Approbation of Q-methodology to Evaluate Parents Attitudes for Demand of Orthodontic Treatment

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Abstract

Objectives: The aim of the present study is to assess certain subjective factors for orthodontic treatment with Q-methodology. **Study design:** Prospective cohort study. Materials and methods: The two-phase method of Stein has been used in order to calculate the number of parents. At the first stage, we have used a sample of 50 parents, set the standard deviation (SD) based on age and standard error (SE) with quality variables. At the second stage, a formula has been applied to calculate the number of observations, P (u)=0.95, S_x=6.35 and Δ=1.214. Parents have been studied for awareness and motivation for orthodontic treatment. A cross-sectional study has been provided for the same purpose as sociological investigation. **Results:** By the parents opinion, the most important reason is aesthetics and here their expectations from the outcomes are very high, r_{xy}=0.92 (P=0.000). The importance of social environment for the need of orthodontic treatment is higher for parents than for children, P<0.05. The factor "Choice through informed consent" shows greater awareness in those who have got previous orthodontic experience, r_{xy}=0.79 (P=0.000). They have found the decision for treatment more important than the children have found it and this fact has determined their motivation. **Conclusions:** The following four factors have been outlined by Q-methodology to determine the motivation of the parents:

- "Aesthetics and a conscious need"
- "Positive attitudes"
- "The choice through informed consent"
- "The importance of social environment"

Key Words: Q-methodology, Orthodontic treatment, Assessment of subjective factors

Introduction

Motivation, cooperation and consent are factors determining the success of orthodontic treatment. Health awareness is the basis of better motivation of the patient. This study is the first in Bulgaria that has used Q-methodology for testing and evaluation of factors (subjective, by the opinion of the patient) in the choice of orthodontic treatment. It is well known that the forecast and perspectives in orthodontics depend on continuing motivation during treatment [1].

Q-methodology has been validated for the first time in 2012 by leading English researchers to assess the motivation of patients who have been already treated for orthodontic deformities [2]. The surveyed units have been monitored in accordance with the recommendations of various researchers that number of patients should be from 40 to 60. Factor analysis conducted in the statistical processing of the data has required that the number of units of observation should exceed 50 [3].

This toolkit combines quantitative and qualitative approaches in assessing the subjective aspects such as motivation and awareness [4]. A set of opinions determining the categories has been generated in the present study as a result of an interview with a target group of children. So far, Q-methodology has been used primarily in the analysis of data in sociological sciences. Following a field review, only three studies include Q-methodology for assessing the subjective factors in orthodontic treatment but only one of them has been verified in accuracy by a factor analysis [5,6]. It has been shown that the factor analysis is an established and widely used technique in psychology, natural sciences and social sphere but has not been applied in orthodontics yet [3].

According to one of the motivation theories, the protection of patient's own health is based on the following four factors:

- Understanding of the gravity of threatening event
- Understanding the probability of occurrence of threatening event
- Usefulness of the recommended preventive behavior
- Benefits of personal health

The motivation for defense is an assessment of the probable threat and how to cope with it. Its main function is to encourage the patient to instigate a direct protective behavior.

The parents have the most important role in motivating and obtaining consent from the child for the upcoming treatments according to Lewit and Virolainen [7]. According to other researchers, certain negative mood could be predicted and thus can thwart the risk factors for orthodontic treatment; the relationships with the orthodontist could be improved, too [8,9].

Materials and Methods

Personal questionnaire has been composed based on the literature review for the pilot study of parents (n=50) which has been validated and provided in 2011. An original Parental Perceptions Questionnaire (PPQ) has been used for this group [10].

The inquiry card consists of 36 questions (open, closed and mixed). The parents have been observed for:

- Socio-demographic characteristics
- The role of the medical school and general practitioners
- Parents attitudes for orthodontic treatment

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- Awareness for orthodontic treatment
- Financing tools of orthodontic treatment

Most studies over subjective experiences of patients in orthodontic treatment have been conducted using questionnaires to assess oral health and anxiety - SF-36, MHI-5, CHQ-12 [11-13]. To reduce subjectivity in the evaluation of children's opinion, the parents have been interviewed, too.

Epidemiological method

In this study we have used a descriptive epidemiology and a cross-sectional design to determine the health awareness of parents under the influence of various external factors. The individual characteristics and material and educational status have been taken into account for the parents. The collected data have allowed finding out whether awareness is changing under the influence from family, school or dentists.

Sociological method

Survey method/interview: Sociological information is collected by conducting a standard individual interview and direct individual questionnaire for parents. In this study, we have been used the following indexes:

- VAS (Visual Analogue Scale)
- IOTN (Index of Orthodontic Treatment Need) [14,15]

The IOTN index, known and applicable in other countries, has been validated by a Bulgarian orthodontist Petrunov to carry out epidemiological read of tooth-jaws deformities and to improve the oral health status of children in the country [16].

Documentary method

For the purpose of the scientific study, data from Regional Health Inspectorate - Plovdiv have been used about the number of dentists distributed in the respective practices and centers [17].

Statistical method

The resulting primary information has been verified, coded and entered into the computer database for further coding, grouping, comparing, recoding, interpretation and summary. The data have been processed using specialized statistical product IBM SPSS 19.0 for Windows. It has been applied to the following statistical analysis:

- Analysis of the frequency distribution;
- Nonparametric analysis - to assess the hypotheses (criterion of Pearson agreement);
- Regression analysis - α-factor Kronbach has been used to assess the internal consistency; coefficient of Kendall;
- Factor analysis of grouping the factors common to a number of variables, among which there are correlations;
- Leveling the series;
- Graphical analysis - results has been performed in EXCEL 2007.

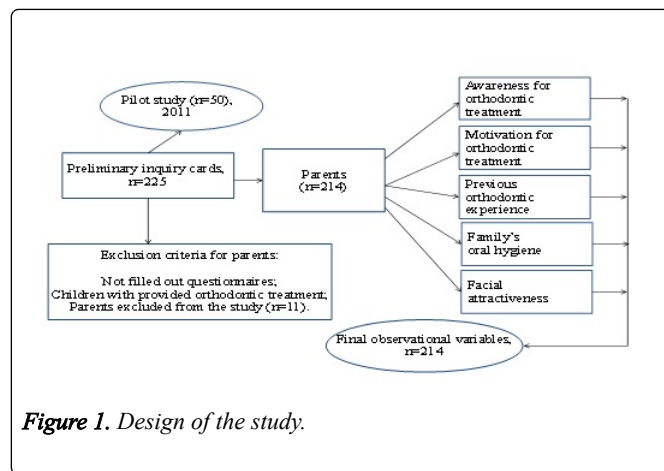The practical model and design of the study is presented in *Figure 1*.

Figure 1. *Design of the study.*

A technique to coordinate the elements of regulated agreement, known as Consort Statement has been used to enhance the quality of scientific research [18]. This is a modern, evidence-based technique, which has promoted transparency in epidemiological studies. Figure 1 shows the elements of the agreement connected through the design, analysis and interpretation of the survey [19-21].

Results

The first step of Q - methodology includes a preliminary conversation with parents. The following questions have been discussed: "Why do you want your child to wear braces?" and "What do you not like in the smile of your child?" Q–matrix for parents has been made, based on their 30 identified statements. Seven categories for parents have been defined at *Figure 2*.
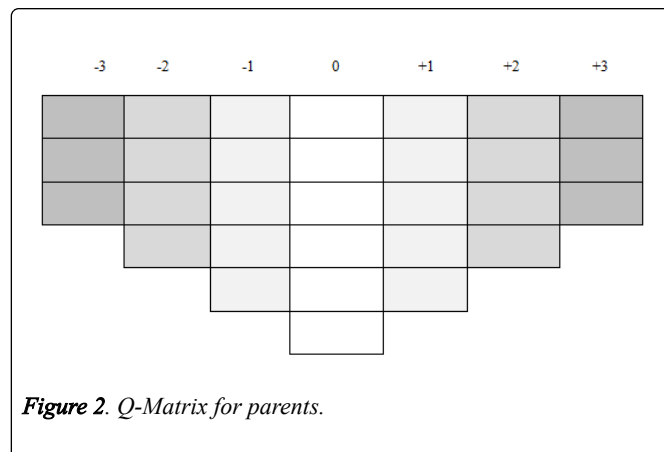

Figure 2. *Q-Matrix for parents.*

The process of clustering of claims on certain opinions

The grouping is done when working with cards that need to be grouped by patient categories from -3 to +3 in 0 for parents:

- This statement can never refer to me – three claims
- This statement hardly applies to me - four claims
- This statement applies too little for me - five claims
- This is neutral for me - 6 claims
- It's probably for me - five claims
- This is very true for me - four claims
- This is (entirely) for me - three claims

The parents' opinions have been identified by themselves and differ from those of children. By the literature review and in this study, typical of both groups is that they have been specified the important opinions.

The second step of Q - methodology has included 130 parents who have been tested with the criteria for inclusion to and exclusion from treatment of their children. General conditions have been met for the use of factor analysis of parents. Adequacy of the conducted factor analysis has been checked.

The results of the correlation matrix shows its symmetrical type and correlations higher than 0.5. For this sample, the most important correlations are between the following opinions:

- "I think it's necessary to wear braces" and "To improve the facial appearance of my child" $r_{xy}=0.71$ (P=0.001);
- "I want my child to be proud with its teeth" and "To support its social realization in the future" $r_{xy}=0.72$ (P=0.001);
- "It can cause complications in future without treatment" and "It is very cool to wear braces" $r_{xy}=0.56$ (P=0.001).

The results obtained in the determination of both factors through the technique of main components provide information on the reasons that motivate parents to start orthodontic treatment. Factors motivating parents for orthodontic treatment of their children are presented in (*Table 1*):

Table 1. Initial solution with two factor conditions with factor analysis.

No.	Factors	Initial status	Factor's weight (r_{xy})	P
1	It can cause complications in future without treatment	1	0.67	P=0.001
2	I want to do the best to my child	1	0.59	P=0.001
3	Better now, when growing, than later when he/she grows up	1	0.85	P=0.001
4	To improve the facial appearance of my child	1	0.83	P=0.001
5	I think it is necessary to wear braces	1	0.79	P=0.001
6	To support its social realization in the future	1	0.86	P=0.001
7	I want my child to be proud with its teeth	1	0.86	P=0.001
8	It is very cool to wear braces	1	0.66	P=0.001
9	The child of my friends has brackets	1	0.86	P=0.001

The task to assess the motivation of parents through Q-methodology is possible on the basis of drawn high correlations (with ratios above $r_{xy}=0.7$) in the following statements:

Better now, when growing, than later, when he/she grows, $r_{xy}=0.85$

To improve the facial appearance of my child, $r_{xy}=0.83$

I think it is necessary to wear braces, $r_{xy}=0.79$

To support its social realization in the future, $r_{xy}=0.86$

I want my child to be proud with its teeth, $r_{xy}=0.86$

The child of my friends has brackets, $r_{xy}=0.86$

The parents' examination of motivation with Q-methodology (*Table 1*) also shows reasonable assumption. Namely, "It can cause complications in future without treatment".

Four factors have been determined for the parents' motivation and their position at Q – matrix are presented at *Table 2*:

Table 2. The positions of four factors, derived with Q–methodology.

Q - matrix	Factor 1 "Esthetics and needs of orthodontic treatment"	Factor 2 "Positive attitudes from orthodontic treatment"	Factor 3 "The choice through informed consent"	Factor 4 "The importance of social environment"
3	It can cause complications in future without treatment, $r_{xy}=0.81$			
2		I want my child to be proud with its teeth, $r_{xy}=0.87$	To improve the facial appearance of my child, $r_{xy}=0.74$	
1		To support its social realization in the future, $r_{xy}=0.91$		
0	I want to do the best to my child, $r_{xy}=0.66$			

-1			Better now, when growing, than later, when he/she grows, r_{xy}=0.79	
--2				The child of my friends has brackets, r_{xy}=0.92
-3	It is very cool to wear braces, r_{xy}=0.76			

The results show that four of the nine components account for 77.25% of the total sample. The motivation of parents, who have participated in the Q-methodology has been proved and presented in *Table 3*. In this study, we have tested the adequacy of the factor analysis.

Table 3. *Variation of the components by the method of Principal Component Analysis (PCA).*

Factor	Initial eigenvalues			Extraction Sums of Squared Loadings**			Rotation Sums of Squared Loadings***		
	Total	Variance (%)	Cumulative %	Total	Variance (%)	Cumulative %	Total	Variance (%)	Cumulative %
1	2.49	27.71	27.71	2.49	27.71	27.71	2.31	25.71	25.71
2	2.38	26.45	54.16	2.38	26.45	54.16	2.03	22.52	48.24
3	1.05	11.64	65.8	1.05	11.64	65.8	1.48	16.49	64.72
4	1.03	11.45	77.25	1.03	11.45	77.25	1.13	12.53	77.25
P=.05									

Discussion

Q-methodology is a new, contemporary method and gives many opportunities for the researchers as a qualitative data collection tool. One, very positive side is to study a small number of respondents instead of a large number. Not at the end of the list is person-oriented approach to shows the subject's inner or to visualize deep problems of the individual. But there is a little limitation related to time-consuming.

One of the most important achievements of modern society's awareness on various issues and the speed with which knowledge is acquired. Awareness depends on perception, reproduction and clarity of the presented information. The desire of parents to accept certain volume of new data gives an idea of the level of health awareness and the ability to conduct orthodontic treatment. Even resultant category "Choice of orthodontic treatment" is based on several sub-categories.

Focusing on dental vision

The motivation of parents seeking orthodontic treatment for their children concerns the importance of factors such as esthetics, oral functioning and social acceptance.

It is easier to wear braces when they are children

And something that is particularly important for children awareness because it assesses the hygienic habits of the people involved in the sample. It is the family and parents who bring up their children in hygiene standards even initially on the method of repetition. If children see their parents to brush their teeth twice a day, they accept it as normal, and vice versa. If parents do not observe hygiene principles for the protection of oral health, children will accept this as normal. In this case, both children and parents are informed about:

Worried that crooked teeth will deteriorate more often

This result is particularly important for the study as it shows a high degree of awareness among children and parents who have decided to undergo orthodontic treatment. For them, it is clear that beautiful are aligned teeth. Orthodontic treatment will result in improved oral health, and to this aim all - children, parents and professionals.

Impress factors with high correlation coefficients r_{xy}=0.86 - "I want my child to be proud of its teeth", r_{xy}=0.86 - "Better now that grows, rather than later when he grows up" and others. Highly informed and motivated for the future of their children's parents have been fallen in the sample according to the obtained results. The parents realize successful social realization of the child, thanks to the beauty of your smile and perfect vision. When you are not convinced of their awareness, they like their children to seek positive examples and obey the rules of the social environment - "child of my acquaintance has brackets" r_{xy}=0.86.

Compared with the well-known tools that are used in orthodontic practice, Q - methodology contains many features such as quality, innovative tool assessment of subjective factors such as awareness and motivation. In Q-methodology usually work with a small number of respondents and focus on patient - oriented approach. So the issues are examined in depth, and the inner world of the individual becomes - understood by researchers of oral health.

Conclusion

The following four factors have been outlined by Q-methodology to determine the motivation of the parents:

"Aesthetics and a conscious need";

"Positive attitudes for the results of orthodontic treatment"

"The choice through informed consent";

"The importance of social environment".

Both factors - "Positive attitudes for the results of orthodontic treatment" and "The importance of social environment" are the most important for parents in decision making.

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