







Original Article (short paper)

WebCas electronic questionnaire to evaluate health-related behaviors of schoolchildren

Rosimeide Francisco dos Santos Legnani^{1,3,6,7} , Elto Legnani^{2,3,5,6} , Tiago Augusto Andrade^{5,6} , Rafael Vieira Martins^{6,7} , Eva Luziane Denkwicz Gustave^{1,6} , Wagner de Campos^{4,7} 

¹Universidade Estadual de Ponta Grossa, Ponta Grossa, PR, Brasil; ²Universidade Tecnológica Federal do Paraná, Curitiba, PR, Brasil; ³Universidade Tecnológica Federal do Paraná, Programa de Pós-graduação em Educação Física, Curitiba, PR, Brasil; ⁴Universidade Federal do Paraná, Curitiba, PR, Brasil; ⁵Universidade Tecnológica Federal do Paraná, Programa de Pós-graduação em Engenharia Biomedica, Curitiba, PR, Brasil; ⁶Universidade Tecnológica Federal do Paraná, Grupo de Pesquisa em Atividade Física, Esporte e Tecnologia, Curitiba, PR, Brasil; ⁷Universidade Federal do Paraná, Centro de Pesquisa em Atividade Física e Saúde, Curitiba, PR, Brasil.

Abstract - Aims: To present to the scientific community the transposition of the printed version to the electronic version of the *WebCas* questionnaire. **Methods:** The transposition of the printed version to the electronic version of the *WebCas* questionnaire was carried out using the service of a computer programming professional. Through a response interface, the students had access to instructions to respond to the questionnaire. The MySQL 5 method was used to store the information, allowing the generation of reports. To record the responses, students were instructed to click on the chosen option. In case of error, they should choose another option, changing the option chosen previously. The “next” arrow indicated that the individuals being evaluated could change the page. **Results:** The *WebCas* questionnaire presented several functionalities related to its presentation and filling out process. In the restricted access to maintenance activities, it is possible to visualize 8 icons: 1 - questionnaire (information regarding the completion and development methodology of the questionnaire); 2 - students (registration information, anthropometric data and student code); 3 - activities (name of the activity, the domain such activity is inserted, intensities and values in MET's); 4 - questions (statement and category of the question); 5 - graphs (showing the results of each question in the bar or pie format graphs); 6 - reports (reports export). **Conclusion:** The *WebCas* questionnaire is a technological resource that will assist health researchers in the collection, storage, and preliminary processing of information regarding health-related behaviors in schoolchildren.

Keywords: *physical activity; transposition; questionnaires; schoolchildren.*

Introduction

Over the last few years, there have been significant changes in people's lifestyle, especially those related to physical activity. In this aspect, the lack of physical exercise, **inadequate** eating habits, alcohol and cigarette consumption, and **insufficient** sleeping habits, are the predominant behavioral and biological factors affecting various types of diseases, especially cardiovascular ones¹⁻³. The increasing presence of these behavioral factors has aroused the interest of health specialists in the use of new technologies in order to investigate the promotion of healthy habits⁴. While technology can contribute to increased sedentary behavior and high levels of insufficient physical activity, on the other hand, the public health field seeks to support technological resources in order to optimize the diagnosis and the treatment of various diseases⁵. In general, in diagnostic or epidemiological studies, several resources are used, but self-report instruments are the most popular and accessible ones.

From this perspective, printed questionnaires are the tools that can help researchers around the world to obtain relevant information on health aspects of various population groups. Despite the widespread use, printed questionnaires seem to

meet the current needs. However, from the productive and resource-saving point of view and, and faster information gathering, it seems prudent to suggest the need to modify the questionnaires application format to more effective and practical models, such as online or electronic questionnaires^{6,7}, especially because, the use of printed questionnaires is a common procedure among health researchers.

Recently, several electronic questionnaires have appeared to evaluate health-related behaviors⁸⁻¹⁰. The use of electronic instruments in epidemiological assessments promptly contributes to the reduction of financial costs, especially due to their practicality, saving of material and financial resources, reducing the time spent on their application, and, mainly, by eliminating data entry by researchers¹¹.

In this sense, it seems interesting the presence and dissemination of technological devices that help researchers and health professionals to collect data in a more practical, modern, safe, and comprehensive manner, especially in relation to lower cost, contributing to more accurate and comprehensive diagnoses¹². Therefore, this research aims to present to the scientific community the transposition process from the printed version to the electronic version of the *WebCas* questionnaire.

Methods

The study was approved by the Ethics Committee on Research with Human Beings of the Universidade Federal do Paraná, under Opinion number: 684.147 / 2014, of June 11, 2014. The transposition of the printed version to the electronic version of the WebCas questionnaire was performed using the service of a computer programming professional. In the preparation of the application, the main resources of information technology were used. Table 1 presents the main technological tools employed in the preparation of the WebCas electronic questionnaire.

The WebCas was designed to be viewed in segments on a computer or mobile screen and followed the same structure as its printed version¹¹. In each segment, questions related to sleeping hours; the usual practice of physical activity (previous day AF recall); eating frequency; sedentary behavior; sleeping habits; alcohol and cigarette consumption, and socioeconomic status, respectively.

WebCas is hosted on a website that can be accessed at www.legnaniwebcas.com.br (figure 1), which was built for the project “Comportamento Ativo e Saudável (Active and Healthy Behavior) - CAS II”, which can be accessed through Internet browsers (Explorer, Mozilla, Google Chrome) on personal computers, notebooks and mobile devices (smartphones and tablets). The WebCas electronic questionnaire was designed for academic research purposes, with no charges to the user, and can be accessed by researchers from all over Brazil. To do so, the researcher just has to make a personal registration, as well as the institution object of the research, in this case, the school from which the data will be collected.

To illustrate the questionnaire, colored images referring to the questions were added. After a preliminary study, some difficulties were found regarding the interpretation of the images representing the physical activities performed by the students, especially regarding the characterization of the PA intensities (weak, moderate, and intense). After a study with a focus on groups conducted by Legnani¹¹, in order to assist the students in filling out the remainder of the physical activities performed on the previous day, the illustrative images referring to each

question contained in the instrument were inserted.

Students have access to instructions to answer the WebCas questionnaire through an answer completion interface. To store the information regarding the students' answers, a database management system was added using the MySQL 5 method (MYSQL, 2004), enabling the creation of reports that can be exported to spreadsheets in Windows Excel (xls) format.

In the WebCas questionnaire, in order to record their answers, the students are instructed to click on the question chosen, and, in case of error, the students should click on the other option in order to change their answer. Directional keys (arrows) can assist the participants in switching screens by simply clicking on the “next” arrow.

Results

As an innovation differentiator, the WebCas questionnaire presents several features regarding presentation and completion. In this regard, WebCas has a module restricted to maintenance activities, where you can see 8 icons: (1) questionnaire; (2) students; (3) activities; (4) questions; (5) graphics; (6) reports, (7) settings, and (8) exit.

The first “quiz” icon provides descriptive information, questionnaire filing out instructions, and WebCas development methodology. The second icon, “Students” presents the student code, registration information, and anthropometric data. The third icon “Activities” presents the name of the activity, the domain in which it is inserted, and its intensities (weak, moderate, and strong) and their values in MET's. The fourth icon “Question” presents the statement and the category of the question. The fifth “Graphs” present the results of each question in the bar or pie format graph. The sixth icon “Report” exports the database results to an Excel spreadsheet. The seventh icon “Settings” makes it possible to include or exclude information or updates, domain types from activities and users, and the eighth icon “Exit” leaves the restricted web environment (FIGURE 5). Settings-related functionality makes WebCas a dynamic and flexible tool, enabling the inclusion and exclusion of specific research questions.

TABLE 1 - List of technologies used in the preparation of the WebCas electronic questionnaire, and access websites.

Technology	Functionality	Access
Web platform “ASP.NET	Provides services for building professional web applications on the ASP.NET server. Applications can be written in any common language runtime-compliant language including Visual Basic and C #	http://www.asp.net/mvc/mvc4
Models; Views; Controllers (ASP.NET MVC);	Tool that allows you to develop software, create web applications with three functions. The project is divided into three parts, Models (M) represent data and business logic; Views (V) create the user interface, and Controllers (C) program the data input logic).	http://www.asp.net/mvc/mvc4
jQuery:	Library rich cross-browser JavaScript library designed to simplify client-side scripts that interact with HTML	http://jquery.com/
Bootstrap:	HTML5 structure and CSS3 framework designed to help you leverage web application and website development	http://getbootstrap.com/
MySQL	Database Management System uses Structured Query Language (SQL).	https://www.mysql.com/
API	Application programming interface (API), which is a set of routines, protocols, and tools for building software applications.	
Google Chart	Google Chart app allows people to create graphs of various styles from some data and embed them in a webpage. Google Chart creates an image of a graph from data and formatting parameters in a Hypertext request. Transfer Protocol (HTTP).	https://developers.google.com/chart/
HTTP	HTTP is a communication protocol used for distributed and collaborative hypermedia information systems, it is the basis for data communication on the World Wide Web (internet).	

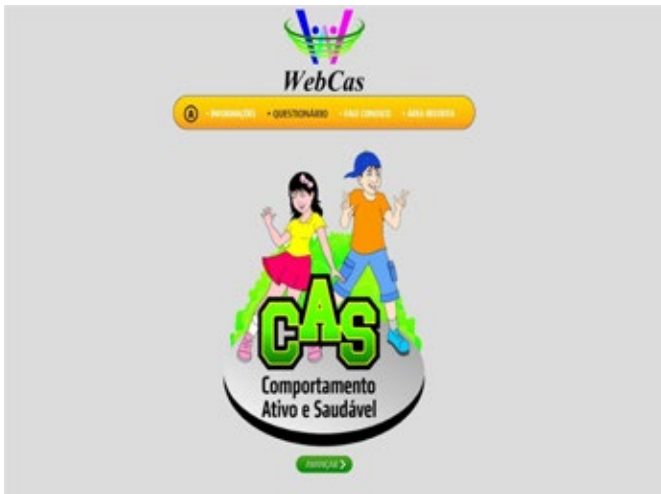


FIGURE 1- WebCas Electronic Questionnaire Home Screen



FIGURE 2 - WebCas Registration Screen



FIGURE 3 - WebCas activity intensity rating screen.

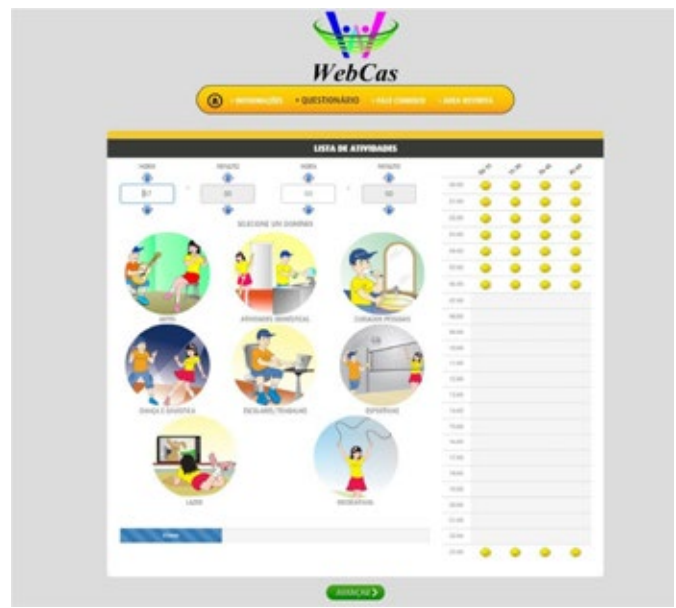


FIGURE 4 - The eight WebCas activity domains screen.

Seq.	Nome	Domínio	Fácil	Moderado	Força
1	Atender animais	ATIVIDADES DOMÉSTICAS	2,0	0,0	0,0
2	Arranjar áreas domésticas	ATIVIDADES DOMÉSTICAS	3,0	0,0	0,0
3	Arranjar/limpar de casa	ATIVIDADES DOMÉSTICAS	3,0	0,0	0,0
4	Arrumar a mesa no jantar	ATIVIDADES DOMÉSTICAS	2,0	0,0	0,0
5	Apilar tijolo	ATIVIDADES DOMÉSTICAS	0,0	4,0	0,0
6	Cavar	ATIVIDADES DOMÉSTICAS	3,0	4,0	0,0
7	Carregar itens muito pesados (barras)	ATIVIDADES DOMÉSTICAS	0,0	0,0	0,0
8	Cortar fubão e vegetais	ATIVIDADES DOMÉSTICAS	3,0	0,0	0,0
9	Conduzir o controle de rádio	ATIVIDADES DOMÉSTICAS	0,0	1,0	0,0
10	Cortar grama	ATIVIDADES DOMÉSTICAS	0,0	0,0	0,0
11	Cortar madeira	ATIVIDADES DOMÉSTICAS	0,0	0,0	0,0

FIGURE 5 - Screen demonstrating the restricted area, activities, and their respective values of energy expenditure in Mets - WebCas.

Seq.	Enunciado	Categoria
1	Comerem, qual o meio de transporte que você utiliza para ir e voltar da escola?	LOCOMOÇÃO PARA A ESCOLA
2	Nos últimos 7 dias, quantas das suas refeições foram feitas em casa?	HÁBITOS DE ALIMENTAÇÃO
3	Nos últimos 7 dias, quantas das suas refeições foram feitas em restaurantes, bares, lanchonetes ou outros locais?	HÁBITOS DE ALIMENTAÇÃO
4	Nos últimos 7 dias, quantas das suas refeições foram feitas em restaurantes, bares, lanchonetes ou outros locais?	HÁBITOS DE ALIMENTAÇÃO
5	Nos últimos 7 dias, quantas das suas refeições foram feitas em restaurantes, bares, lanchonetes ou outros locais?	HÁBITOS DE ALIMENTAÇÃO
6	Nos últimos 7 dias, quantas das suas refeições foram feitas em restaurantes, bares, lanchonetes ou outros locais?	HÁBITOS DE ALIMENTAÇÃO
7	Desde os últimos 30 dias, quantas das vezes você consumiu bebidas alcoólicas além das permitidas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO
8	Desde os últimos 30 dias, quantas das vezes você consumiu bebidas alcoólicas além das permitidas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO
9	Desde os últimos 30 dias, quantas das vezes você consumiu bebidas alcoólicas além das permitidas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO
10	Desde os últimos 7 dias, em quantas das vezes você fumou cigarro ou tabaco além das permitidas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO
11	Desde os últimos 7 dias, em quantas das vezes você fumou cigarro ou tabaco além das permitidas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO
12	Qual frequência você consome drogas ilícitas?	CONSUMO DE BEBIDAS ALCOÓLICAS E TABACO

FIGURE 6 - Restricted area demo screen for WebCas questions

Discussion

Recently, various tools based on information technology and the worldwide web are leveraging the Web and Mobile application development to assess behavioral aspects such as the practice of physical activity, eating frequency, sleeping hours, consumption of licit and illicit drugs. Corroborating the information above, we can mention electronic questionnaires, Webdafa⁶ and Whoqolweb¹³ designed to evaluate the main behaviors related to children's health (6 to 10 years) and the elderly's quality of life, respectively. They can be accessed at www.criancaativaesaudavel.com.br and <http://www.whoqolweb.com.br>, respectively.

Evidence indicates that electronic questionnaires can be more attractive to people because of their administration method^{14,15}. In addition, electronic questionnaires have some advantages over printed instruments, such as immediate and direct access to the data entered, eliminating manual data entry and printing costs, greater accuracy, and faster data gathering^{10,16,17}.

In a study by Bonn et al.¹⁸, the authors highlight the need to design and validate questionnaires specifically for use on the web-based on the increased use of computers by various people at various ages. Regarding the above, other authors have developed electronic instruments and advise the scientific community to use innovative tools with this format, as found in the electronic questionnaire^{19,20}. Moreover, the web format of electronic questionnaires seems to be more attractive to people of all ages, especially when it comes to children⁶.

On one side, the WebCas questionnaire has features available in its restricted area allowing the inclusion of additional questions to its original format, a database allowing the individual's data to be stored in various stages of a study, providing comparative data in time series of the same individual and group. At the end of the data gathering process, the researcher can visualize dynamic graphs, fed by the respondent's information. Moreover, this instrument enables faster feedback on the variables analyzed, thus contributing to effective implementation and intervention of public policies of primary health care for children and adolescents⁶.

These factors may have direct implications for epidemiological studies at regional, state, and national levels, as they may increase the scope of the studies, adding accuracy in relation to the number of individuals researched and, consequently, the sample universe^{6,12,19,21}.

On the other side, web and mobile questionnaires may have some downsides regarding their use. Since problems such as failing to scroll to the end of the page, or being unable to correct a wrong answer, can generate invalid data²². In addition, the need to offer the respondent the possibility of setting up the web questionnaire or the Mobile application, as well as the need to access the instrument via the web, can become a barrier to its use in some regions of Brazil^{6,23}.

Conclusion

The process of transposing the printed version to the electronic version of the WebCas questionnaire is one of the pioneering initiatives regarding the use of information technology resources

to assist researchers in the collection, storage, and preliminary processing of data regarding health-related behaviors. The features presented by the WebCas questionnaire demonstrate that web-based instruments can have numerous advantages over traditional pen and paper models. Thus, this instrument is expected to contribute to the improvement of behavioral research involving adolescents from various regions of Brazil.

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Corresponding author

Rosimeide Francisco dos Santos Legnani
 Campus Uvaranas - Av. General Carlos Cavalcanti, 4748 - CEP 84030-900 – Departamento de Educação Física - Bloco G , Fone: (42) 3220-3000 / 3220-3300 , Ponta Grossa, Paraná
 Email: legnanirosi@gmail.com

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