Characteristics of visitors and revisitors to an Internet-delivered computer-tailored lifestyle intervention implemented for use by the general public

Wendy Brouwer1*, Anke Oenema1, Hein Raat1, Rik Crutzen2, Jascha de Nooijer2, Nanne K. de Vries2 and Johannes Brug3

Abstract

The Internet has become important for the delivery of behavior change interventions. This observational study examines how many people visited, registered and revisited a web-based computer-tailored intervention promoting heart-healthy behaviors when it is implemented for use by the general public. Among registered visitors, the association between visitors’ characteristics and initiating, completing and revisiting the website and/or its behavior-specific modules was analyzed. Server statistics showed that 285,146 visitors from unique IP addresses landed on the home page in a 36-month period; of these, >50% left the intervention website within 30 s. In total, 81,574 (28.6%) visitors completed the registration procedure and gained access to the intervention; 99% of registered visitors initiated one module, 91% completed at least one module and 6% revisited the intervention. The majority of the registered visitors were women, medium to highly educated, with a body mass index (BMI) <25. Women, visitors aged 40–50 years, visitors with a medium educational level and visitors with a BMI <25 were more likely to initiate and finish the modules. It is concluded that a heart-healthy computer-tailored Internet program can reach substantial numbers of people, but additional research is needed to develop promotional strategies that reach the high-risk population, i.e. men, older and lower educated persons.

Introduction

The Internet has become a key medium to obtain health information [1–3]. It is, therefore, a very attractive mass medium for the delivery of behavior change interventions since it allows to deliver individualized feedback and advice by means of computer tailoring [4–6]. An increasing number of health professionals have started to use the Internet to deliver behavior change interventions on various health topics such as diet [7, 8], physical activity [9, 10], smoking [11, 12] or a combination of these topics [6, 13, 14]. Although the Internet has the potential to reach large numbers of people [15, 16], the actual reach of interventions seems to lag behind these high expectations [17, 18]. Moreover, it may be difficult to keep visitors engaged long enough in the intervention program so that they become exposed to at least the most important parts of the program [19–23]. As stressed in the Diffusion of Innovation theory [24] and also in the Reach, Efficacy, Adoption, Implementation and Maintenance (RE-AIM) framework [25], it is important to know the characteristics of those who adopt an intervention, i.e. the so-called innovators and early adopters [24]. It is also important to know who visits these intervention programs and how visitors use the program, e.g. which parts or

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modules do they visit, do they finish complete modules and do they revisit the Internet intervention. More insight into the characteristics of users who are currently reached, and those who actually use and revisit a program, may elucidate what needs to be changed in the promotion of Internet interventions to increase the reach and what changes are needed in intervention programs to keep visitors engaged and encourage them to revisit.

There are currently almost 1.5 billion Internet users worldwide (http://www.internetworldstats.com/stats.htm); this number will increase with the lowering of costs and the improved speed of Internet connections. With an Internet access penetration rate of 90.1%, The Netherlands has one of the highest rates worldwide, comparable with countries such as Canada (84.3%), Australia (79.4%), Japan (73.8%) and United States (72.3%) (http://www.internetworldstats.com/top25.htm). This means that ~14.5 million of all Dutch inhabitants, including children and adolescents, have Internet access. Despite these high penetration rates, relatively few people are reached by behavior change Internet interventions [16, 26], whereas, theoretically, most of the Internet users are potential visitors.

It is important to reach those who could benefit the most from these Internet interventions, i.e. those who engage in risk behaviors such as smoking, lack of physical activity or unhealthy dietary patterns. These risk behaviors are prevalent among all population groups, but even more so among people with a lower socioeconomic status [27–29]. Therefore, people from all population groups should be reached with Internet-delivered interventions. However, not all population groups may sufficiently be reached since it has been reported that women, older people and people in lower socioeconomic positions have lower online access [30–32]. Even though the increase in Internet users is the largest among these under-served groups [3, 33, 34], it is still important to study to what extent these specific groups are currently reached with Internet-delivered behavior change interventions.

To date, most studies have focused on the acceptability, feasibility and efficacy of behavior change Internet interventions and very few on the actual reach of these interventions [12, 33, 35]. These studies (all focusing on interventions for single-risk behaviors) showed that, despite the fact that Internet access for women is generally somewhat lower [30], the participation rate of women was higher than that of men and that different people were reached with different recruitment strategies. In the present study, we investigated which groups of people were reached with an Internet intervention that was implemented for use by the general public, aiming to promote heart-healthy behaviors, i.e. physical activity, low-saturated fat intake and non-smoking. Previous studies have focused on the characteristics of visitors of single-risk behavior interventions only [9, 36–38]. None of these studies reported on visitor characteristics of a multi-risk behavior intervention or made a distinction between the three stages of exposure (i.e. first visit, staying and revisiting).

The present study examined how many people were reached with an implemented multi-risk behavior intervention [www.gezondlevencheck.nl; Gezond Leven Check (GLC)/Healthy Life Check] by means of landing on the home page and what proportion of these visitors actually used the program. The characteristics of these visitors were compared with those of the general adult population in The Netherlands. Within the group of people that registered for the GLC intervention, we investigated which visitors’ characteristics correlated with initiating and finishing one of the three modules provided and which characteristics correlated with revisiting the intervention more than once.

Methods

Design and study population

An observational study was conducted from January 2005 through December 2007. During this period, server statistics revealed that 285,146 visitors from unique IP addresses accessed the home page of the intervention program. A total of 81,574 visitors registered on the website and thereby gained access to the intervention program.
Intervention

For this study, data of the implemented Internet-delivered intervention GLC (www.gezondleven-check.nl) of the Netherlands Heart Foundation (NHF) were used. This intervention is in the Dutch language and available free of charge via the Internet for the general public. The intervention consists of a website that provides individualized tailored feedback on saturated fat intake, physical activity and smoking cessation. The efficacy of these three modules, and the full intervention program, has already been tested [6, 39, 40]. The efficacy of the GLC was evaluated in a two-group randomized controlled trial with 2000 adult participants [6]. Compared with the non-intervention control group, the GLC resulted in a significantly lower self-reported saturated fat intake ($b = -0.76$, $P < 0.01$) and a greater likelihood of meeting physical activity guidelines of at least 30 min of moderate intensity physical activity on at least 5 days of the week among respondents who were insufficiently active at baseline (odds ratio = 1.34, 95% confidence interval = 1.001–1.80). No significant intervention effects were found for self-reported smoking status.

When people visited the intervention for the first time, they were asked to register before they could enter the intervention content. People could register by providing a login name, password and some personal characteristics (i.e. gender, age, educational level, height and weight); these characteristics were used to provide the visitors with their personally tailored advice. Although everyone could register, only visitors aged 18 years and older were included in this study because the intervention focused on this target group. After registration, a brief assessment of perceived fat intake, perceived physical activity level and smoking status was used to direct visitors to the modules that would best fit their needs. However, visitors were free to make their own choice regarding the module they wanted to visit first. Each of the three modules took 10–15 min to complete. The saturated fat intake and physical activity modules consisted of two parts. First, visitor’s personal saturated fat intake or physical activity level assessed by means of validated self-reported frequency questionnaires [41, 42]. Based on this information and their personal characteristics, visitors received tailored feedback and advice regarding their personal saturated fat intake and/or physical activity. Second, after receiving tailored advice, visitors were able to continue with the program by answering a question about their intention to change their behavior. Based on that answer, they were either directed to a module about their attitude regarding the topic or a module about self-efficacy was started. For the present study, we used only the first part (i.e. the assessment questionnaires) of the saturated fat intake and physical activity modules. Regarding smoking, for this study the whole module was taken into account; the content of this intervention and its efficacy have been described in detail elsewhere [6]. Multiple visits were possible and visitors were advised to visit the program again (revisits) to check their status and progress regarding changing a behavior. However, these revisits were not manipulated in any way by, for example, sending reminders or other prompts. The personal feedback was saved on the server under a login name/password combination and could be accessed by a revisit.

Implementation

The GLC has been accessible for the general public from September 2004 onwards. The program is hosted and promoted by The NHF. The NHF continuously promotes the GLC through a variety of promotion methods, including (1) advertisements in NHF publications, e.g. in their quarterly magazine, in regular newsletters for NHF sponsors and in newsletters distributed via pharmacies; (2) regular banners and URL links on the NHF website; (3) articles and advertisements in qualitative newspapers; (4) flyers and posters distributed in public places, e.g. libraries and municipal health services; (5) flyers distributed to health care professionals and articles in health care journals; (6) sponsored links on health portals and commercial websites and in e-mail newsletters of these portals and websites and (7) free publicity, such as articles in
freely distributed newspapers, women(-oriented) magazines and health magazines.

Measurements

Server statistics

Since the introduction of the intervention in September 2004, server statistics have registered the number of unique IP addresses and the length of time spent on the website (http://awstats.sourceforge.net/). Unique IP addresses were used as an indicator of the number of people that landed on the home page, even though it may be possible that more than one person from a unique IP address accessed the website. For the present study, we used server statistics from January 2005 through December 2007. These server statistics were anonymously registered and were not linked to the data provided by the visitors. User characteristics were available only for those persons who stayed on the website and actually registered in the program.

Characteristics of registered visitors

Information on the personal characteristics of the registered visitors (e.g. gender, age, educational level, height and weight) were retrieved from the server database that stored the information needed for registration in the program, as well as the responses to the individual-tailoring questionnaires in the program. This information was stored in such a way that anonymity was guaranteed.

Smoking status was derived from the question ‘Do you currently smoke? (yes/no)’. For this study, the education level was categorized as low (≤9 years: primary school, lower and intermediate secondary education or lower vocational training), medium (10–14 years: higher secondary education or intermediate vocational training) or high (≥15 years: higher vocational training or university). Age was categorized as 0 = ≥40 to <50 years, 1 = ≥18 to <30 years, 2 = ≥30 to <40 years and 3 = ≥50 years. Body mass index (BMI) was calculated as weight (kilograms) divided by height (meters) squared and categorized as 0 = ≥18.5 to <25; 1 = <18.5; 2 = ≥25 to <30; 3 = ≥30.

Characteristics of the general Dutch population

Data from Statistics Netherlands (www.statline.nl) were used, apart from assessing saturated fat intake, to compare the characteristics of the registered visitors with those of the general Dutch population aged 18 years and older. The instrument used to assess physical activity among the Dutch population is the same as used for assessing physical activity in the intervention program [42]. The instrument for assessing saturated fat intake is different. Data for the Dutch population were assessed by means of dietary assessment of two independent 24-hour recalls and an additional questionnaire, including food frequency questions [43], whereas in the intervention program, only a food frequency questionnaire was used [41].

Outcome measures

For each module, two variables were created, one that indicated that a visitor had initiated the module and another that the visitor had finished a module and had received tailored feedback and advice. The variable for initiating a module (yes/no) was determined by the first question of the module on saturated fat intake, physical activity and smoking. The variable for finishing a module (yes/no) was determined by using either the last question of the assessment questionnaire for saturated fat intake and physical activity or the last question of the smoking module. The variable for revisiting the intervention (yes/no) was determined by comparing the first and last date of logging on to the intervention website.

Statistical analysis

Descriptive statistics were used to describe the registered visitors. Multiple logistic regression analyses were conducted with the outcome measures initiating and finishing a module (0 = no; 1 = yes) as dependent variables and gender, age, education level and BMI as independent variables. Age, education and BMI were used as categorical variables to determine which user characteristics increased the odds for visiting or finishing the Internet intervention. For revisiting the intervention, the risk behaviors physical activity, saturated fat intake...
and smoking were also incorporated in the model as independent variables. Statistical significance was set at a level of 0.05. All analyses were conducted in SPSS version 15 (SPSS, Inc., Chicago, IL, USA).

Results

Number of home page visitors
Server statistics showed that during 2005–07, 285,146 visitors from unique IP addresses (persons, as indicated by IP addresses) accessed the website of the GLC. Figure 1 shows the fluctuation of visitors during 2005–07. During May until August, the number of visitors appears to be lower compared with the other months. The peaks in the number of visitors (October 2005, September 2006 and March 2007) resulted mainly from sponsored advertisements in a newsletter distributed by e-mail via a commercial Dutch lifestyle website.

Visitors stayed on the website for an average of 6 min and 43 s. However, the majority of the visitors (56.3%) left the website within 30 s. Of those that stayed >30 s, 23% stayed between 30 s and 2 min, 13% between 2 and 5 min, 28% between 5 and 15 min and 24% between 15 and 30 min. The remainder (13%) stayed >30 min. The number of hits on the website was constant throughout the day, with a small dip around 6.00 p.m. and a sharp peak around 8.00 p.m.

Characteristics of registered visitors
By comparing the figures of the server statistics with the data provided by the people that registered, it appeared that 81,574 (28.6%) of the visitors logged on to the GLC and completed the registration procedure. Of all the registered visitors three-quarter were women, over half of the visitors were <40 years and most of them had a medium to high education level. Furthermore, over half of the registered visitors had a healthy BMI, whereas nearly a third was either overweight or obese. Compared with the general Dutch population (last column in Table I), the registered visitors to the GLC were more often women, younger, higher educated and with a healthier BMI.

Regarding the three risk behaviors, fewer visitors smoked compared with the general Dutch population, i.e. 18.7 and 29.6%, respectively. Of all visitors who completed the physical activity module, 42.4% complied with the Dutch guidelines of at
least 30 min of moderately intensive physical activity on at least 5 days of the week (compared with 55% in the general Dutch population). Regarding saturated fat intake, 63.2% complied with the Dutch guidelines of a maximum of 10 energy percent saturated fat intake, compared with only 10% of the general Dutch population.

### Initiating and finishing behavior modules

Of all visitors who completed the registration procedure, 99% initiated one of the three modules and 91% completed at least one module. Regarding physical activity, 80% initiated this module, of which 89% completed the assessment questionnaire and received tailored advice. The saturated fat module was initiated by 69% of the visitors, of which 95% completed the assessment questionnaire and received tailored advice. Of the 19% of the visitors who reported to be smokers, 68% initiated the smoking module and 58% finished this module. Of all the visitors that logged on, 57% visited both the physical activity and the saturated fat intake modules; of these, 52% completed both the assessment questionnaires and thus received personal advice on these topics. Of the 10 327 visitors who could access all three modules (i.e. the smokers),

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**Table I. Personal and behavioral characteristics of visitors accessing the intervention website from January 2005 through December 2007 compared with the general Dutch population in 2006**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>Total 2005–07</th>
<th>Dutch population 2006a</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>39 688</td>
<td>24 772</td>
<td>17 114</td>
<td>81 574</td>
<td>12 752 453</td>
</tr>
<tr>
<td><strong>Personal characteristics</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Sex (%)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Men</td>
<td>25.5</td>
<td>24.0</td>
<td>24.8</td>
<td>24.9</td>
<td>49.0</td>
</tr>
<tr>
<td>Women</td>
<td>74.5</td>
<td>76.0</td>
<td>75.2</td>
<td>75.1</td>
<td>51.0</td>
</tr>
<tr>
<td><strong>Age in years (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18 to &lt;30</td>
<td>34.9</td>
<td>38.5</td>
<td>37.0</td>
<td>36.5</td>
<td>18.4</td>
</tr>
<tr>
<td>≥30 to &lt;40</td>
<td>20.5</td>
<td>20.6</td>
<td>20.1</td>
<td>20.4</td>
<td>19.1</td>
</tr>
<tr>
<td>≥40 to &lt;50</td>
<td>20.9</td>
<td>18.8</td>
<td>19.3</td>
<td>19.9</td>
<td>19.9</td>
</tr>
<tr>
<td>≥50</td>
<td>23.7</td>
<td>22.1</td>
<td>23.6</td>
<td>23.2</td>
<td>42.6</td>
</tr>
<tr>
<td><strong>Education level (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Low</td>
<td>25.8</td>
<td>26.6</td>
<td>27.4</td>
<td>26.4</td>
<td>33.6</td>
</tr>
<tr>
<td>Medium</td>
<td>39.2</td>
<td>40.7</td>
<td>38.9</td>
<td>39.6</td>
<td>41.2</td>
</tr>
<tr>
<td>High</td>
<td>35.0</td>
<td>32.7</td>
<td>33.7</td>
<td>34.0</td>
<td>25.2</td>
</tr>
<tr>
<td><strong>BMI (kg m^(-2)) (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>3.6</td>
<td>4.4</td>
<td>4.9</td>
<td>4.1</td>
<td>1.6</td>
</tr>
<tr>
<td>≥18.5 to &lt;25</td>
<td>55.0</td>
<td>55.3</td>
<td>56.2</td>
<td>55.3</td>
<td>51.9</td>
</tr>
<tr>
<td>≥25 to &lt;30</td>
<td>30.3</td>
<td>28.7</td>
<td>27.9</td>
<td>29.3</td>
<td>35.2</td>
</tr>
<tr>
<td>≥30</td>
<td>11.2</td>
<td>11.6</td>
<td>11.0</td>
<td>11.2</td>
<td>11.3</td>
</tr>
<tr>
<td><strong>Behaviors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Smoking (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17.7</td>
<td>20.1</td>
<td>19.2</td>
<td>18.7</td>
<td>29.6</td>
</tr>
<tr>
<td>No</td>
<td>82.3</td>
<td>79.9</td>
<td>80.8</td>
<td>81.3</td>
<td>70.4</td>
</tr>
<tr>
<td><strong>30-min physical activity (PA) a day (%) (N = 57 950)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–4 days a week</td>
<td>57.3</td>
<td>58.6</td>
<td>57.0</td>
<td>57.6</td>
<td>45.0</td>
</tr>
<tr>
<td>5–7 days a week</td>
<td>42.7</td>
<td>41.4</td>
<td>43.0</td>
<td>42.4</td>
<td>55.0</td>
</tr>
<tr>
<td><strong>Saturated fat intake (%) (N = 55 660)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not comply with the recommended level</td>
<td>38.0</td>
<td>36.5</td>
<td>34.2</td>
<td>36.8</td>
<td>90.0b</td>
</tr>
<tr>
<td>Did comply with the recommended level</td>
<td>62.0</td>
<td>63.5</td>
<td>65.8</td>
<td>63.2</td>
<td>10.0</td>
</tr>
</tbody>
</table>

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*aBased on data from Statistics Netherlands (www.statline.nl).

bSee [44].
31% visited all of them; of these visitors, 57% completed all three modules.

Results of multiple logistic regression analyses showed that women, visitors aged 40–50 years, visitors with a medium educational level and people with a normal BMI (18.5–25) were more likely ($P < 0.05$) to both initiate and finish the physical activity module and the saturated fat intake module (Table II). Regarding initiating the smoking module, no differences were found for gender and education level, but visitors aged 40–50 years and people with a BMI of either <18.5 or $>30$ were more likely to initiate the smoking module.

**Revisiting the Internet intervention**

In total, 6% ($n = 4857$) of the registered visitors visited the GLC more than once in the period 2005–07. Of these revisits, 33.6% took place within 1 week after the first visit, whereas 13.6 and 3.8% revisited the program within 2 and 3 weeks, respectively. After that, the length of time between the first visit and revisit increased relatively quickly. Regression analyses showed that women, visitors aged 40–50 years, visitors with a low or high educational level and people that did not comply with the advised physical activity level and saturated fat intake were more likely ($P < 0.05$) to revisit the Internet intervention (Table II).

**Discussion**

This study is one of few to report on the characteristics of visitors to a multi-risk behavior Internet intervention implemented for use by the general public. An important finding was that >50% of the visitors left the intervention within 30 s. However, once visitors had registered and gained access to the intervention program, almost every registered visitor initiated one of the modules, and most of them finished at least one module and received individually tailored feedback and advice for that specific risk behavior. Compared with the general Dutch population, the majority of visitors that accessed the program were women, medium to highly educated and had a higher BMI. However, women, visitors aged 40–50 years, visitors with a medium educational level and visitors with a healthy BMI were more likely to finish the modules.

Since the introduction of Internet-delivered behavior change interventions, high attrition rates have been a serious concern [19, 21, 45, 46]. This problem is also reported in the field of E-learning [22, 23] and was also experienced in the present intervention. An immediate reason for a person not to initiate the intervention may be sheer disinterest. A second reason could be the presence of a registration procedure to access the intervention program, as recently reported [47]. Kerr *et al.* [48] also stated that a registration procedure can be seen as a barrier, especially if there are concerns about the trustworthiness of a website. However, Griffiths *et al.* [49] indicated that sites that require registration before obtaining all the available information were perceived to be of higher quality. Providing visitors with a clear explanation for why a registration procedure is necessary may prevent them from leaving the website before they actually start the program. Furthermore, a professional appearance and a clear navigation structure are factors that visitors take into consideration when deciding whether or not to extend a visit on an intervention website [45, 47, 50, 51]. Therefore, it is important to establish whether the presence of a registration procedure and an unprofessional appearance and/or an unclear structure are important factors for website visitors in deciding whether or not to continue with an Internet intervention.

Analysis of our visitors’ characteristics revealed that women were more inclined to visit this Internet intervention, which is consistent with other studies [11, 33, 52–54]. Women were also more likely to complete a module and to revisit the site; this may be because women are generally more interested in health issues, also via the Internet [16, 31]. The fact that men and older and lower educated persons were reached less often is disconcerting since these latter groups are at increased risk for cardiovascular disease. This lower reach is in contrast to the fact that the Internet is generally used more often by men and is increasingly used by older and lower educated people. However, the lower access of these
<table>
<thead>
<tr>
<th>Personal characteristics</th>
<th>Starting PA module(^a), OR (95% CI)</th>
<th>Finishing PA module(^b), OR (95% CI)</th>
<th>Starting fat intake module(^c), OR (95% CI)</th>
<th>Finishing fat intake module(^d), OR (95% CI)</th>
<th>Starting smoking module(^e), OR (95% CI)</th>
<th>Finishing smoking module(^f), OR (95% CI)</th>
<th>Revisiting(^g), OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>65 059</td>
<td>57 756</td>
<td>56 286</td>
<td>53 244</td>
<td>10 327</td>
<td>6014</td>
<td>4857</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men (reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Women</td>
<td>1.23 (1.18–1.28)</td>
<td>1.50 (1.41–1.58)</td>
<td>1.51 (1.46–1.56)</td>
<td>1.84 (1.69–2.00)</td>
<td>0.93 (0.85–1.01)</td>
<td>1.44 (1.27–1.63)</td>
<td>1.16 (1.06–1.26)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥40 to &lt;50 (reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>≥18 to &lt;30</td>
<td>0.82 (0.78–0.87)</td>
<td>0.90 (0.83–0.98)</td>
<td>0.91 (0.86–0.95)</td>
<td>0.96 (0.85–1.09)</td>
<td>0.96 (0.85–1.09)</td>
<td>1.02 (0.84–1.25)</td>
<td>0.79 (0.72–0.88)</td>
</tr>
<tr>
<td>≥30 to &lt;40</td>
<td>0.43 (0.41–0.45)</td>
<td>0.44 (0.41–0.47)</td>
<td>0.75 (0.72–0.79)</td>
<td>0.56 (0.50–0.62)</td>
<td>0.63 (0.56–0.70)</td>
<td>0.44 (0.38–0.53)</td>
<td>0.72 (0.65–0.79)</td>
</tr>
<tr>
<td>≥50</td>
<td>0.63 (0.59–0.67)</td>
<td>0.85 (0.78–0.93)</td>
<td>0.90 (0.86–0.95)</td>
<td>0.83 (0.74–0.93)</td>
<td>0.81 (0.67–0.97)</td>
<td>0.74 (0.66–0.82)</td>
<td></td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Medium (reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Low</td>
<td>0.72 (0.68–0.75)</td>
<td>0.82 (0.77–0.87)</td>
<td>0.98 (0.94–1.01)</td>
<td>1.01 (0.92–1.11)</td>
<td>0.99 (0.91–1.08)</td>
<td>1.27 (1.10–1.45)</td>
<td>1.12 (1.03–1.22)</td>
</tr>
<tr>
<td>High</td>
<td>0.55 (0.52–0.57)</td>
<td>0.62 (0.58–0.66)</td>
<td>0.88 (0.84–0.91)</td>
<td>0.73 (0.66–0.80)</td>
<td>0.97 (0.89–1.07)</td>
<td>1.25 (1.08–1.45)</td>
<td>1.25 (1.14–1.38)</td>
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<tr>
<td><strong>BMI</strong></td>
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<tr>
<td>≥18.5 to &lt;25 (reference)</td>
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<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
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<tr>
<td>&lt;18.5</td>
<td>0.91 (0.86–0.97)</td>
<td>0.69 (0.63–0.76)</td>
<td>0.84 (0.80–0.89)</td>
<td>0.95 (0.83–1.08)</td>
<td>1.22 (1.08–1.38)</td>
<td>0.83 (0.68–1.02)</td>
<td>0.97 (0.88–1.11)</td>
</tr>
<tr>
<td>≥25 to &lt;30</td>
<td>0.77 (0.70–0.85)</td>
<td>0.54 (0.47–0.62)</td>
<td>0.80 (0.73–0.87)</td>
<td>0.66 (0.54–0.80)</td>
<td>1.11 (0.92–1.35)</td>
<td>0.86 (0.63–1.18)</td>
<td>1.03 (0.81–1.30)</td>
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<tr>
<td>≥30</td>
<td>0.97 (0.91–1.03)</td>
<td>0.87 (0.79–0.97)</td>
<td>0.95 (0.90–1.01)</td>
<td>1.07 (0.93–1.22)</td>
<td>1.14 (1.00–1.30)</td>
<td>0.88 (0.71–1.09)</td>
<td>1.03 (0.92–1.16)</td>
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<tr>
<td><strong>Behaviors(^e)</strong></td>
<td></td>
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<td></td>
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<tr>
<td>30-min PA per day</td>
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<td></td>
<td></td>
<td></td>
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<td>1.23 (1.11–1.37)</td>
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<tr>
<td>Saturated fat intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.19 (1.10–1.28)</td>
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<tr>
<td>Smoking</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>0.93 (0.87–1.01)</td>
</tr>
</tbody>
</table>

ORs in bold indicate a significant association ($P < 0.05$).

\(^a\)Coded as 0 (not started) or 1 (started).

\(^b\)Coded as 0 (not finished) or 1 (finished).

\(^c\)Coded as 0 (smokers who did not start) or 1 (smokers who started).

\(^d\)Coded as 0 (one-off visit) or 1 (more than one visit).

\(^e\)Reference: 0–4 days 30-min PA, comply with the recommended level of saturated fat intake, not smoking.
latter groups [3, 34] may be because the strategies used to promote the GLC were not specifically focused on these potential visitors. Therefore, it is advisable to explore whether promotion strategies aimed specifically at men, and at older and lower educated people, will attract them to this Internet intervention. Focus group discussions with potential visitors indicated that different groups are likely to be attracted by different kinds of (preferably) traditional promotion strategies (e.g. advertisements in newspapers and on TV and radio) [47]. McClure et al. [12] demonstrated that different recruitment strategies for a smoking cessation website attracted different types of visitors. Furthermore, a potentially effective strategy to retain subgroups in the program may be to tailor the promotion activities and the intervention program itself to certain personal characteristics (e.g. gender or educational level) by employing a different ‘tone of voice’ or a different appearance (e.g. different layout, styles or colors).

A common criticism is that people who are more committed to a healthy lifestyle are more likely to visit a health promotion program on the Internet and will therefore be more inclined to stay and finish the intervention program. This study has shown that the registered visitors were more likely to be higher educated, smoke less and eat less-saturated fat intake compared with the general adult Dutch population; this has also been reported by others [9, 14]. However, the present results also indicate that the GLC attracted more people that were less active compared with the general Dutch population and that the proportion of people who were overweight was similar to that of the general Dutch population. Additional studies are needed to establish which kinds of promotion strategies can best be used to attract these subgroups.

Limitations

In the present study, we were dependent on the information registered in the design of the server statistics program attached to the website, which prevented us from answering some important and relevant questions. First, because the server statistics were not linked to the individual level, it was not possible to compare subgroups that differed regarding sociodemographic, psychosocial or behavioral measures, regarding exposure to the intervention (i.e. duration time and frequency of revisits). Second, the server registration system used IP addresses to identify the number of persons that visited the intervention website. This may have caused an inaccurate count of the total number of hits/visitors to the website since different people using one computer may have accessed the website. This might imply that the 28.6% of all visitors that actually registered on the website might be an over-representation. Third, the statistics program provided no information about active use, use of specific pages and other on-site behavior. This type of information is important to gain deeper insight into use and usage patterns and number and patterns of revisits. This study shows that, when designing a server statistics program, it is important to determine at an early stage what information (at the individual and group level) is required to gain insight into use and usage patterns. Furthermore, the different promotion strategies used for the GLC were not included in the analysis. The different promotion strategies might have attracted, for example, more women and higher educated people to visit the intervention. For future interventions, it is recommended to keep accurate records of which promotion strategies were used so that these can be related to visitors’ data to reveal which promotion strategies attracted which type of visitor. Finally, although we know how many registered visitors completed one or more modules and thus received personal feedback and advice, it is unclear to what extent these visitors actually read and acted on such feedback and advice. Future studies could focus more on how much of the information is read and how intensively it is read and processed, to gain more insight into using and processing of the Internet intervention content.

Conclusion

The present study shows that a heart-healthy computer-tailored Internet program can reach a substantial number of people. Although >50% of the visitors left the intervention before registering,
attrition during the intervention program (as reported by others) was not a major problem in this multi-behavior Internet intervention. Because our visitors could choose between three different behavior modules, they may have felt ‘freer’ in their decisions and perhaps more inclined to finish the selected modules. However, similar to other Internet interventions, more women and higher educated people visited the intervention. Therefore, in order to reach a population that is at increased risk (such as men, and older and lower educated people), future studies should aim at developing promotion strategies that will attract these specific subgroups.

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Conflict of interest statement

None declared.

References

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Visitor characteristics of Internet lifestyle intervention


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