	https://orcid.org/0000-0002-3059-5522	Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation and Writing - Original Draft.
MJSC 	https://orcid.org/0000-0003-3217-9001	Conceptualization, Formal Analysis, Investigation and Writing - Review and Editing.
SLMJ 	https://orcid.org/0000-0003-3601-8264	Conceptualization, Formal Analysis, Investigation and Writing - Review and Editing.
MMP 	https://orcid.org/0000-0002-8418-4139	Data Curation, Writing - Review and Editing and Supervision.
RWFV 	https://orcid.org/0000-0003-0861-7243	Conceptualization, Methodology, Investigation, Data Curation, Writing - Review and Editing, Visualization and Supervision.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

Financial Support

None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

References

- [1] Rodrigues CK, Shintcovsk RL, Tanaka O, França BHS, Hebling E. Civil responsibility of orthodontist. *Rev Dent Press Ortod Ortop Facial* 2006; 11(2):120-7. <https://doi.org/10.1590/S141554192006000200015>
- [2] Lyra MCAR, Pereira MMF, Musse JO. The obligation of results in the civil liability actions of the dentist in Brazil in 2017. *Rev Bras Odontol Leg RBOL* 2019; 6(3):47-58. <https://doi.org/10.21117/rbol.v6i3.259>
- [3] Ferreira MR, Terada ASSD, Araújo LG, Paz DC, Dezem TU, Silva RHA. Correlation between consumer complaints and lawsuits for failures in dental services, São Paulo state, Brazil. *Rev Bras Odontol Leg RBOL* 2018; 5(1):30-9. <https://doi.org/10.21117/rbol.v5i1.147>
- [4] Castro ACC, Franco A, Silva RF, Portilho CDM, Oliveira HCM. Prevalence and content of legal suits founded on dental malpractice in the courts of midwest Brazil. *Rev Bras Odontol Leg RBOL* 2015; 2(1):46-52. <https://doi.org/10.21117/rbol.v2i1.20>
- [5] Dias PEM, Beaini TL, Fernandes MM, Melani RFH. Legal liability and orthodontics: avoiding lawsuits. *Rev Bras Odontol Leg RBOL* 2014; 1(1):40-51. <https://doi.org/10.21117/rbol.v1i1.6>
- [6] Coltri MV, Silva RHA. Patient's record: comments to Brazilian Federal Law n. 13.787/2018. *Rev Bras Odontol Leg RBOL* 2019;6(2):89-105. <https://doi.org/10.21117/rbol.v6i2.253>
- [7] Magalhães LV, Costa PB, Silva RHA. Analysis of the lawsuits involving Dentistry in metropolitan Vitória, Espírito Santo State, Brazil. *Rev Bras Odontol Leg RBOL* 2019; 6(2):13-20. <https://doi.org/10.21117/rbol.v6i2.232>
- [8] Prado MM, Lopes APG, Aquino RS, Mendanha MH. Orthodontics and the interpretation of its obligatory nature: analysis of the potential impact of a decision from the Superior Court of Justice (STJ). *Rev Bras Odontol Leg RBOL* 2016; 3(2):53-65. <https://doi.org/10.21117/rbol.v3i2.5>
- [9] Guedes CRS, Leite ICG, Campos MJS, Mota Júnior SL, Phiton MM, Vitral RWF. Plain access to justice and the orthodontist's activity in Brazil: vulnerability in the professional practice in the face of risks of malpractice lawsuits. *Dent Press J Orthod* 2018; 23(4):88-93. <https://doi.org/10.1590/2177-6709.23.4.088-093.sar>

- [10] Soares ED, Carvalho AS, Barbosa JA. Commercial relation of the Brazilian orthodontist with his patient, obligatory nature of the service performed and risks of the orthodontic treatment. *Rev Dent Press Ortod Ortop Facial* 2007; 12(1):94-101. <https://doi.org/10.1590/S141554192007000100013>
- [11] Barroso MG, Vedovello Filho M, Vedovello SAS, Valdrighi HC, Kuramae M, Vaz V. The orthodontist's civil responsibility post-orthodontic therapy. *RGO* 2008; 56(1):67-73.
- [12] Melani RFH, Silva RD. The relationship between the dentistry professional and patient: the understanding and legal aspects involved in the orthodontic treatment. *Rev Dental Press Ortodon Ortop Facial* 2006; 11(6):104-13. <https://doi.org/10.1590/S141554192006000600013>
- [13] Scoaris RCO, Pereira AMTB, Santin Filho O. Elaboration and validation of an attitude assessment tool regarding the use of history of science in science teaching. *Rev Eletronica Ensen Cien* 2009; 8(3):901-22.
- [14] Silva PR, Araújo ESNN, Caldeira AMA, Carvalho GS. Construction and validation of a questionnaire for the analysis of bioethical conceptions. *Rev Bioet* 2012; 20(3):490-501.
- [15] Dias IM, Bastos RR, Alves RT, Leite ICG. Construction and validation of an questionnaire for evaluating self-medication practised by patients with temporomandibular disorders. *J Oral Rehabil* 2019; 46:424-32. <https://doi.org/10.1111/joor.12764>
- [16] Koo TK, Li MY. A Guideline of selecting and reporting intraclass correlation coefficients for reliability research. *J Chiropr Med* 2016; 15(2):155-63. <https://doi.org/10.1016/j.jcm.2016.02.012>
- [17] Norman G. Likert scales, levels of measurement and the "laws" of statistics. *Adv in Health Sci Educ* 2010; 15:625-32.
- [18] Streiner DL. Being inconsistent about consistency: when coefficient alpha does and doesn't matter. *J Pers Assess* 2003; 80(3):217-22. https://doi.org/10.1207/S15327752JPA8003_01
- [19] Hair JF, Anderson RE, Tatham RL, Black WC. *Análise Multivariada de Dados*. 6th. ed. Porto Alegre: Bookman; 2009. [In Portuguese].
- [20] Dancy CP, Reidy J. *Statistics without Maths for Psychology: Using SPSS for Windows*. 3th ed. London: Prentice Hall; 2005.
- [21] Kaufman L, Rousseeuw PJ. *Finding Groups in Data – An Introduction to Cluster Analyses*. New York: John Wiley and Sons; 1990.
- [22] Souza RA, Oliveira AF, Pinheiro SMS, Cardoso JP, Magnani MBBA. Expectations of orthodontic treatment in adults: The conduct in orthodontist/ patient relationship. *Dental Press J Orthod* 2013; 18(2):88-94. <https://doi.org/10.1590/S2176-94512013000200019>
- [23] Oliveira CML, Bezerra ESM, Lobato IH, Nobre RM, Machado SM, Barroso RF. Processes against dentists at "Conselho Regional de Odontologia - seção Pará" in the last seven years. *Saúde, Ética e Justiça*. 2010;15(1):46-52.
- [24] Soares ED, Araújo NS. Brazilian orthodontists and the legal issues involving their professional activity: A legal and behavioral proposal. *Dental Press J Orthod* 2013; 18(6):65-71. <https://doi.org/10.1590/S2176-94512013000600011>
- [25] Silva DMB, Bruno KF, Praxedes LR, Tolentino PHMP. Proposed of informed consent in regenerative endodontics. *Rev Bras Odontol Leg RBOL* 2020; 7(2):33-42. <https://doi.org/10.21117/rbol-v7n22020-293>