

Assessing preferences from the perspective of different social actors in decision-making related to minimal intervention strategies - a protocol guiding discrete choice and willingness-to-pay experiments to link clinical evidence to implementation

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Study protocol

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Abstract

Background

Although substantial evidence supports Minimal Intervention Dentistry (MID) for managing dental caries in children, translating this evidence into routine practice remains challenging. As evidence-based dentistry integrates the best available evidence with professional expertise and patients' values, understanding how different social actors value diagnostic and treatment strategies may facilitate evidence implementation. This protocol describes the development of discrete choice experiments (DCEs) and willingness-to-pay (WTP) assessments to evaluate the preferences of children, caregivers, and society regarding evidence-based strategies for caries management in pediatric dentistry.

Methods

This multicenter study will include children aged 6–10 years, parents or caregivers, and adults without children from the five geographical regions of Brazil. Participants will be recruited through a citizen science strategy involving universities, public health services, and trained citizen researchers. Audience-specific DCE instruments will be developed following ISPOR recommendations through attribute selection, experimental design, pilot testing, and instrument refinement. Participants will complete binary choice tasks based on hypothetical scenarios describing evidence-based diagnostic and treatment strategies for caries management. A complementary WTP assessment will estimate the value assigned to these strategies from a societal perspective. Preferences will be analysed using panel mixed logit models to estimate the relative importance of the attributes and to explore preference heterogeneity according to participants' characteristics.

Discussion

By incorporating the perspectives of children, caregivers, and society, this study seeks to generate evidence that supports the implementation of evidence-based pediatric dental care. The findings are expected to inform implementation strategies, guide resource allocation, and support health policy decisions that better reflect users' values and preferences.

Trial Registration

<https://osf.io/eybh4>

Background

Untreated dental caries in primary dentition encompasses more than 600 million children throughout the world, being the burden disease more prevalent among children (1). Although minimal intervention is a

philosophy scientifically recognized to manage this situation and recent scientific evidence has contributed to application of diagnostic and therapeutic evidence in this sense into clinical practice, such background is not sufficient for this scientific evidence in a real-world scenario either in clinical practice or in health public policies.

While scientific community has tremendously invested in producing evidence related to minimal intervention to caries management on clinical setting, translating scientific knowledge into the healthcare context may be a complex process, including several barriers, such as those structural, organizational and behavioral. These barriers may result in approximately two decades in between evidence production and its actual incorporation into the healthcare services (2). Therefore, recently produced evidence, motivated by real-world problems, faces a big deal to solve the situation they are produced for. In this sense, it is essential to comprehend those factors which may influence the decisions in clinical practice (3)

The first attempt of our group has been focused on dentists' perspectives of recently produced scientific evidence on clinical practice (3). Nevertheless, evidence-based dentistry involves the balance of the best available information and the patient's values, besides professional expertise, to optimize outcomes (1, 4, 5). As different attributes may be considered in the decision-making process (6) and preferences may vary according to audience (7), it is important to understand what different stakeholders value when choosing some intervention in pediatric dentistry to promote the implementation of evidence. Different perspectives from different stakeholders may also be directly related to the implementation of such findings in clinical practice.

Crucial agents in this process are the patient and their families. On the other hand, there is a significant gap in accounting for patient preferences regarding healthcare interventions (8–11). Besides, when considering the adoption of an intervention in a public healthcare system, healthcare users' point of view, even those who are not benefited by such intervention directly, are relevant for decision-making since they are in charge for sustaining such inclusion in terms of taxes or funding (12). As different attributes may be considered in the decision-making process (6), it is important to understand what different stakeholders value when choosing a treatment like those, aiming to promote the implementation of evidence. We believe that an implementation proposal that considers the views of these different stakeholders tends to be more efficient.

The parallel use of different models and methodological strategies may permit an actual overview of different users' preferences and choices and how they value different interventions, related to caries management, both regularly offered (or to be offered) in the healthcare system or those whose evidence to clinical use has been recently produced.

Understanding user preferences is possible through the construction of hypothetical scenarios that present different alternatives for choice, with varying characteristics (attributes and their levels, possible variations) (13). The Discrete Choice Experiment (DCE) one of the techniques used to quantify preferences and has been commonly used in the health field for patients, professionals, and other

stakeholders (13, 14). The DCE will evaluate decision-making in a non-obvious way to minimize the ready-made response bias and permit to understand which factors influence on this decision, helping to create strategies for implementing evidence in public policies (15).

Another possibility to determine the strength of users' preference is the Willingness To Pay (WTP) measurements. They permit establishing the relationship between stakeholders preferences and the valuation of the intervention is being proposed. This is an important parameter for some economic analyses, cost-benefit analyses, that consider patient's preferences and monetize these preferences using these WTP measurements (16). These economic assessments are valuable tools since valuing an health effect in monetary units (WTP), and may bring out a more objective view of the value in their lives (17, 18). In such experiments, users are supposed to value their options based on a pool of attributes, valorizing those in the pool that they prefer conjointly (19), which also permits weighing different attributes in a more complete context that involves decision-making. In this way, different and diverse stakeholders and scenarios can be explored in such analyses.

Specifically in Pediatric Dentistry, an additional challenge should be stated. Children's and adolescents' views as decision-makers have been significantly recognized in healthcare (20, 21). Systematic measurement of children's preferences is not widely explored, and several methodological challenges may be posed due to that (21, 22). Parents' or caregivers' answers have been commonly used as a proxy for children's answers due to difficulties when measuring themselves (23, 24). However, they do not necessarily reflect the child's preference (25). On the other hand, the child/adolescent will be directly impacted by the chosen therapeutic option. It is also a matter of inclusion to consider children's/adolescent's preferences in decision-making process. That is why pediatric patients must also be included in the decision-making process, and their preferences must also be heard and such issue reflect another innovative aspect of this project.

Considering the exposed up to here, it is evident that understanding preferences requires a representative and comprehensive overview of the society/population. In this sense, our group has been advocating the use of citizen science to fulfil the premises we expect for these behavioral economic experiments applied to decision-making in healthcare involving different stakeholders (3). Citizen Science is a key strategy we are using in this sense because it can achieve a sample that may represent the diversity of stakeholders inserted into different realities and optimize data collection by involving citizens in formal research (22, 26, 27). Using citizen science tries to comply with diversity, equity and inclusion (DEI) principles. Those principles in healthcare have focused on ensuring impartial treatment and promoting respect, support, and active engagement for all individuals, regardless of their diverse backgrounds (28, 29). We expect to represent a wide range of identities — including race, ethnicity, gender identity, sexuality, and socioeconomic status— and also to critically examine the barriers from the evidence to the implementation process, contributing to an equitable and inclusive healthcare system, benefiting all individuals and communities (28, 29). Besides the preferences and their potential diversity, leading with resource allocation is mandatory to implement a novel strategy in private and public health

systems. Considering how different stakeholders present diverse perspectives and value the treatments may be essential to optimize the use of the available resources (27).

Therefore, this protocol encompasses a pioneering study that aims to assess the preferences of different social actors regarding recently produced evidence to base interventions in Pediatric Dentistry. It focuses on the attributes of decision-making processes among pediatric patients, their parents/caregivers, and society which is whom chance different healthcare system. Such an approach can facilitate resource allocation, increase patient satisfaction, and ultimately improve outcomes in the treatment of dental caries worldwide. This is part of a broader initiative to reduce gaps in implementing scientific evidence into clinical practice and in developing health policies on prevention, such a study will enable the customization of evidence dissemination to the intended audience, encompassing both health professionals and service users. By judging how diversity and economic factors influence these decisions, we also aim to contribute to developing more inclusive public health policies.

Methods/Design

This protocol was written following a modified version the International Society for Pharmacoeconomics and Outcomes Research - ISPOR Good Research Practices for Conjoint Analysis Task Force (9, 10) (Appendix 1).

Aim/Study Design

DCE and WTP experiments will be conducted cross-sectionally to identify the attributes associated with the choices and preferences related to decision-making for recently produced scientific evidence, reported by healthcare system users (children, caregivers, and other adults - society in general, tax payers). This study is part of a broader initiative aimed at reducing possible gaps between the production of scientific evidence and its incorporation into real-world practices, and to this end the opinions of different stakeholders are being explored for the development of various protocols in Brazil (DOI: 10.1186/s12903-024-04090-3). This part of the initiative, focused on society, is registered in the Open Science Framework platform (<https://osf.io/eybh4>). Other segments were also registered and published separately (3). This initiative aggregates researchers from different Brazilian academic centers to ensure that different views are included, and that potential data are collected from different geographical regions.

Research question and hypotheses

1. What are different social stakeholders' preferences, choices (children/patients, caregivers and healthcare users-society), and willingness to pay regarding clinical decision-making considering recently produced evidence on diagnostic and therapeutical minimal intervention procedures in pediatric dentistry?
2. Are observed different children's value attributes of evidence-based oral health practices, and in what ways does this perspective diverge from or converge with value indicators established by

caregivers and specialists?

Participants and strategies of recruitment

Our sample will comprise Brazilian adults (> 18 years old), with or without children, who agree to participate in the study, and children aged 6 to 10.

The sample will include people from different regions in Brazil. 14 centers of Health Departments and Public Universities from different states across Brazil will be involved in the process (Fig. 1). In the North Region, participating institutions included the Federal University of Pará (UFPA) and the Federal University of Amazonas (UFAM). The Central-West Region was represented by the University of Brasília (UnB). In the Northeast Region, data were collected by the Federal University of Ceará (UFC), Federal University of Bahia (UFBA), Federal University of Piauí (UFPI), Federal University of Paraíba (UFPB), the Municipal Health Department of João Pessoa, and the Federal University of Pernambuco (UFPE). The Southeast Region included the State University of Rio de Janeiro (UERJ) and the University of São Paulo (USP), which also served as the coordinating center. In the South Region, participating institutions were the Federal University of Pelotas (UFPEl), Federal University of Rio Grande do Sul (UFRGS), and Federal University of Santa Catarina (UFSC).

Figure 1 - Centers involved in the process

Source: the authors

Representatives from the centers will receive comprehensive training to ensure they could administer the questionnaire both ethical and efficient. This training will provide guidance on standardized procedures, clarified any potential doubts about the application process, and emphasized the importance of maintaining consistency and ethical standards. The centers involved in the study will adopt different recruitment strategies depending on local context and available resources.

Participants enrolled in the study will be invited to become citizen researchers. Those who accept will receive training on both ethical and methodological aspects, ensuring the integrity and autonomy of the professionals they will subsequently recruit. These citizen researchers will then apply the instrument to their peers, expanding the study's reach to citizens from different regions of the country, including those distant from major research centers.

The sample size for caregivers and the social public was determined based on the number of attributes in the DCE. A priori, we calculated the sample size using the rule of ten respondents per attribute plus 50, totaling 120. Considering a 20% non-response rate, the final target was 150 people per center, allowing analyses at the individual centre level with sufficient statistical power. For the experimental design, we opted to use two blocks to make the experiment shorter and less cognitively demanding. For the sample of children, a maximum of six attributes per DCE was set, and the minimum required sample size is 110 participants. Adding 20%, the projected total is 132 participants.

Settings

The DCE instrument will be self-administered and delivered in a virtual environment. The computerized approach has already been used in previous studies measuring preferences (30). This strategy is also reported as an alternative by the World Health Organization guidelines for conducting DCEs (31).

DCE Development

The development of the DCE instrument was divided into four phases:

1. Definition of attributes and levels,
2. Determination of the experimental design (efficient combination of the attributes and attribute levels presented to the respondents),
3. Pilot test of the preliminary instrument
4. Adjustments in the preliminary instrument to create the final version of the instrument to be used in the experiment

A summary of all these processes is shown in Fig. 2 and will be detailed in the following sections.

Figure 2 - Steps to the development of the experimental instrument: (a) Definition of attributes and levels, (b) Determination of the experimental design for efficient combinations of attributes and levels presented to respondents, (c) Pilot test of the preliminary instrument conducted with a small convenience sample and (d) Final adjustments guided by pilot test to provide the final instrument. The steps will be the same for each instrument devised for each specific audience.

Source: the authors

Phase 1 - Definition of attributes and levels

Attributes will be considered the characteristics that may influence decision-making, e.g. cost, discomfort, time) while levels were to describe or to define these attributes (e.g., low, medium and high cost; with or without discomfort; 5min or 10min) (Fig. 3).

Figure 3 - Example of hypothetical choice sets using arbitrary attributes and a treatment clinical scenario followed by a binary set of unlabeled alternatives. Participants will complete each choice set by answering a scenario question: "To control some caries lesion, would you prefer a treatment that combines which set of characteristics?". Alternatives vary in attribute levels.

Source: the authors

This list of attributes will be submitted to a different panel of specialists to revise the items regarding their relevance and clarity to a non-dentist audience. For the composition of the children's panel,

professionals with experience in understanding children's perceptions and cognitive abilities will be invited, including educators, psychologists, pediatricians, and experts in communication and visual representation.

The panel will comprise representatives from each region of Brazil, one dentist and one non-dentist, who could represent the views of the users responding to the experiment. The participants will be presented with a list containing the pre-defined attributes and their varying levels, based on the DCE developed for dentists (3). After the presentation, the panelists must evaluate the attributes and levels critically. They will be invited to express their contributions, suggesting possible modifications whenever they demand. They can contribute by adding new attributes and/or deleting those presented if they deem it necessary. At the end of the session, the panelists should agree on the final list, which will then be validated.

In this stage, the goal will also be to adapt the attributes and levels related to the incorporation of scientific evidence to the child's perspective, taking into account their cognitive, emotional, and communicational characteristics. To this end, the way information is presented will be adjusted, using resources such as graphical representations, visual elements, and other strategies that facilitate understanding, without distorting the study's core decision-making content. The research project will be presented to the panel participants, and the feasibility of evaluating, in an ethical and methodologically appropriate manner, children's participation in a discrete-choice experiment focused on their perception of evidence-based information related to oral health care will be discussed. The list of attributes and levels previously defined by the DCE-caregivers/society panel will be made available as an initial reference and may be adapted as necessary.

Phase 2 - Determination of the experimental design

At this stage, the aim was to produce the minimum possible choice sets (pairs of alternatives), combining the levels of the attributes. The experimental design is a manner to combine these pairs for each choice set in the most efficient arrangement of the pairs of alternatives, aiming not to use all possible combinations (cognitively impossible) but a number enough to permit the preference to be measured. The more attributes and levels (more sets of choices) used, the greater the complexity of the experiment and, consequently, the more significant unobserved variability we must consider in the analysis. A list with minimum but enough combinations will be generated at the end. The design efficiency (D-efficiency) will be calculated to determine if the number of pairs set, as mathematically combined, can assess the possible effects (preference) intended to be measured. The experimental design, as well as the D-efficiency calculations, will be performed using the Ngene software (32).

Phase 3 - Pilot test of the preliminary instrument

A pilot study will determine after the respective panel is appropriate for investigating preferences. Then, a convenience sample of 20 respondents will be selected for each DCE in the coordinator center

(FOUSP). In this stage, representatives from diverse scholarship levels must be included to check for any amendments that need to be made before the main assessment.

Firstly, a pilot assessment with levels presented independently will be performed to identify respondents' comprehension of their meaning and application, approximating from a face and content validity. In case of any inconsistency or need for amendment, a co-creation panel with the representatives of the target audience will be formed, and these representatives will help in finding a way to transmit the information more clearly and accurately.

Then, when solving possible issues regarding communication, an electronic form will be created with each DCE-pilot version. Besides the choice sets, specific questions about the difficulty level and the time needed to answer the questions will be inserted to check feasibility. Besides completing the form, the pilot respondents will be invited to share their difficulties and opinions with the coordinator board to create suggestions for improvement for the experiment. If the pilot instrument is acceptable and does not need adjustments, this sample will be considered automatically as part of the main sample in an internal pilot study (33). In case amendments are needed, and a change in the instrument or the experimental design is mandatory, an external pilot will be considered (34).

Phase 4 - Adjustments in the preliminary instrument

Based on inputs of the pilot respondents regarding cognitive exhaustion, reasonability and comprehensibility of the tests, any amendment may be done in the attributes and levels, number of alternatives, experiment format or presentation and the final instrument will be created to guide the main collection. Depending on the type of the request/ query, one or more phases described above will have to be redone. Eventually, a new pilot study may be necessary to retest the changes and produce a final experiment for the whole main sample.

Willingness to pay experimente Development

A Willingness To Pay (WTP) experiment will also be implemented to allow participants to demonstrate the value they assign to the interventions under investigation, considering their characteristics and specificities. To conduct this experiment, given the described scenario, we will investigate the population's willingness to finance such resources through societal contributions, so that the diagnostic methods and treatments under analysis could be implemented in primary dental care for children (societal perspective).

The WTP was developed for each pair of interventions studied individually and applied concurrently to the same sample. This approach will allow the monetization of values centered on society's perspective and may also associate the value assigned to favored attributes. After presenting the scenarios, participants will be introduced to a "bidding" procedure (bidding algorithm) involving monetary amounts, with the tool administrator demonstrating and informing participants of the service outcomes (effects),

alternatives, and consequences. This allows individuals to decide their preferences and how much they would be willing to pay for the service (WTP). The WTP will be addressed as the amount participants are willing to pay for society to access the proposed diagnostic and treatment methods for the control of caries lesions, with effects assumed for two years after receiving the diagnostic methods and treatment.

To obtain WTP, the process will start with an initial bid representing an individual contribution so that all children with primary dentition receive the diagnostic methods and treatment in the public health system (SUS). Subsequently, the bid will be increased if the participant responds positively or decreased if the response is negative, until reaching the value the participant is willing to pay for the benefit of the provided intervention. If participants do not choose a particular intervention or condition (in preference to another being evaluated), it will be assumed that they are not willing to pay any contribution, ending the bidding process. This approach allows for comparison of WTP values reported by family members and other adults in society.

This experiment will also investigate the children's own willingness to assign value to evidence-based oral health care practices, using hypothetical scenarios tailored to their age group and cognitive abilities. The experimental design will seek to capture, in an indirect and non-strictly monetary manner, the perceived value children assign to the presented alternatives, while respecting the ethical principles of research involving minors and ensuring that the process is appropriate for their developmental level.

To explore children's value attribution, the experiment will begin with a scenario of pediatric oral health care presented as a standard, every day, and familiar situation. This scenario will be described using simple language and visual aids, depicting a basic follow-up visit and care guidance. Based on this initial situation, the children will be invited to express, in a progressive manner adapted to their age group, how much they value the adoption of care approaches based on recent scientific information, considering the perceived benefits in the presented context.

Instrument properties

In all DCEs, the electronic template to be completed by participants will encompass the Informed Consent Form, a preliminary questionnaire to gather participant information, and the Discrete Choice Experiment (DCE) instrument itself, including the choice sets outlined in the following sections. In the Children's DCE, parents must sign a consent form, and for children aged 7 years or older who can read and write, a form for free and informed consent will be provided in the presence of a legal guardian. The DCE instrument will feature sequential choice sets, presenting pairs of alternatives within a binary forced-choice framework, given a clinical decision-making context of choosing an alternative to controlling caries lesions in children. The experiment will comprise three blocks:

1. (a) Hypothetical alternatives combining levels of attributes, as determined in the experimental design as outlined in the following section and;
2. (b) Real alternatives, including the same attributes as hypothetical alternatives, but whose levels will be intentionally defined considering the pairs of interventions proposed as a reference in the

beginning. Among the alternatives, labelled and non-labelled alternatives will be randomly disclosed to avoid generating an automatic association between them and permit the judgment concerning anchorage bias in choosing (or not) treatments that potentially cause aesthetical dissatisfaction.

3. (c) Willingness to pay

Data collection

After consent/assent is obtained, a preliminary questionnaire that encompasses sociodemographic questions and gathers information on the respondent's dental history will be applied. In the case of children, the sociodemographic and dental history questionnaire will be completed by their guardians, and the remaining phases of the procedure will be similar to those of other DCEs, with appropriate adaptations. The form collects the following sociodemographic information: age, race, gender, sexual orientation, presence of disability, marital status, educational level, occupation, presence of children (number, age, and history of dental treatment), number of household members, family income, as well as city and state of residence.

Following that, questions containing the hypothetical scenario and hypothetical pairs of alternatives with varying levels will be presented, enabling the respondent to engage in the validation process through their responses. Finally, in the last section, the same scenario will be presented but associated with labelled and non-labelled pairs of real interventions defined by the same attributes used in the previous section. Respondents must choose between the options available and click on "proceed". Then, the context will not change until the last choice set, but the alternatives (levels) will vary. The choices made in the survey will be coded as chosen (1) or rejected (0).

All data collected using online forms will be securely stored in a cloud-based system (Google Drive) and anonymized by the study coordinator using random numbers. Only the designated researcher (MMB, LGF, RPLP) can access identifiable data and signed consent forms, while the research team will work exclusively with the anonymized dataset. An independent data set will be created for each DCE.

After the study, the anonymized data will be downloaded for analysis, and any records on virtual platforms will be permanently deleted. Additionally, the dataset will be made publicly available in an institutional repository after the results are published. Any missing data will be handled using conditional imputation methods, applying the appropriate regression models based on the type of imputed variable. At the end of the study, anonymized data will be available in an open institutional repository (<https://uspdigital.usp.br/repositorio/>).

Analysis plan

Using the DMPtool, we prepared one analysis plan and are available for access (35).

From the main preference assessment, the choice outcomes on different attributes for each DCE will be collected. Independent variables will also be collected from the preliminary block to characterize the

participants. Centre coordinators will also collect center characteristics to ensure further model adjustments and explore possible variabilities.

Missing data will be identified and reported, but in the first analysis, a per-protocol analysis will be conducted to avoid external influences. An intention-to-respond strategy may also be used and the method of conditional imputation will be utilized considering an appropriate regression model according to the type of variable to be inputted.

The characteristics of the respondent sample will be examined against the known characteristics of the population whose preferences researchers may want to generalize, using appropriate statistical analyses to test the hypothesis posed. Non-respondents' characteristics will be compared to those of respondents to verify if any selection bias may have been included in the study. Another purpose of such statistical analyses might be to estimate how preferences vary by individual respondent characteristics. Multinomial regression models will be used to relate respondents' choices to respondents' personal and professional characteristics (respondents' profiles).

The validity of the data will be checked considering response error (included in the set of choices to detect internal validity failures), respondents who always or nearly always choose the alternative with the best level of one attribute, and preferences dominated by a single attribute. Any failure of internal validity detected will be controlled statistically as the analyses progress.

An attribute selection will be considered the primary outcome to estimate the strength of preferences for the attributes included in the survey. We also aim to demonstrate how choice probabilities may vary with changes in attributes or attribute levels. Additionally, we intend to estimate how preferences vary based on individual respondent characteristics in such statistical analyses. At a first attempt, the probability of choice for each attribute (and its respective levels) may be calculated using panel mixed logit models. This method fits a mixed logit model to choice data in which respondents make repeated choices (different sequential tasks). It uses random coefficients to model the correlation of choices across alternatives (36, 37). The random coefficients are on variables that vary across alternatives (and may vary over individuals and choice sets), known as alternative-specific variables. The correlation of choices across alternatives relaxes the independence of alternatives assumption required by other models. Marginal effects will be used to estimate the effects of variables and facilitate parameter interpretation. Direct (an alternative-specific variable on its own choice probability – main outcome/attribute) and indirect (an alternative-specific variable on the choice probabilities of the other alternatives– other attributes) marginal effects will be also calculated (38). For goodness-of-fit, the likelihood ratio chi-square test will be calculated for each model to provide a way to determine whether the inclusion of attribute-level variables significantly improves the fit of the model compared to a null model.

This study also includes an analysis of diversity, equity, and inclusion, considering the sociodemographic characteristics of the sample as a representation of Brazilian society. Diversity refers to the variety of characteristics among participants and their contexts, including geographic diversity (citizens from all five Brazilian regions), household income range, and educational attainment. Equity was ensured by

providing all participating centres with comparable conditions and resources for participant recruitment, regardless of their geographic location, size, or institutional capacity. Inclusion refers to the extent to which different sociodemographic groups were represented in the sample and given equal opportunity to participate, that individuals and groups should be respected, supported, and engaged in the research context.

Data analysis is planned to be performed in Stata 18 statistical software (StataCorp LLC 2023). Commands will be used as proposed in the respective manual (38) and the scripts will be available in an open repository linked to registration.

Discussion

This protocol is pioneering in the use of this methodology to quantify our audience's preferences in pediatric dental care, particularly in relation to diagnostic strategies and minimally invasive interventions. One of the main strengths of this work is its focus on society and the family unit, emphasizing the importance of understanding the preferences of health service users, involving a multifaceted and complex process.

In this context, the use of the DCE methodology is an effective way to identify the importance of different characteristics/attributes within a group of respondents, without directly asking for explicit preferences (14). Stated preference methodologies refer to questionnaire-based approaches designed to capture individuals' inclinations toward certain behaviors, especially when nuances and particularities are not fully understood (39). Through hypothetical scenarios, participants weigh different choices and decide on a product or service alternative that offers them the greatest benefit (40, 41). Thus, reasonable predictions about health-related behaviors can be made (42).

In recent years, the use of DCEs as a patient-centered methodology to identify health preferences has gained prominence. In dentistry, this has been done mainly to assess their preferences regarding oral health interventions (43–46). In pediatric dentistry, attributes such as cost, number of appointments required, and success rate can play significant roles in decision-making and, consequently, influence the proposed treatment plan (45). After all, this makes it possible to tailor the approach and offer personalized care aligned with individual needs and values, resulting in better clinical outcomes, greater satisfaction, increased treatment adherence, and possibly a reduction in gaps in evidence-based practices (8–10).

Another differential in this protocol, also aligned with DE&I principles, is the attempt to capture preferences from a sample that reflects the diversity of the Brazilian population. Brazil possesses an intrinsic geographical, cultural and ethnic diversity but actively demands efforts to ensure greater equity and inclusion for all its citizens. In this context, adopting the multicentric and citizen science strategy will contribute to ensuring the sample's representativeness. This approach will also facilitate access to diverse respondent profiles and contexts (47), may optimize resources spent in the protocol conduction

and democratize science by involving regular citizens in different phases of the research process and making society active contributors to science (47, 48).

Using the methodology to capture societal preferences, this study aims to offer evidence-based guidance to stakeholders such as dental professionals, healthcare decision-makers, policymakers, helping to align pediatric dentistry with the values and needs of patients and Society. The recognition of the importance of targeting specific audiences highlights the need for the validation of questionnaires (49, 50), including those used in DCE studies (14, 51). In addition, the implementation of research methods ensures the integration of patient preferences and values into decisions about healthcare services designed for their needs and monetizes this preference by verifying their willingness to pay for a given attribute (21).

This innovative study, focused on society and the family, has the potential to generate fundamental insights into the preferences of healthcare service users. However, considering that preferences may vary between countries, this study could serve as a model for adapting these practices, recognizing different contexts. By measuring user preferences through the chosen methodology, this study can provide input for evidence-based guidelines and recommendations that are not only based on scientific data but also aligned with patients' preferences and values, thereby improving the quality of pediatric dental care. From a broader perspective, the methodological choices discussed here have the potential to generate results that support the implementation of processes in a more representative, inclusive, and equitable manner. Ultimately, these findings may contribute to improving health outcomes for the general population in the future.

Abbreviations

- DCE
Discrete Choice Experiment
- WTP
Willingness to Pay
- DEI
Diversity, Equity, and Inclusion
- MID
Minimal Intervention Dentistry
- SUS
Unified Health System (*Sistema Único de Saúde*)
- ISPOR
International Society for Pharmacoeconomics and Outcomes Research
- OSF
Open Science Framework
- D-efficiency
Design Efficiency

- UFPA

Federal University of Pará

- UFAM

Federal University of Amazonas

- UnB

University of Brasília

- UFC

Federal University of Ceará

- UFBA

Federal University of Bahia

- UFPI

Federal University of Piauí

- UFPB

Federal University of Paraíba

- UFPE

Federal University of Pernambuco

- UERJ

State University of Rio de Janeiro

- USP

University of São Paulo

- FOU SP

School of Dentistry, University of São Paulo

- UFPel

Federal University of Pelotas

- UFRGS

Federal University of Rio Grande do Sul

- UFSC

Federal University of Santa Catarina

Declarations

Ethics approval and consent/assent to participate

The study on the views of the society and caregivers was approved by the Ethics Committee of the Dentistry School, University of São Paulo (Number: 6.492.845 and 7.746.487), and will be conducted virtually, using electronic forms following the recommendations of the World Health Organization guidelines for conducting DCEs (52). The phase involving children's perceptions has been submitted to the ethics committee and is awaiting approval.

Consent for publication

Not applicable

Availability of data and materials

All data, including the questionnaires, all resources, and intermediate parts, will be available at <https://osf.io/eybh4>. The final data will be available as open data via the University of Sao Paulo online data repository.

Competing interest

Prof. Mariana M. Braga is a Senior Editor, Prof. Tatiana Pereira-Cenci and Prof. Tathiane L. Lenzi are Associate Editors at BMC Oral Health. Besides, Prof. Paulo Nadanovsky is Editorial Advisor for the same journal. Nevertheless, none of them will take part of the editorial process related to this manuscript. Other authors do not have any competing interests.

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Author's contribution

MMB is the initiative coordinator and was responsible for the conceptualization and design of the study. She also will be responsible for the experimental design, trial supervision, data management, analysis, and data interpretation.

RPLP was responsible for drafting the protocol and participating in the conceptualization and design of the study. She also organizes and contributes to the DCE instrument development. She will be responsible for data collection, study conduction, data management, and interpretation. She also will be responsible for drafting the articles derived from this protocol.

ACFL, LGF, LGSR, MVZPS organizes and contributes to the DCE instrument development, and will be responsible for data collection, study conduct, data management, and interpretation. They also will be responsible for drafting the articles derived from this protocol.

AYF, MMSC, LSA, LAJ and MHH participate in the design of figures for this protocol, and the organization of the multidisciplinary panel, as well as DCE instrument development. They will assist in the application of the DCE instrument and the collection of data.

ACC contributes to the refinement of the study design, integrates the multidisciplinary panel, as well as will contribute to the review of the DCE instrument. She also will participate in the discussion study findings.

FCAC, MFMT, MG participates in the conceptualization of the study and integrates the multidisciplinary panel. They are also acting as a facilitator in applying the instrument at the Brazilian Unified Health System (SUS) and will participate in the discussion study findings.

DPR, FMM, TKT, TG, MGB, GMC, MMB, FCAC, EMC, CMP, LRPA, FCM, LBM and JCPI participate in the conceptualization of the study and integrate the coordinator board to refine the final list of attributes and levels. They also will participate in the discussion of the study findings.

ACC, MAB, TLL, TPC, RSAC, RDF, PN, PGC, MSC, MG, MFMT, MDML, MCC, MSM, LLSF, LSO, KNMC, IMD, HHCP, GAP, EHGL, CBVL, CCL, CLS, CVG, CMS, CMCCB, AFM, APPS, APCQH, ALSFM and AERM integrates the multidisciplinary panel, have substantively revised this manuscript, and will participate in the application and discussion of study findings.

All authors critically reviewed, approved the final manuscript as submitted and have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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Figures

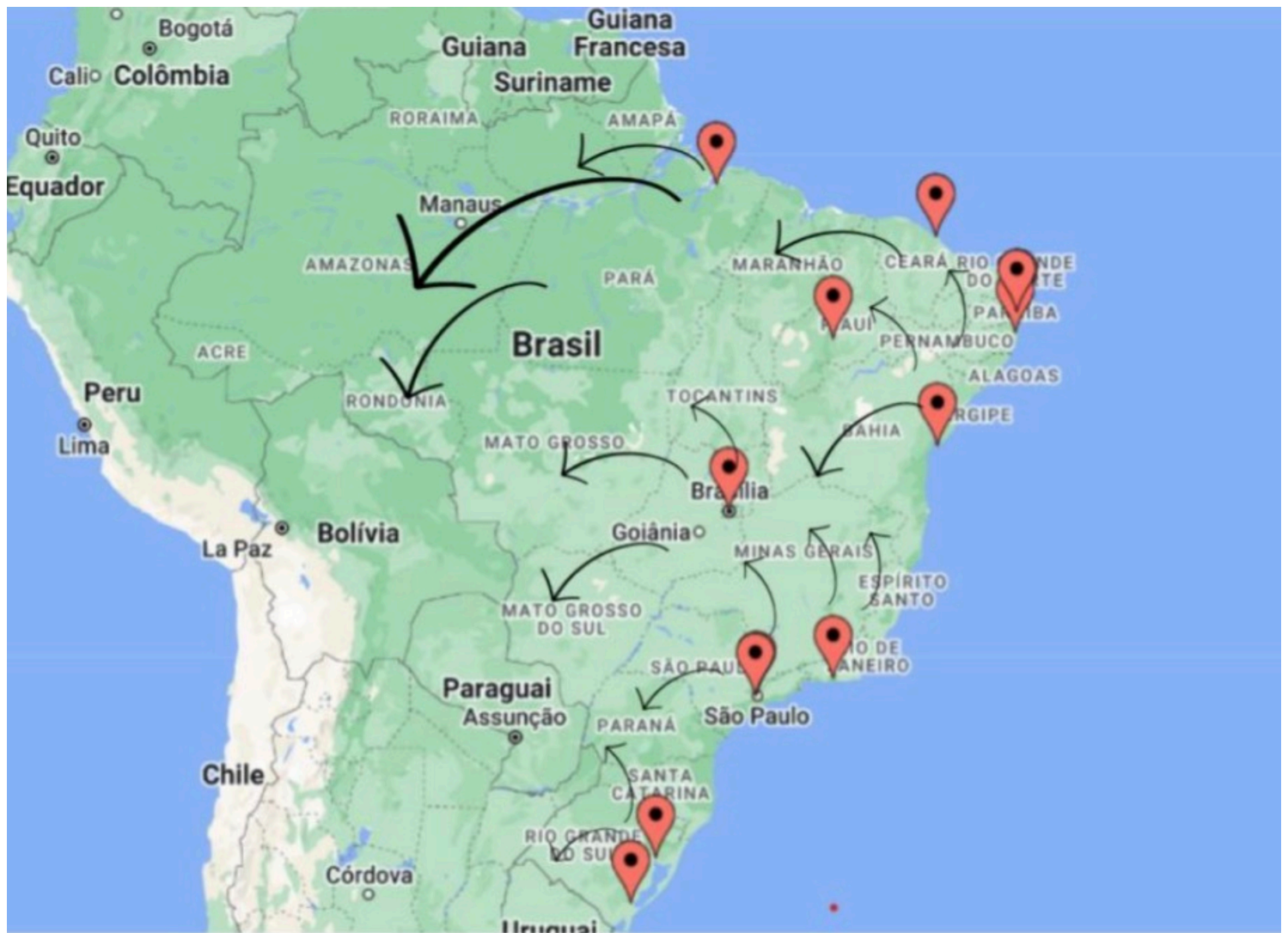


Figure 1

Centers involved in the process

Source: the authors

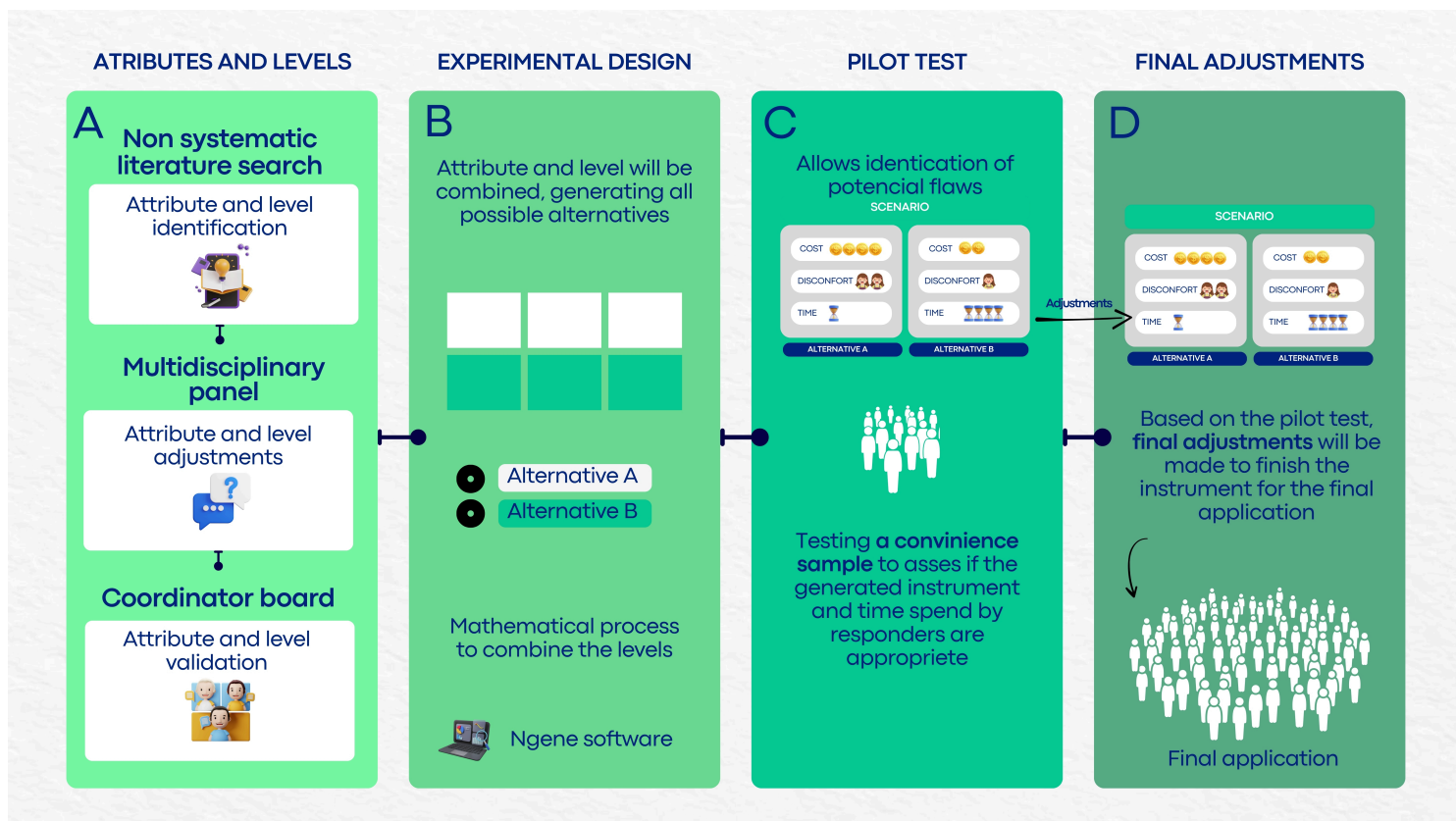


Figure 2

Steps to the development of the experimental instrument: (a) Definition of attributes and levels, (b) Determination of the experimental design for efficient combinations of attributes and levels presented to respondents, (c) Pilot test of the preliminary instrument conducted with a small convenience sample and (d) Final adjustments guided by pilot test to provide the final instrument. The steps will be the same for each instrument devised for each specific audience.

Source: the authors

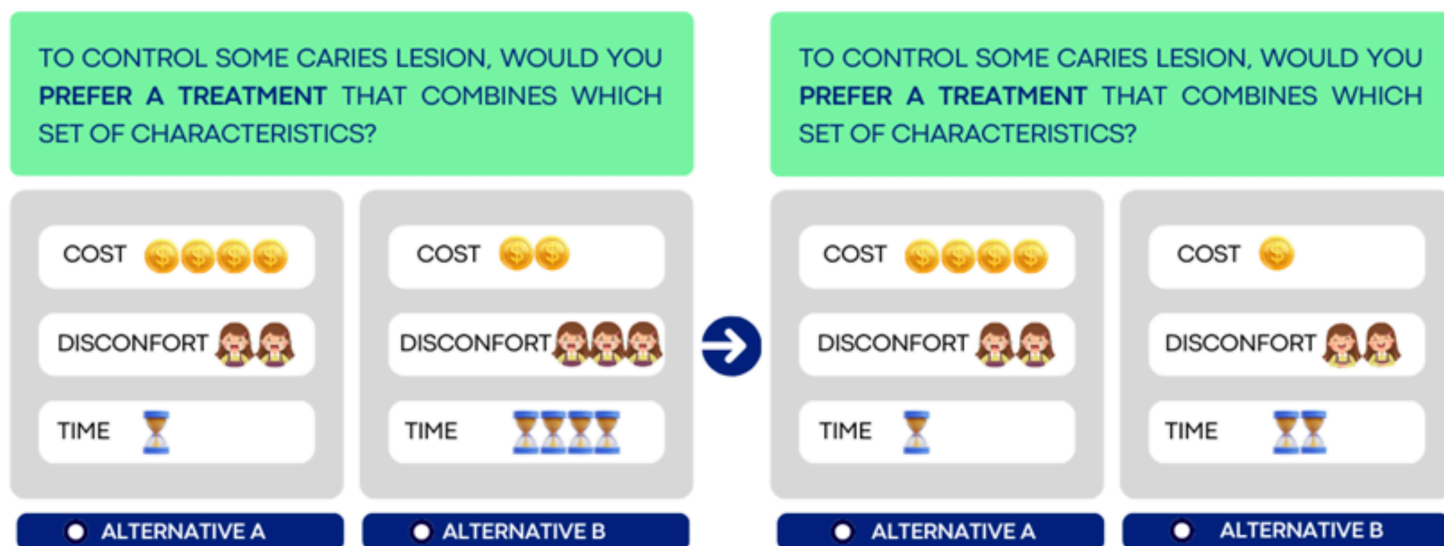


Figure 3

Example of hypothetical choice sets using arbitrary attributes and a treatment clinical scenario followed by a binary set of unlabeled alternatives. Participants will complete each choice set by answering a scenario question: "To control some caries lesion, would you prefer a treatment that combines which set of characteristics?". Alternatives vary in attribute levels.

Source: the authors

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