

# Development of a responsive website to promote behavior changes in computer users

*Desenvolvimento de um site responsivo para promover mudanças comportamentais em usuários de computador*

*Desarrollo de una página web adaptable para estimular cambios conductuales en los usuarios de computadoras*

Evandro Carlos Giorgette Filho<sup>1</sup>, Ludmilla Maria Souza Mattos de Araújo Vieira<sup>2</sup>, Tatiana de Oliveira Sato<sup>3</sup>

**ABSTRACT** | The increase in the use of technology for prolonged periods, both inside and outside of work, is associated with a sedentary lifestyle, a risk factor for several health problems. Change in this behavior can be promoted with the use of technologies. We aim to develop an interactive responsive website to promote behavioral changes in computer users. From a literature review, modifiable risk factors associated with health problems in computer users were identified. Messages were created to increase knowledge and promote behavioral changes in users. These messages include recommendations regarding breaks, adjustments in the workplace, physical exercise, hydration, among others. The messages are personalized, and the user includes personal information and current lifestyle habits. All this information was implemented in an interactive responsive website developed in JavaScript language and Node.js engine. The responsive website was developed, including the proposed features, and is available online. Future studies can evaluate the effectiveness of the responsive website in promoting behavioral changes among computer users, improving their health and quality of life.

**Keywords** | Physiotherapy; Ergonomics; Occupational Health; Physical Inactivity; Sedentary Lifestyle.

**RESUMO** | O crescimento do uso da tecnologia fez com que os trabalhadores passassem a usar o computador por longos períodos, dentro e fora do trabalho. O uso prolongado de computadores está associado a um

estilo de vida sedentário, sendo um fator de risco para diversos problemas de saúde. Porém, a transformação deste comportamento pode ser promovida por meio de tecnologias, como um site responsivo interativo que visa promover mudanças comportamentais em usuários de computador. A partir de um levantamento bibliográfico, foram identificados fatores de risco modificáveis associados aos problemas de saúde nessa população. Em seguida, foram criadas mensagens para ampliar o conhecimento e promover mudanças comportamentais nos usuários. Essas mensagens incluem recomendações a respeito de pausas, ajustes no posto de trabalho, exercícios físicos, hidratação, dentre outras. As mensagens podem ser personalizadas, bastando que, para isso, o usuário inclua informações pessoais e hábitos de vida atuais. Todas as informações foram implementadas em um site responsivo interativo desenvolvido em linguagem JavaScript e motor Node.js. O site responsivo foi desenvolvido, incluindo as funcionalidades propostas, e está disponível online. Em estudos futuros, poderá ser testada a efetividade do site para promover mudanças comportamentais nos usuários de computador, melhorando sua saúde e qualidade de vida.

**Descritores** | Fisioterapia; Ergonomia; Saúde do Trabalhador; Inatividade Física; Sedentarismo.

**RESUMEN** | El creciente uso de la tecnología llevó a los trabajadores a utilizar las computadoras por largos períodos dentro y fuera del trabajo. El uso prolongado de

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<sup>1</sup>Universidade Federal de São Carlos (UFSCar) – São Carlos (SP), Brazil. E-mail: evandronhof@gmail.com.

ORCID-0000-0002-2700-2765

<sup>2</sup>Universidade Federal de São Carlos (UFSCar) – São Carlos (SP), Brazil. E-mail: ludmillasouzamattos185@gmail.com.

ORCID-0000-0002-3155-8600

<sup>3</sup>Universidade Federal de São Carlos (UFSCar) – São Carlos (SP), Brazil. E-mail: tatisato@ufscar.br. ORCID-0000-0001-8797-8981

computadoras está asociado al sedentarismo y resulta ser un factor de riesgo para diversos problemas de salud. Sin embargo, este comportamiento puede modificarse con las tecnologías, como en una página web adaptable interactiva cuyo objetivo es estimular cambios conductuales en los usuarios de computadoras. A partir de una búsqueda bibliográfica, se identificaron los factores de riesgo modificables asociados a problemas de salud en esta población. Después se crearon mensajes para difundir los conocimientos y estimular cambios conductuales en los usuarios. Los mensajes contenían recomendaciones sobre descansos, ajustes en el lugar de trabajo, ejercicios físicos, hidratación, entre

otros temas. Además, la información podría ser personalizada, siempre que el usuario incluyera datos personales y hábitos de vida actuales. Toda la información se aplicó a una página web adaptable interactiva desarrollada en lenguaje JavaScript y motor Node.js. Se creó la página web adaptable con las características propuestas incluidas, y se la puso a disposición en línea. Estudios futuros pueden probar la efectividad de la página web en el estímulo de cambios conductuales en los usuarios de computadoras, mejorando su salud y calidad de vida.

**Palabras clave** | Fisioterapia; Ergonomía; Salud del Trabajador; Inactividad Física; Sedentarismo.

## INTRODUCTION

With evolving technology, the use of computers has become increasingly common both in and outside the workplace. Office workers spend an average of six hours a day using the computer in sedentary activities<sup>1,2</sup>.

The World Health Organization (WHO) estimates that each year about 3.2 million people die due to physical inactivity<sup>3</sup>. The Americas is one of the regions with the highest proportion of people with sedentary lifestyles, considered as those who practice less than 30 minutes of physical activity per week<sup>4</sup>. This behavior, common in office workers, is a risk factor for the development of disorders and diseases<sup>5-7</sup>.

One of the most common complaints in office workers are musculoskeletal disorders in the neck, shoulders, and lumbar spine<sup>8-11</sup>. Prolonged use of the computer can also lead to a cascade of consequences, such as obesity<sup>12</sup>, visual disturbances<sup>13</sup>, cardiovascular disease, type 2 diabetes<sup>14</sup>, and an overall higher risk of mortality<sup>14,15</sup>.

In the study by Ng and Popkin<sup>16</sup>, conducted in five countries, the results showed an increase in sedentary behaviors in populations. The review by Coenen et al.<sup>7</sup> exposed the lack of policies specifically focused on sedentary occupational behaviors, suggesting the need to address this issue, since interventions aimed at reducing sedentary behavior can result in healthier and more productive employees.

Some studies have shown that interventions via electronic means can improve health and safety behaviors<sup>5,6</sup> and reduce complaints of musculoskeletal pain<sup>17,18</sup>. A systematic review recently published on the effectiveness of digital interventions in the workplace presented moderate evidence of beneficial effects on

workers' health regarding their psychological well-being, sleep, physical activity, and sedentary behavior<sup>19</sup>.

Recently, a software application (Welbot) similar to the one proposed in this study was developed and demonstrated positive effects on the health and well-being of computer users<sup>20</sup>. However, we did not find a responsive website, available to Brazilian workers, that broadly addressed the promotion of health by encompassing behavioral habits with interactive means. Therefore, this study aimed to present and to describe an interactive and customizable responsive website developed for computer users, with notifications and interactions aimed at prevention and health promotion by changing their lifestyle habits and their workplace.

## METHODOLOGY

A bibliographic survey was conducted to identify the modifiable risk factors associated with health problems in computer users. The search terms used in PubMed were: sedentary behavior, sedentary worker, sedentary work, white collar work, office worker, computer users, computer work, electronic media-based health, electronic health, mobile health, technologies, digital intervention. After bibliographic survey and identification of risk factors, messages were created to increase users' knowledge and promote behavioral changes. These messages included recommendations regarding breaks, adjustments to the workplace, physical exercises, hydration, among others.

For the development of the project, all information was implemented in a responsive site using JavaScript language—a high-level programming language that provides up-to-date content, interactive maps, and animated

2D/3D graphics—and Node.js engine—responsible for making the website run and stay functional. The illustrations and videos were developed in the Animaker program.

The changes to the workplace were proposed according to Regulatory Norm No. 17 (NR-17) via an explanatory video. Within the website, a blog page was developed to present detailed information about each behavioral aspect. The blog also provides informative booklets so that the workers can adjust their workplace and perform exercises to avoid pain. The exercises proposed for computer workers have four types of breaks with stretching and dynamic exercises for upper limbs, lower limbs, and trunk. To remind the workers that they must drink water, a visual and sound notification is issued by the website. Figure 1 shows the study steps.

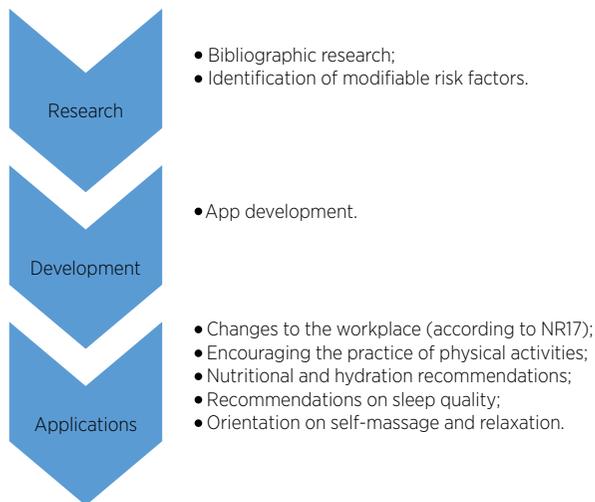


Figure 1. Study flowchart

## RESULTS

The responsive website, called *Habitus* (<https://habitus.app.br>), has been designed with high usability, so that users have no difficulty in using its functionalities. The website contains home, blog, sign in, register, data screening, and system pages.

The responsive website aims to promote greater awareness of the worker on their daily habits and work routine and how such habits affect their everyday lives. It also provides notifications and interactive information about behavior, stimulating the worker’s mindset for change. Messages are customized with the inclusion of the user’s personal information and current lifestyle habits.

The home page of the website contains many motivational phrases and information. The main menu consists of three buttons—Blog, Enter,

and Register—which contain the main features of the website. To begin, the user must first register by inserting their name, email, date of birth, gender, and a password; each user has their information stored, according to the term of use.

After this first step, the user answers to a brief questionnaire for data screening and definition of the notifications that will be issued. Thus, the website generates a personalized model of interventions aimed at changing the user’s lifestyle habits. The notifications indicate the recommended actions every 30 minutes (Figures 2 to 4).



Figure 2. The software application home screen, with explanatory video



Figure 3. Software application home screen, with interactive buttons

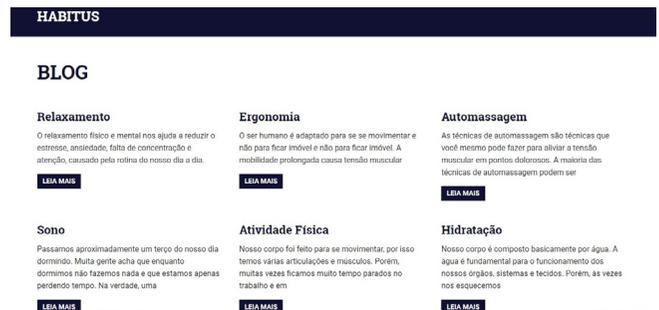


Figure 4. Software application blog, with explanatory texts on each topic addressed

In addition to the notifications contained within the responsive website, a blog was created to inform users about the importance of the proposed actions and how to put them into practice. The blog consists of pages on ergonomics, exercise, relaxation, self-massage, hydration, food, and sleep.

In the ergonomics page, a booklet was developed with guidelines so that the worker can find what is wrong and adapt their workplace, enabling comfort and preventing accidents and work-related disorders.

In the physical exercise tab, there are recommendations and tips encouraging the user to practice physical activities, as well as an infographic with stretching exercises, such as how to do them, the sets, time, and required care.

The relaxation tab contains practices and methods to help reduce stress, such as breathing technique and body perception, in addition to meditation, which helps to calm and to maintain concentration. The self-massage tab presents techniques to reduce pain and stress, in which the person applies on themselves, in the painful areas of the body: head, neck, shoulder, back, hip, feet, glutes, and hands.

The hydration tab gives tips for the user to remember to ingest water. In the nutrition tab, there is information about healthy foods, what to eat and what to avoid. In the sleep tab, there are recommendations on what to do and not to do before bed and how to choose the best mattress and pillow.

## Limitations

The proposal to provide periodic feedbacks that show the evolution of the user has not yet been implemented in this first version of the responsive website.

## CONCLUSIONS

The responsive site *Habitus* was developed to be a personalized and interactive tool capable of promoting healthy habits to computer users.

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