

Who Uses Action Planning in a Web-Based Computer-Tailored Intervention to Reduce Workplace Sitting and What do Action Plans Look Like? Analyses of the *Start to stand* Intervention among Flemish Employees

Katrien De Cocker*  and Ineke Vergeer

University of Southern Queensland, Springfield Central, Australia

Greet Cardon

Ghent University, Ghent, Belgium

Theda Radtke

University of Zurich, Zurich, Switzerland

Corneel Vandelanotte

CQUniversity, Springfield Central, Australia

Background: Action planning plays an important role in many web-based behaviour change interventions. As such, it is important to identify who engages in action planning and what action plans look like. This study examines (1) attributes of users creating an action plan and (2) the content of action plans made during a web-based intervention to reduce workplace sitting. **Methods:** Users answered “what” (short standing breaks and/or longer periods of standing), “when” (working hours, work breaks, commuting), “where” (workplace, transport mode), and “how” (frequency, duration, implementation intentions) questions. MANOVA and chi-squared tests were conducted to compare those creating an action plan with those who did not. Descriptive statistics were used to examine the content of the action plans. **Results:** Those creating an action plan ($n = 236/1,701$) were significantly older, more sedentary at work, and more aware of health risks related to excessive sitting compared to those not planning ($n = 1,465$). The majority planned standing breaks ($n = 212$) every 30 minutes, and periods of standing ($n = 173$) for 1 to 2 hours. **Conclusions:** Future interventions should promote action planning more, especially among younger employees and those with less health-related knowledge

*Address for correspondence: Katrien De Cocker, University of Southern Queensland, Springfield Central Queensland, Australia. Email: katrien.decocker@usq.edu.au

about sitting. Action plans were compatible with current sitting messages used in health promotion.

Keywords: eHealth, self-regulation, implementation intention, sedentary behaviour, online program, Internet

PRACTITIONER POINTS

- Employees planned short breaks from sitting every 30 minutes and periods of standing for 1 to 2 hours during work hours.
- Employees selected simple, low-cost solutions to plan short and long standing breaks.
- Those at risk of not creating an action plan are employees of a younger age, those reporting less sitting at work, and those less aware of the health risks related to too much sitting.

INTRODUCTION

There has been a rapid growth in electronic health (eHealth) and mobile health (mHealth) interventions promoting more physical activity, less sedentary behaviour, and healthy diets (Muller et al., 2018). These types of interventions have several advantages, including the ability to use a personalised approach, to reach large numbers of participants, and to be implemented easily and at low cost (Broekhuizen, Kroeze, van Poppel, Oenema, & Brug, 2012). In addition, these approaches have been found to be feasible, acceptable, and effective in changing a variety of health-related behaviours (Broekhuizen et al., 2012). This is also true for the “*Start to stand*” intervention, one of the first web-based, computer-tailored interventions targeting workplace sitting (De Cocker, De Bourdeaudhuij, Cardon, & Vandelanotte, 2015a, 2016, 2017). As the prevalence of workplace sitting is high (Clark et al., 2011; De Cocker, Duncan, Short, van Uffelen, & Vandelanotte, 2014) and recent evidence showed that sedentary behaviours (i.e. waking behaviour spent in a sitting, reclining or lying posture with a low energy expenditure; Tremblay et al., 2017) are associated with increased negative health outcomes, interventions to reduce workplace sitting are needed. An international group of experts recommends desk-based employees to reduce their sitting initially by accumulating 2 hours/day of standing and light activity (light walking) during working hours, and eventually progressing to a total of 4 hours/day (Buckley et al., 2015). In addition, the World Health Organization (World Health Organization, 2018) and several governments (e.g. AUS, UK, USA,

Canada) currently encourage a core dual public health message promoting more physical activity and less sitting time. This is also the case in Flanders (northern, Dutch-speaking part of Belgium), where the local “Flemish Institute Healthy Living” is promoting more interrupted and less total sitting among the population. In order to do this among the working population, the institute has implemented and disseminated the *Start to stand* intervention since October 2016 (De Cocker et al., 2018).

As part of *Start to stand*, participants receive personalised feedback on constructs based on the Theory of Planned Behaviour (TPB; Ajzen, 2011) and Self-Regulation Theory (SRT; Hagger & Luszczynska, 2014). The TPB focuses on increasing the intention to adopt or modify a behaviour by targeting attitudes, perceived social influence, and self-efficacy (Ajzen, 2011). The SRT technique promoted here was the completion of an action plan (Hagger & Luszczynska, 2014), identified as behaviour change technique (BCT) number 1.4 in Michie et al.’s (2013) comprehensive model of behaviour change interventions. *Start to stand* was found to be feasible, acceptable, and effective in reducing self-reported workplace sitting (mean reduction of 59 minutes/day after 1 month in the intervention group) among Flemish employees (De Cocker et al., 2015a, 2016). Data resulting from our clustered RCT showed that this intervention effect was significantly moderated by action planning (De Cocker et al., 2017), suggesting that creating an action plan is an essential strategy in order to decrease workplace sitting. Action planning, considered to bridge the so-called intention–behaviour “gap” (Hagger & Luszczynska, 2014), has also been found effective in other eHealth interventions (Webb, Joseph, Yardley, & Michie, 2010).

Given its important role in behavioural change interventions (Hagger & Luszczynska, 2014), including the *Start to stand* intervention, it is necessary to identify those not engaging in action planning and thus unlikely to fully benefit from the intervention. This information is crucial for future intervention development and health promotion. In addition, it is essential to know what the action plans targeting workplace sitting look like, in order to gauge what type of strategies seem feasible and acceptable for employees, so that better interventions, policies, and public health messages can be developed. Therefore, the aims of the study presented here were to (1) examine the characteristics of the users of the *Start to stand* website who had made an action plan since the program’s dissemination in Flanders and (2) describe the content of these action plans and compare them with the current messages used in health promotion; using data from the recent “real-world” dissemination study.

METHODS

Participants and Procedures

Since October 2016, the *Start to stand* intervention has been promoted among the partners of the Flemish Institute Healthy Living (De Cocker et al., 2018).

This dissemination gave us the opportunity to investigate the proposed research questions. The Flemish Institute Healthy Living is a local governmental health promotion institute mainly using online and social media strategies in combination with the engagement of professional partners (for example, umbrella organisations for health and safety at work) to disseminate the intervention to reach as many Flemish employees as possible (De Cocker et al., 2018).

To use the freely available website (<http://starttostand.be/nld/pages/homepage>), potential users needed to register (create a login and password) in order to get access to the intervention. After logging in, a short introduction pop-up screen was shown in which users provided informed consent. Users were then referred to the home page, inviting them to complete an assessment questionnaire. If users reported being younger than 18 years, older than 65 years (official retirement age in Belgium in 2016), or to have no paid job at that time, they could not proceed and received the message that this website was not suitable for them because of their age or employment situation, respectively. The total length of the assessment questionnaire was a maximum of 37 questions depending on the answers given (see De Cocker et al., 2015a, for details of the questionnaire). After completing the assessment questionnaire, users received personalised feedback about their sitting and advice to change this. The study protocols were approved by the Ethics Committee of the Ghent University Hospital, Belgium (2012_320; IRB registration number B670201214227).

“Start to Stand” Intervention

The development of the theory-driven intervention has been described in detail elsewhere (De Cocker et al., 2015a, 2016, 2017). In brief, users of *Start to stand* received computer-tailored feedback and advice about sitting after completing an assessment questionnaire. These assessment questions obtained job-related information, knowledge about the health effects of sedentary behaviour, and constructs of the TPB (Ajzen, 2011) including attitudes, self-efficacy, social norm, and intention to change. A set of predefined decision rules selected feedback messages that were matched and tailored to the specific answers given by the users during the initial assessment. These feedback messages appeared immediately on the user’s screen after completing the initial assessment. This advice contained details on the users’ sitting time (normative feedback [BCT 2.2], health risk of too much sitting [BCT 5.1]; Michie et al., 2013) and suggestions on how to interrupt (having short breaks from sitting) and reduce (replacing sitting by periods of standing) sitting time.

At the end of the feedback page, users were able to request up to five additional specific sections, if interested. These optional sections were all available at once, but could also be accessed at a later time. The focus was on, respectively, (a) interrupting sitting during working hours, (b) replacing sitting by standing during working hours, (c) sitting during commuting to work, (d) sitting during

(lunch) breaks at work, and (e) action planning to interrupt and reduce sitting. In the first four sections, BCTs were feedback on behaviour (BCT 2.2) and information about health consequences (BCT 5.1) (Michie et al., 2013). In the last section (action planning), users were invited to create (an) action plan(s) (BCT 1.4) (Michie et al., 2013) through SMART (Specific, Measurable, Attainable, Relevant and Time-bound) goals (Maes & Karoly, 2005) and implementation intentions or “if-then” statements (Gollwitzer, 1999). When all questions were completed, a schematic overview of the personalised action plan(s) appeared immediately on the user’s screen, which could be printed. After completing the action plan section, users were asked to rate the section by giving one to five “stars”.

Measures

An overview of the assessment questions is given below. More details are available elsewhere (De Cocker et al., 2017).

Action planning. In the section on action planning, users were asked *what* (have more brief breaks from sitting by standing or walking, replace sitting by standing altogether, or a combination of both) they wanted to change about their sitting. Further, users indicated *when* (during working hours, lunch, commuting, or combinations), *where* (workplace, transport mode), and *how* (duration [10 s, 20 s, . . . , 4 min, 5 min] and frequency [every 5, 10, . . . , 55, 60 min] of breaks from sitting; duration of periods of standing [15 min, 30 min, . . . , 3 h 45 min, 4 h, >4 h]) they wanted to plan this. In the first general section and during the creation of an action plan, users were informed that current recommendations suggest interrupting sitting every 30 minutes for a period of at least 1 minute. No recommendation was given regarding the duration of longer periods of standing. Finally, users were asked to select predefined “if-then” statements (see Table 3) or formulate new “if-then” statements themselves (open-ended). The use of “if-then” plans can promote health behaviour change by linking a critical situation (“if”) to an appropriate behavioural response (“then”) (Achtziger, Gollwitzer, & Sheeran, 2008) and was found to be effective in changing (health) behaviours (Gollwitzer & Sheeran, 2006). As the matter of sedentary behaviour was fairly new when the intervention was promoted, it was decided to provide examples of “if-then” statements, based on previous research (De Cocker et al., 2015b). Seven predefined “if-then” statements were developed to plan breaks from sitting during working hours, four “if-then” statements aimed at breaks from sitting during work breaks and two focused on breaks from sitting during commuting (see Table 3). Regarding action plans to have (more) standing periods, six “if-then” statements were focused on the working hours, four on work breaks and two on commuting (see Table 3). Users could choose as many options as they wanted and selecting all predefined statements resulted

in 25 “if-then” options. Website usage statistics were used to define the number of users (not) setting up (an) action plan(s). Details on the content of the action plans were also gathered from the website itself.

Demographics. Users self-reported their age, gender, and education (low [no diploma, elementary school, secondary school] vs. high [college, university]).

Work-Related Variables. Work-related variables included: average daily time spent at work (hours-minutes), employment duration (number of years), and the average level of efficiency and concentration at work during the last month (two items; scores between “1” ([low] and “10” [high]).

Health-Related Variables. To assess participants’ health, the following variables were obtained. Weight and height were used to calculate the body mass index (BMI) ($\text{weight}/\text{height}^2$). The frequency of neck and back pain during the previous workweek was measured using two 5-point scales ranging from “never” (“1”) to “always” (“5”). The level of sitting time was assessed using the reliable and validated Workforce Sitting Questionnaire (WSQ; Chau, van der Ploeg, Dunn, Kurko, & Bauman, 2011). Users self-reported the time spent sitting on work and non-workdays for the last 7 days while (1) travelling to and from places; (2) being at work; (3) watching TV; (4) using a computer at home; and (5) doing other leisure activities. The validated International Physical Activity Questionnaire (IPAQ) short version (Craig et al., 2003; Vandelandotte, Bourdeaudhuij, Philippaerts, Sjöström, & Sallis, 2005) was used to assess the number of days and average amount of time for each day spent walking, and doing moderate and vigorous-intensity physical activity in the last week. Based on the guidelines for data processing and analysis of the IPAQ (IPAQ, 2005), total scores for walking, moderate and vigorous physical activities (multiplying the “number of days” by the “average amount of time for each day”), and total MVPA (summation of moderate and vigorous physical activity) were computed.

Psychosocial Variables. The questionnaire assessed five psychosocial factors (see Table 1). Users’ *knowledge* about the health risks of too much sitting was measured via a disagree/unsure/agree item. *Attitudes* towards changing sitting were measured using six items (for example “I think changing my sitting behaviour is awkward”) of which a mean score was calculated. *Self-efficacy* was measured by asking how confident employees were about changing their sitting behaviour (mean score of four items, for example self-efficacy to change when colleagues don’t do this). *Social support* was assessed by asking whether colleagues would support them when trying to change their sitting behaviour. For attitudes, self-efficacy, and social support, the response options involved 5-point

TABLE 1
 Characteristics of Users Setting Up an Action Plan and Users not Setting Up an Action Plan

| <i>Characteristics</i> | <i>Set up at least one action plan (n = 236)</i> | <i>Did not set up an action plan (n = 1,465)</i> | <i>Comparison F or χ^2 (p)</i> |
|---|--|--|--|
| Demographic variables | | | |
| Age: $x \pm SD$ years | 40.1 \pm 11.1 | 38.2 \pm 10.8 | $F = 6.1$ (.013) |
| Gender: n men (%) | 48/236 (20.3) | 351/1,453(24.2) | $\chi^2 = 1.6$ (.200) |
| Education: n college/university (%) | 208/233 (89.3) | 1183/1,331 (88.9) | $\chi^2 = 0.03$ (.861) |
| Work-related variables | | | |
| Hours at work: $x \pm SD$ days | 8.1 \pm 1.1 | 8.0 \pm 0.9 | $F = 2.7$ (.100) |
| Occupational status: n white collar (%) | 230/233 (98.7) | 1,305/1,331 (98.0) | $\chi^2 = 0.5$ (.487) |
| Employment duration: $n > 5$ years (%) | 134/233 (57.5) | 729/1,331 (54.8) | $\chi^2 = 0.6$ (.438) |
| Average efficiency during last month ^a : $x \pm SD$ | 6.7 \pm 1.4 | 6.8 \pm 1.3 | $F = 1.8$ (.171) |
| Average concentration during last month ^a : $x \pm SD$ | 6.6 \pm 1.4 | 6.8 \pm 1.3 | $F = 1.6$ (.201) |
| Health-related variables | | | |
| BMI: $x \pm SD$ kg/m ² | 24.4 \pm 4.4 | 24.0 \pm 4.0 | $F = 1.8$ (.183) |
| Frequency of neck pain in previous week ^b : $x \pm SD$ | 2.5 \pm 1.2 | 2.5 \pm 1.2 | $F = 0.03$ (.876) |
| Frequency of back pain in previous week ^b : $x \pm SD$ | 2.6 \pm 1.1 | 2.6 \pm 1.1 | $F = 0.06$ (.800) |
| Walking: $x \pm SD$ minutes/day | 19.3 \pm 18.4 | 19.1 \pm 21.8 | $F = 0.0$ (.898) |
| Moderate-intensity PA: $x \pm SD$ minutes/day | 14.7 \pm 19.4 | 16.5 \pm 19.3 | $F = 1.6$ (.203) |
| Vigorous-intensity PA: $x \pm SD$ minutes/day | 8.7 \pm 12.9 | 9.0 \pm 12.3 | $F = 0.1$ (.742) |
| MVPA: $x \pm SD$ minutes/day | 23.4 \pm 25.1 | 25.5 \pm 26.0 | $F = 1.3$ (.263) |
| Meeting PA guidelines: $n \geq 30$ min MVPA/day (%) | 63/233 (27.0) | 436/1,331 (32.8) | $\chi^2 = 3.0$ (.084) |
| Total sitting: $x \pm SD$ minutes/workday | 778.3 \pm 266.0 | 759.2 \pm 265.3 | $F = 0.4$ (.529) |
| Total sitting: $x \pm SD$ minutes/non-workday | 240.6 \pm 139.4 | 227.6 \pm 134.5 | $F = 1.3$ (.252) |
| Sitting at work: $x \pm SD$ minutes/day | 357.1 \pm 120.4 | 338.0 \pm 120.0 | $F = 5.0$ (.026) |
| Sitting during transport: $x \pm SD$ minutes/day | 83.4 \pm 102.6 | 80.8 \pm 89.8 | $F = 0.2$ (.695) |
| Sitting during TV viewing: $x \pm SD$ minutes/day | 115.7 \pm 65.5 | 109.4 \pm 64.7 | $F = 1.8$ (.174) |
| Sitting during PC use: $x \pm SD$ minutes/day | 72.5 \pm 66.9 | 77.5 \pm 72.8 | $F = 1.0$ (.326) |
| Other leisure time sitting: $x \pm SD$ minutes/day | 99.2 \pm 58.0 | 99.2 \pm 59.7 | $F = 0.0$ (.990) |
| High level of sitting: n (%) reporting ≥ 8 h/day | 213/233 (91.4) | 1,169 (87.8) | $\chi^2 = 2.5$ (.115) |

TABLE 1 (Continued)

| <i>Characteristics</i> | <i>Set up at least one action plan (n = 236)</i> | <i>Did not set up an action plan (n = 1,465)</i> | <i>Comparison F or χ^2 (p)</i> |
|---|--|--|--|
| Psychosocial variables related to sitting | | | |
| Knowledge: <i>n</i> (%) agreeing that daily prolonged sitting can cause health problems | 208/233 (89.3) | 1,120/1,331 (84.1) | $\chi^2 = 4.1$ (0.044) |
| Attitudes ^c : $x \pm SD$ | 3.6 \pm 0.8 | 3.5 \pm 0.8 | $F = 2.8$ (.095) |
| Self-efficacy ^c : $x \pm SD$ | 3.9 \pm 0.6 | 3.8 \pm 0.6 | $F = 3.6$ (.057) |
| Social support: <i>n</i> (%) agreeing that their colleagues encourage them to change sitting during working hours | 28/233 (12.0) | 136/1,331 (10.2) | $\chi^2 = 0.7$ (.408) |
| Intention: <i>n</i> (%) intending to change right away or in the coming weeks | 232/233 (99.6) | 1,320 (99.2) | $\chi^2 = 0.4$ (.521) |

BMI, body mass index; MVPA, moderate-to-vigorous intensity physical activity; PA, physical activity; *SD*, standard deviation.

^a*e* mean score of 10-point scale ranging from 1 (low) to 10 (high).

^b*f* mean score of 5-point scales ranging from “never” to “always”.

^c*e* mean score of 5-point scales ranging from “strongly disagree” to “strongly agree” (based on average of items).

scales ranging from “strongly disagree” (“1”) to “strongly agree” (“5”). Finally, employees’ *intention* to change sitting was assessed (No/Yes, I may do this in the future/Yes, I will try this in the coming weeks/Yes, I will start doing this right away). All questions were based on previously validated questions to measure psychosocial correlates of physical activity (De Bourdeaudhuij & Sallis, 2002), with the wording changed to reflect psychosocial correlates of sitting (De Cocker et al., 2014).

Statistical Analyses

All analyses were conducted in SPSS version 24.0 (IBM Corporation, Armonk, NY, USA) and significance was set at $p < .05$. Chi-squared tests (for categorical outcomes, i.e. gender, education, occupational status, employment duration, high level of sitting, knowledge, social support, and intention to change) and one-way MANOVA test (for continuous outcomes; three models: one for age and work-related variables, one for health-related variables, and one for psychosocial variables) were conducted to compare the demographic, work-related, health-related, and psychosocial variables between those who did set up an action plan and those who did not. Descriptive statistics were used to examine the kind of action plans made by the employees.

RESULTS

Participant Characteristics

At the time of data collection (13 March 2018), 1,701 users had logged onto the website and received the web-based, computer-tailored advice. The majority of this sample was female, college/university educated, not-overweight, employed in a white-collar job, highly sedentary and intending to change this. Of those visiting the website, 236 (13.9%) completed the additional section on action planning. Of these users, only 12 individuals (5.1%) returned to this section at a later stage to make another action plan.

The characteristics of those setting up an action plan and those not creating an action plan are presented in Table 1. Those who set up an action plan were significantly older ($p = .013$), reported more sitting at work ($p = .026$), and were more aware of the health risks related to too much sitting ($p = .044$) compared to those who did not make an action plan (see Table 1). No other differences in demographic, work-related, health-related, or psychosocial variables were found between the two groups (see Table 1).

Content of the Action Plans

Of those that completed the section on action planning, the majority ($n = 149$, 63.1%) set up two action plans at the same time (i.e. one for more breaks from sitting and one for longer periods of standing), while the others ($n = 87$, 36.9%) made a single plan. Of those completing only one action plan, 63 (72.4%) planned to have more breaks from sitting and 24 (27.6%) planned to have more periods of standing.

A total of 212 action plans were set up focusing on breaks from sitting and 173 on replacing sitting by periods of standing. Table 2 gives an overview of the situations in which users preferred to make the action plans (four users did not provide this information), for both types of goals (breaks from sitting and periods of standing) separately.

Action Plan to Have Short Standing Breaks. Overall, the preferred situation to plan (more) breaks from sitting was during *working hours* (selected in 201 [97.6%] of the 210 “breaks from sitting” action plans), followed by *work breaks* (selected in 106 [50.5%] of the 210 “breaks from sitting” action plans). The least preferred situation to plan (more) breaks from sitting was during *commuting* (selected in 59 [28.1%] of all “breaks from sitting” action plans) (see Table 2). Users mostly planned to have a break from sitting every 30 minutes (64% of the “breaks from sitting” action plans), some to have a break every 60 minutes (11.8%), and a few users planned to have it every 45 minutes

TABLE 2
Situations in Which Changes were Planned

| | <i>Breaks from sitting n/N (%)</i> | <i>Periods of standing n/N (%)</i> |
|---|------------------------------------|------------------------------------|
| Working hours | 96/210 (45.7) | 64/171 (37.4) |
| Work breaks | 4/210 (1.9) | 2/171 (1.2) |
| Commuting | 0/210 | 0/171 |
| Working hours and work breaks | 51/210 (24.3) | 53/171 (31.0) |
| Working hours and commuting | 8/210 (3.8) | 7/171 (4.1) |
| Work breaks and commuting | 1/210 (0.5) | 4/171 (2.3) |
| Working hours, work breaks, and commuting | 50/210 (23.8) | 41/171 (24.0) |

(8.1%). The length of the planned break from sitting was mostly 1 minute (50.2%); fewer selected interruptions of 2 minutes (17.1%), 30 seconds (9.0%), and 5 minutes (8.5%).

On average, users selected 4.5 ± 2.2 of the total number of predefined “if-then” statements to have more breaks from sitting. The most popular if-then plans were “If I print a document, then I will get up to get it”, “If I need to put something in the bin, then I will stand up”, and “If the phone rings, then I will stand up” (see Table 3).

Action Plan to Have Periods of Standing. The action plans to have (longer/more) periods of standing were focused on *working hours* (selected in 165 [96.5%] of the 171 “standing periods” action plans) and *work breaks* (selected in 100 [58.5%] of the 171 “standing periods” action plans). *Commuting* was least popular (selected in 63 [36.8%] of all “standing interruptions” action plans) (see Table 2). The most common planned lengths of the standing periods were 60 minutes (41.9%), 2 hours (19.2%) or 3 hours (9.3%).

An average of 3.3 ± 2.0 “if-then” statements focusing on periods of standing was selected. The following predefined “if-then” statements were most popular: “If I want to have a brief discussion with a colleague, then I will do it standing”, “If I need to read a paper document, then I will do it standing”, and “If I’m done with lunch, then I will spend the rest of my break standing” (see Table 3).

Self-Selected Action Plans. Forty-two users (17.8% of those completing the section on action planning) made an “if-then” plan using the open-ended question format. Overall, most of the self-defined “if-then” plans focused on the working hours ($n = 36$); fewer focused on work breaks ($n = 5$) and commuting ($n = 3$). Ten users formulated “if-then” plans related to the home environment. Interestingly, five of these plans focused on increasing physical activity rather than reducing sitting time.

TABLE 3
Frequency of Selecting Pre-composed "if-then" Plans

| <i>If-then statements for planning</i> | <i>Situation</i> | <i>Frequency (n)</i> |
|--|------------------|----------------------|
| ... (more) breaks from sitting | | |
| If I print a document, then I will get up to get it | Working hours | 163 |
| If I need to put something in the bin, then I will stand up | Working hours | 128 |
| If the phone rings, then I will stand up | Working hours | 123 |
| If my computer starts up, then I will install software to remind me to stand up every x minutes | Working hours | 95 |
| If I have a meeting, then I will get something to drink halfway through the meeting | Working hours | 74 |
| If I have a glass of water, then I will stand up while drinking | Work breaks | 74 |
| If I arrive at work in the morning, then I will set an alarm to remind me to stand up | Working hours | 61 |
| If a colleague comes by, then I will stand up as well | Working hours | 61 |
| If I get coffee, then I will have my coffee standing | Work breaks | 55 |
| If I eat a snack at my desk, then I will have it standing | Work breaks | 45 |
| If I have a hot meal during lunch, then I will clean up immediately instead of staying seated | Work breaks | 36 |
| If I have to wait for a long time, then I will get up and walk around every 15 min | Commuting | 20 |
| If I'm waiting for the bus/train, then I will stand | Commuting | 6 |
| ... (more) periods of standing instead of sitting | | |
| If I want to have a brief discussion with a colleague, then I will do it standing | Working hours | 113 |
| If I need to read a paper document, then I will do it standing | Working hours | 94 |
| If I'm done with lunch, then I will spend the rest of my break standing | Work breaks | 60 |
| If I take a break in the morning, then I will walk around the building | Work breaks | 53 |
| If I arrive at work in the morning, then I will start to work standing first | Working hours | 45 |
| If I take a break in the afternoon, then I will get some fresh air instead of staying inside | Work breaks | 45 |
| If I return to the office after lunch, then I will stand to work first | Working hours | 42 |
| If I have a sandwich or salad for lunch, then I will have it standing | Working hours | 34 |
| If I'm waiting for the train, tram or bus, then I will stand | Commuting | 27 |
| If I have meetings for half a day or longer, then I will stand during the first and/or last part | Working hours | 21 |
| If I'm using public transport, then I will stand during the last part of the trip | Commuting | 16 |
| If I'm with a client, then I will have the conversation standing | Working hours | 11 |

Evaluation of the Section on Action Planning. After receiving the action plan(s), 105 users (44.7% of those setting up an action plan) completed the question rating the action planning section. The mean “star” score was 3.9 ± 1.0 out of 5, and 71 (67.6%) rated the section highly (four or five stars), while eight users (7.7%) gave the action planning lowly a low rating (one or two stars).

DISCUSSION

As action planning was previously found to be a significant moderator of the effectiveness of the *Start to stand* intervention (De Cocker et al., 2017), the present study (with a new sample) investigated which users engaged in action planning and what action plans looked like. The present findings are useful for future (web-based) interventions and policies targeting workplace sitting.

An important first finding is the fact that those setting up at least one action plan differed only in some aspects from those not making an action plan. Differences were found in workplace sitting, age, and health-related knowledge about sitting. First, those who did not set up an action plan reported less workplace sitting compared to those making an action plan. Similar findings were reported elsewhere (users who were already physically active [Reinwand et al., 2016; Van der Mispel, Poppe, Crombez, Verloigne, & De Bourdeaudhuij, 2017] or consumed enough fruit and vegetables [Van der Mispel et al., 2017] showed more attrition and were less likely to set up action plans), suggesting that the program particularly reached those most in need of the intervention. However, both groups (those setting up an action plan and those who did not) reported high levels of overall sitting (88–91% ≥ 8 h/day of sitting), and between-group differences in sitting may be small from a clinical point of view. The second characteristic related to action planning was older age. A previous study also showed that returning to the website and completing additional sections was lower among younger adults (Van der Mispel et al., 2017), while another study found that age was no predictor of action planning (Reinwand et al., 2016). No other studies on the association between action planning and age could be found, so more research is needed to confirm the present results or to explain this finding. Finally, in the group creating an action plan, more users (89%) were aware of the potential health problems compared to those not creating an action plan (84%). However, it should be noted that, overall, both groups were well informed about the health consequences of too much sitting. Further, it is promising to see that the action planning component did not distinguish between subgroups based on gender, education, work-related, most health-related, and other psychosocial variables. This is to a certain extent comparable to previous eHealth interventions promoting a healthy lifestyle which showed that education (Reinwand et al., 2016; Van der Mispel et al., 2017), weight status (Van der Mispel et al., 2017), and self-efficacy (Reinwand et al., 2016) were not associated with action planning. However, some characteristics did relate to the disuse

of action planning in other studies, such as male gender (Van der Mispel et al., 2017) and low intention (Reinwand et al., 2016), which is in contrast to the present findings. Regarding the latter, it should be noted that 99 per cent of the present website users reported intending to change their sitting behaviour, and according to the Health Action Process Approach (Schwarzer, 2008), action planning strategies would be very suitable for these “intenders” (people motivated to change but not yet acting). Still, in the present study, a large part of these “intenders” did not create action plans and should be encouraged more in the future, especially as action planners rated this intervention component relatively positively.

The second aim of the present paper was to evaluate the content of the action plans and compare it to current public health messages regarding (workplace) sitting. A first remarkable finding is the fact that the majority (63%) decided to make two action plans (both focusing on breaks from sitting and periods of standing) simultaneously. A previous study on action planning for physical activity showed that the quantity of action plans matters, showing that the more plans are being generated, the more likely behaviour change will be successful (Wiedemann, Lippke, Reuter, Ziegelmann, & Schüz, 2011). However the optimal number of generated plans is unknown. Our results suggest that setting up action plans for both breaks from sitting and periods of standing is feasible for the users of *Start to stand*.

A second interesting result concerns the type of behaviour that action planners want to change. Overall, only slightly more people decided to plan breaks from sitting ($n = 212$) compared to planning periods of standing ($n = 173$). In one of our previous studies, breaking up sitting (80% were confident that they could do this) seemed more feasible than replacing sitting by periods of standing (16% were confident that they could do this) (De Cocker et al., 2015b). However, the current findings suggest that both options are deemed feasible and acceptable. It is also important to note that work breaks (e.g. lunch breaks) and commuting were the least popular situations in which action planners wished to make changes. This might be explained by practical reasons, such as commuting by car or having lunch breaks at “normal” tables together with colleagues.

We also aimed to compare the action plans to the current guidelines for reducing sitting time. Concerning breaking up sitting time, the majority planned to have these interruptions every 30 minutes (64%) for about 1 minute (50%), as was recommended in the *Start to stand* advice and as most local/national public health messages currently suggest (Australian Department of Health, 2014; Flemish Institute Healthy Living, 2017). Regarding plans to have periods of standing, the majority planned no more than 1 (42%) or 2 (19%) hours of standing at once, while a recent expert statement recommends office workers to accumulate 2 to 4 hours of standing and light physical activity during working hours (Buckley et al., 2015). In our study, people planned less, which may suggest that longer periods of standing might be intimidating and not feasible at this stage. A

gradual build-up may need to be encouraged. A recent study showed that German desk-based workers preferred to stand for about 1 hour and 10 minutes during their working hours (which was about 25 minutes more than their actual amount of standing) (Wallmann-Sperlich, Chau, & Froboese, 2017). To some extent, this is comparable to the present action plans, even though the exact amount of standing in the present sample is unknown.

Finally, it seems that the choice to offer predefined “if-then” plans was appropriate as only a small number of users (18%) formulated self-selected “if-then” plans. In other health promotion interventions, for example to reduce alcohol consumption, users have also been asked to set action plans by ticking relevant situations, statements, and solutions from a predefined list (Armitage & Arden, 2012). Further, there was a clear preference towards certain “if-then” plans in the present study. The most popular “if-then” plans were examples of changes in the physical environment making certain behaviours more likely; for example, placing a bin not close to the desk but further away so that individuals need to stand up. These preferences confirm the usefulness of “nudging interventions” (Marteau, Ogilvie, Roland, Suhrcke, & Kelly, 2011), as the preferred predefined “if-then” plans were simple, low-cost solutions not requiring organisational or higher level adaptations. So in terms of affordable public health in the workplace, it is positive that these changes seemed feasible to the users intending to change their sitting.

As we are not aware of any similar eHealth workplace sitting interventions looking at characteristics of participants setting up action plans, a strength of the present study is its added value to the literature, and in particular the use of action planning and its association with demographic, work-related, health-related, and psychosocial variables. A further strength is the insights gained regarding the content of the action plans, which is useful for intervention developers and policy makers aiming to reduce and interrupt prolonged sitting at work. Finally, our results derived from a “real-world” dissemination intervention and not from a controlled research setting, potentially resulting in better generalisation of the findings.

It should, however, be acknowledged that the present sample consisted mostly of female, college/university educated, healthy (weight), white-collar employees reporting high levels of sitting which they were intending to change. Further, we were unable to link the findings about the number and the content of the action plans to “plan enactment” (do individuals execute their plans as intended?) (de Vries, Eggers, & Bolman, 2013) and actual behaviour changes. Finally, the number of users within *Start to stand* setting up an action plan was relatively low (14%). However, overall attrition is a common plague in eHealth interventions, and losses of up to 60–80 per cent of participants have been reported elsewhere (Geraghty, Torres, Leykin, Perez-Stable, & Munoz, 2013). Compared to the present study, previous eHealth interventions including planning tools showed a similar number of planning tool users in dietary intake (18–58%) and physical activity (16–64%)

(van Genugten, van Empelen, & Oenema, 2014; Storm et al., 2016; Van der Mispel et al., 2017) interventions. In one study, the intervention component with the highest attrition was action planning (compared to other intervention components such as, for example, self-monitoring) (Van der Mispel et al., 2017). We are unaware of any other studies using action planning in interventions targeting workplace sitting, except for our own previous work testing the feasibility and acceptability of the *Start to stand* intervention (De Cocker et al., 2015a), in which 21 per cent of employees of a public city service set up an action plan. The present findings can be a first step in targeting groups at risk of not creating an action plan. However, there could be various reasons why users did not set up an action plan. For example, it could be that users felt they had received sufficient advice at the time they stopped using the program (Van der Mispel et al., 2017) or that there was an overload of additional intervention components (there was the possibility to complete five additional sections to get extra information and advice), which could make the users feel “satisfied” or “saturated” after completing the first section(s). It is important to note that the action plan section was the last one of five additional sections. Investigating whether the engagement in action planning would be higher if the action planning section was, for example, the second additional section is a useful direction for future studies. More (qualitative) research is needed to examine the barriers to creating action plans and to find out what would stimulate users to do so; for example, other formats (e.g. collaborative plans) of action plans, or incentives from the employer.

CONCLUSION

In the present sample of highly educated, mainly female, inactive and sedentary employees who were intending to change their sitting behaviour, about one in seven users completed the eHealth intervention component on action planning. Future research needs to understand why this attrition occurs and how it can be avoided, especially in those of a younger age, those reporting less sitting at work and those less aware of the health risks related to too much sitting. Action plans focusing on changes during working hours were most popular and the plans were comparable to the current health messages used in public health promotion, namely planning breaks from sitting every 30 minutes and/or planning periods of standing for 1 hour.

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