

Questionnaires in health education research. Advantages and disadvantages of open-ended questions. Implications for health research methodology

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This paper compares the use of two question formats (open-ended and closed form) in questionnaires and evaluates their implications for the validity and the reliability of health survey methodology. The study is based on the analysis of three questionnaires employed in a Brazilian health education research project aimed at investigating the current status of health education in public and private schools of Rio de Janeiro County. The questionnaires' items were carefully constructed and administered to a representative sample of 117 teachers and 394 elementary and junior high students. Through the use of open-ended questions, it was possible to identify not only important omissions and distortions, but also interesting and unusual aspects in the samples' answers. Such issues would be less noticeable if choices had been provided for participants. Although closed form questions allow a faster and a more reliable data analysis in surveys, they may provide the researchers with less valid information when compared to open-ended questions. There is a constant need for balancing both reliability and validity in every chosen design, as well as for directing our efforts towards the construction of more valid and reliable measures of assessment in the health education area.

O presente artigo tem como objetivo comparar dois tipos de questões (abertas e fechadas) em questionários e avaliar as implicações do formato da questão para a validade e consistência da metodologia de pesquisa na área de saúde. O estudo baseia-se numa análise de três questionários utilizados numa pesquisa em educação em saúde que tem como meta principal investigar a situação atual da educação em saúde em escolas públicas e particulares do ensino fundamental do município do Rio de Janeiro. Os itens foram construídos cuidadosamente e os questionários aplicados numa amostra representativa de 117 professores e 394 alunos de 1ª a 8ª séries do ensino fundamental. O uso de questões abertas permitiu não só a identifica-

ção de importantes omissões e distorções, mas também o aparecimento de aspectos interessantes e pouco usuais nas respostas da amostra. Aspectos esses que certamente não seriam notados, se opções de respostas fossem oferecidas aos participantes. Embora questões fechadas propiciem uma análise mais rápida e confiável dos dados, elas podem gerar um menor número de informações válidas para o pesquisador, quando comparadas com as questões abertas. Existe uma constante necessidade de se buscar o equilíbrio entre validade e consistência em qualquer delineamento de pesquisa, bem como de se concentrar esforços na construção de instrumentos mais válidos e consistentes na área de educação em saúde.

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General Articles

Many problems in the field of health education can be investigated using survey techniques. The survey research has its own methods of exploring relationships among facts. There have been increasing efforts towards improving the quality of survey tools. One of the basic tools of survey research is the questionnaire (1). The questionnaire is an instrument which can attain its goals if carefully designed. Questionnaires, as every research tool, have some strengths and limitations. According to Isaac and Michael (2), questionnaires have some advantages such as: *a)* They are not expensive; *b)* they can reach a wide range of people as well as include a wide range of topics and *c)* they can be self-administered. Questionnaires' limitations can be attenuated, if the researcher carefully takes into account the variables which contribute to their weaknesses.

Although it is outside the scope of this paper to discuss all the important variables that should be taken into account when constructing a questionnaire, it is important to mention that the way questions are structured (in an open or closed form) has important implications for data collection and data analysis.

The purpose of this paper is to analyze the advantages and disadvantages of question format (closed or open-ended) in questionnaires and its implications for validity and reliability of health-related research. An illustration of the use of questionnaires in a health education research in Brazil (Fundação Oswaldo Cruz) will be provided. The importance of having some of the questions in an open-ended form for this research will be discussed.

Data analysis of questions

Studies show that both open-ended or closed form questions can lead to similar outcomes. Closed form questions are as easy and quick for the respondent to answer as they are for the researcher to categorize and analyze. Open-ended questions can be extremely difficult for the respondent to write and for the investigator to analyze (2). However, there are situations where open-ended questions can provide the researcher with more valid information about certain research topics. This point will be further analyzed in this paper.

Open-ended questions, in contrast to closed form questions, are usually studied by content analysis which is a research technique for the objective, systematic and quantitative description of the manifest content of the communication (3). In addition, free answer and open-ended questions require the construction of classification systems in order to be coded. A different classification system is needed for each of the questions. Responses have to be carefully interpreted by the raters before they can be classified. Content categories involving inferences or evaluation on the part of the rater are more difficult to develop (4). As pointed out by Oppenheim (5), it is highly important that several raters can use the system of categories with a high degree of interrater reliability.

A Brazilian health education research project

Description of the research project

The project "Ciranda da Saúde" is a health education project created by Schall (6) for the first level Brazilian schools (elementary and junior high), especially for the first 5 grades, involving children from 7 to 12 years old. This project has three major goals: *a)* To evaluate the present status of health education in first level schools of Rio de Janeiro County; *b)* to generate data which may serve as a basis for developing instructional materials to improve health education for children and *c)* to create an updated course on important health issues for first level teachers.

Questionnaire employed in the research project

To achieve the first goal, the most important for the purpose of this paper, three questionnaires were constructed by Schall and Rozemberg (7) taking into account general important steps for questionnaire construction. The questions were based on a clear definition of objectives. The items were written to avoid biased responses. The questions were also organized in a logical order, avoiding very important questions at the end. These health questionnaires were pretested before their use to identify how items were functioning, as well as to estimate the time required for their completion. The questionnaires included items of basic knowledge on health, illnesses, as well as opinions and attitudes toward health issues. The basic knowledge items were worded in a multiple choice format, whereas the conceptual, attitudinal and opinion items varied from structured questions with possible choices for answers to open-ended questions. The questionnaires were used for data collection among first level and science teachers, as well as first level students (in Brazil, the first level of the educational system lasts 8 years).

The questionnaires were composed of 57 items for teachers and 42 items for students from third to eighth grade, respectively. An adaptation for younger students maintaining approximately the same content and proportion of items was made. The specific content of the questionnaires is described elsewhere (8).

Data collection procedures

Mailed questionnaires have the negative effects of no assurance that the questions were understood and that the addressee was actually the one who answered it (2). To avoid such negative effects, teachers and third to eighth grade students answered the questionnaire in groups in the presence of two research assistants, whereas the first and second graders were interviewed by the principal investigator and by specially trained research assistants. In both procedures, students were assured that the questionnaire was only a health education research and that there was no need to worry about grades. Teachers were assured of anonymity. As designed by Schall (6), stratified random sampling was employed to select a representative sample of schools. In the 10 selected schools, all the

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elementary and science teachers were selected to participate, whereas five students in each grade level per school were randomly chosen by a computer draw.

Content analysis and results of questions

Teachers and students' answers to the questions: *a)* What is illness? and *b)* How do you take care of your health? were analyzed through a content analysis (3). A system of categories was created following the same steps described in our previous study (8). Categories created were shown to research assistants not involved with the analysis of these questions and their suggestions were used to improve the coding system. Additionally, each category was defined operationally and a set of rules was established to determine the placement of answers in categories. Raters were also unaware of the age, gender and socioeconomic status of the subjects during the categorization process. Disagreement in the categorization process was solved through discussion among the raters.

Though it is outside the scope of this paper to analyze specific results as it was done by Boruchovitch, Felix-Sousa and Schall (9), some findings are of special interest. In defining illness, only 13.3% of the science teachers and 0% of the elementary school teachers included the social dimension involved in illness in their answers (Table 1). In addition, there was an expressive percentage of responses in the category "Do not know" (Table 1). When required to describe what they usually do to take care of their own health, very few teachers regarded leisure time, as well as sleep and rest as important health preventive-maintenance practices (Table 2). Despite the small percentage (3.8%), it was interesting to note that students considered engagement in socially relevant actions such as: Not stealing, helping mother with the housework, not fighting with peers at school, as important personal health care practices.

Table 2 - Rio de Janeiro County teachers' answers to the question: "How do you take care of your health?"^{a,b}

Categories	1st to 4th grade teachers	Science teachers	Total
Number of subjects	97	20	117
Number of answers	208	35	243
	(%)	(%)	(%)
1. Do not know	1.4	2.8	1.6
2. Action of physical care	92.3	82.8	91.0
2.1. General	4.8	22.8	7.4
2.2. Nutrition	20.7	14.3	19.7
2.3. Hygiene	35.6	8.6	31.7
2.3.1. Personal	21.2	5.7	18.9
2.3.2. Preservation of appearance	11.5	2.8	10.3
2.3.3. With foods/house	2.9	0.0	2.5
2.4. Sleep and rest	4.8	2.8	4.5
2.5. Physical action	3.8	8.6	4.5
2.6. Physical prevention	2.4	5.7	2.9
2.7. Treatment	20.2	20.0	20.2
3. Leisure time	2.4	0.0	2.0
4. Actions of social care	1.0	0.0	0.8
5. Lack of care	2.9	5.7	3.3
6. Other types of care	0.0	8.6	1.2
Subjects in 1st category	38.1	65.0	42.7
Subjects in more categories	61.8	35.0	57.3

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^b Percentage was calculated based on the number of answers.

This paper will discuss the importance of having two questions in an open-ended format for both teachers and students. It is noteworthy that the majority of teachers conceptualized illness without taking into account its social dimension (Table 1). This omission is a very important information for the health education field, especially in a country like Brazil where social and economic conditions play important roles in the health and illness processes. The expressive percentage of responses in the "Do not know" category also bears noting. Most likely, if this question were presented to the teachers with some possible response choices, teachers'

Table 1 - Rio de Janeiro County teachers' answers to the question: "What is illness?"^{a,b}

Categories	1st to 4th grade teachers	Science teachers	Total
Number of subjects	68	13	81
Number of answers	103	15	118
	(%)	(%)	(%)
1. Do not know	35.9	6.7	32.2
2. Disequilibrium/bad functioning of the conditions: Physical and mental	25.2	6.7	22.9
2.1. Physical and mental and social	0.0	13.3	1.7
3. Alteration of the person's general state	4.8	33.2	8.5
4. Absence of health or defense	18.4	6.7	16.5
5. A bad thing	6.8	6.7	6.8
6. Lack of physical or mental well-being	6.8	6.7	6.8
7. Multicausal process	1.0	6.7	1.7
8. Enemy of a healthy life	1.0	6.7	1.7
9. Lack of healthy habits	0.0	6.7	0.8
Subjects in one category	86.7	84.6	86.4
Subjects in more than in 1 category	13.2	15.4	13.6

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^b Percentage was calculated based on the number of answers.

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Table 3 - Rio de Janeiro County students' answers to the question: "How do you take care of your health?"^{a,b}

Categories	1st	2nd	3th	4th	5th	6th	7th	8th	Total
Number of subjects	50	51	52	49	52	50	46	44	394
Number of answers	97	113	64	65	74	83	89	75	660
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1. Do not know	3.1	0.0	9.4	4.6	9.4	6.0	3.4	1.3	4.2
2. Action of physical care	82.4	84.7	90.6	93.7	87.6	92.7	93.2	94.7	89.7
2.1. General	1.0	0.9	10.9	6.1	2.7	2.4	3.4	1.3	3.2
2.2. Nutrition	17.5	15.0	20.3	27.7	21.6	24.1	21.3	28.0	21.3
2.3. Hygiene	21.7	28.3	25.0	32.2	24.2	27.7	30.3	34.7	27.8
2.4. Sleep and rest	5.1	4.4	0.0	0.0	2.7	1.2	3.2	1.3	2.4
2.5. Physical activities	1.0	2.6	0.0	0.0	4.0	4.8	5.6	4.0	3.0
2.6. Physical prevention	20.6	18.5	20.3	9.2	9.4	13.2	13.5	8.0	14.6
2.7. Treatment	15.5	15.0	14.1	18.5	23.0	19.3	16.8	17.3	17.3
3. Leisure time	3.1	5.3	0.0	0.0	1.3	1.2	0.0	1.3	1.8
4. Actions of social care	10.3	7.1	0.0	1.5	1.3	0.0	3.4	2.7	3.8
5. Lack of care	1.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Subjects in 1st category	38.0	31.4	82.7	71.4	73.1	60.0	36.9	43.2	55.2
Subjects in more categories	62.0	68.6	17.3	28.6	26.9	40.0	63.0	56.8	44.7

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^b Percentage was calculated based on the number of answers.

lack of awareness regarding the social components involved in illness, as well as their lack of conceptual knowledge to define illness would certainly be less noticeable.

In respect to the fact that teachers also failed to recognize the importance of leisure time, as well as that of sleep and rest in the maintenance of health (Table 2), it is also questionable whether this omission would still have happened if possible responses had been provided. Similarly, students' unusual, and interesting ideas on health practices (associating to take care of their health with socially relevant behaviors) would probably not be present in their answers, if choices had been provided. Moreover, open-ended questions are also more suitable to study cognitive developmental differences in a diverse age group of students when thinking about health-related issues. These cognitive-developmental differences are also very useful information for the health education field.

Generally, when a research employs closed-form questions there is always a risk that the choices may remind respondents of issues that they would normally not include in their answers.

It is clear that there is a need for further research in improving the validity and reliability of assessment techniques in the health area. Evidence suggests that a great number of studies in the health education area do not report the reliability of assessment measures. As demonstrated by Burbach and Peterson (10) there is also a lack of measures with predictive validity for health-related behaviors.

One of the difficulties faced by health-related research is that in order to have more valid information, sometimes the researcher has to lose some reliability. There is a constant need for balancing both reliability and validity, and to be very clear about the objectives of the research in order to select the proper tools. As the current status of the research tools reflects the absence of a perfect tool, we will always be dealing with their possibilities and their limitations in every chosen design. This awareness is of paramount importance, as

well as are the efforts toward the construction of more valid and reliable measures of assessment in the health area. ■

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