Abstract

Aims: As sedentary behaviour is becoming more prominent in office based work environments, this study aimed to explore office workers' perceptions of sedentary behaviour, explore potential behavioural strategies to reduce sedentary behaviour in the workplace and identify barriers which may hamper behaviour change. Methods: One hundred and forty office workers were recruited and surveyed from the same workplace. The survey included questions regarding perceptions of the relationship between sitting time and health. Following the survey, 12 employees also participated in focus groups to identify potential sedentary behaviour intervention strategies and barriers. The responses from the survey and focus groups were thematically analysed. Results: Eighty-eight percent of all participants surveyed agreed that there was a relationship between sitting time and health. The most prominent theme identified was musculoskeletal complaints followed by general health and weight gain or obesity. The focus groups identified that interventions targeting reducing sitting time should include education, supportive and knowledgeable managers and a variety of behaviour change strategies to address individual preferences and barriers. Conclusions: Multiple behavioural strategies were identified which appear to be appropriate for sedentary behaviour change.

Key words: Sedentary, musculoskeletal pain, occupational health

Introduction

Due to the increasingly sedentary nature of occupations through advancements in technology,[1] workplace sitting patterns have contributed substantially to overall sitting time for people who work.[1,2,3,4] Office workers have been reported as being sedentary or seated for between 4.1 hours and 7.3 hours per day during work hours.[4,5] Additionally, office workers average two more hours of sitting time and achieve less standing and walking time on work days compared to leisure days,[6] indicating a need to target workplace sitting time when addressing sedentary behaviour. Chu and colleagues[7] have determined that effective interventions can reduce occupational sitting by 40 minutes over an 8-hour work day, however further research is required to explore behavioural perceptions of standing in an office based work environment and the long-term adherence of behaviour change.[8]

Increased sitting time has been associated with elevated risk of mortality from all causes including cardiovascular disease[9,10,11] and reduced life expectancy.[12] Additional links to health impediments such as weight gain,[13] some cancers,[14] type 2 Diabetes,[10,15] and breathing difficulties[16] have also been identified. Recent studies have demonstrated that a higher frequency of sitting time interruptions may reduce associated health risks such as high adiposity, and elevated triglyceride and plasma glucose levels.[17,18,19]

Recently the Australian Sedentary Behaviour Guidelines have been developed and recommend minimising the amount of time spent in prolonged sitting by breaking up long periods of sitting as often as possible.[20] Although these generic guidelines have been developed and reduced/interrupted sitting time has produced benefits in health outcomes, [17,18,19] further investigation is required to determine the most appropriate behavioural strategies to encourage workers to adopt these guidelines. Previous literature has indicated that there are many factors contributing to behaviour change in a workplace such as cultural context, physical environment and personal factors.[21] Due to the range of potential contributing factors a 'one size fits all' approach to behaviour change in the workplace may be sub-optimal.[22] Gilson, Straker and Parry[22] highlighted that a variety of approaches that cater for individual worker preferences may be essential for successful reduction of occupational sitting time.

Previously, only a few studies have focused on the perceptions of office workers in preparation for sedentary behaviour change interventions.[3,23,24] These studies have provided participants an opportunity to be involved in the decision-making process of behaviour change.[25] The participant inclusion may positively influence an individual's self-efficacy by incorporating behavioural strategies which they perceive as being achievable.[25] Therefore the aims of the current

study was 1) to explore the relationship between sitting time and health as perceived by office workers 2) to explore potential strategies to reduce sedentary behaviour in the workplace and 3) to identify barriers which may limit the effectiveness of the strategies suggested.

Subjects and Methods

A convenience sample of full-time and part-time office workers who were employed at a large workplace across two regional cities in Australia were recruited via email for the study. The email was sent to all professional staff who performed administrative roles as defined by the workplace Enterprise Agreement[26] with non-administrative staff (for example, laboratory technicians) excluded from the study. The participants were invited to complete an online survey regarding workplace sitting time. One-hundred and forty workers (age: 40 ± 11 years; 114 females and 26 males; 110 full-time and 30 part-time employees; work hours 8.6 ± 0.7 hours for full-time employees and 7.6 ± 1.3 hours for part-time employees) volunteered to participate.

Within the survey, participants were asked ‘do you think there is a relationship between sitting time and your health’ which required a ‘yes’ or ‘no’ response. Participants were then prompted to provide a free-text explanation of their response. This question was adapted from a previous study.[3]

After the survey responses were collected and analysed, further exploration was required to gain a richer understanding of the workers' perceptions. Survey responders were invited to participate in focus groups. The focus groups explored the concepts of sitting time and the relationship with their health and practical methods to reduce occupational sitting including potential workplace interventions and barriers. Focus groups have previously been used successfully to explore sedentary behaviour in an occupational setting [3,21,23,27] and are an effective method to highlight attitudes, group norms, and to allow for debate within a group surrounding specific topics.[28] Twelve (11 female, 1 male) participants volunteered for this phase of the study, representing approximately 10% of the survey population; and participated in one of two focus group sessions. The participants were 'naturally occurring' work groups and the participant numbers (four and seven) in the focus group were considered to be appropriate.[28] Focus groups were facilitated by the principal investigator and were audio recorded for subsequent transcription.

The focus groups were semi-structured and lasted between 40 and 60 minutes. Examples of the open-ended questions asked during the focus groups are: do you think there is a relationship between sitting time and your health? What do you think you could do in your current work environment to change your sedentary behaviour? Based on the responses from the previous question, the

group was asked if they could successfully achieve the suggested interventions and whether they could identify any barriers to achieving the behaviour change. All questions were explored with additional discussion depending on the responses provided by participants.

Ethical approval

Ethics approval for the study was obtained from the James Cook University Human Research Ethics Committee (H5176). All participants were informed about the objectives of the research and provided informed consent prior to participation via acceptance on the first page of the survey, to proceed with the survey. Participants provided written consent for their participation in the focus groups.

Analysis

The free text responses to the survey question about the relationship between sitting time and health, and the focus group transcriptions were analysed separately by two researchers via qualitative thematic analysis using the following process outlined by Braun and Clarke[29]: 1) familiarisation of data set 2) generated initial codes 3) searched for themes; 4) reviewed themes 5) defined and named themes. The themes were generated based on the content of the survey responses and focus group transcriptions in relation to the aims of

the study. Responses which did not appear to answer the question asked were not included in the analysis.

Results

Eighty-eight percent of respondents perceived that there was a relationship between sitting time and their health. A total of 118 participants provided explanation about the relationship. One hundred responses indicated that more sitting time equated to worsening health outcomes. Five responses positively linked sitting time to rest and recuperation as a positive health outcome. Thirteen responses were excluded from the analysis due to lack of relevant information. Seventeen health themes were identified by thematic analysis from the survey responses; and the number of responses for each health theme is recorded in Table 1. Some responses identified multiple health themes therefore the total in Table 1 exceeds 118 (participant responses). The themes are presented in descending order of frequency and are described by quotes from the survey and the follow-up focus groups.

Table 1 near here

Musculoskeletal complaints, conditions or function

Musculoskeletal complaints, conditions or function was the most prominent health theme identified in the survey. The major contributors to this health concern was back complaints (n = 21) including back pain or stiffness, lower back pain or an aching back for example, “sitting for long periods seems to put pressure on my lower back…” (survey response). Other issues included neck complaints (n = 10), for example “…Too much sitting at computer increases level of neck/shoulder strain…” (survey response and decreased muscle tone or wastage (n = 10), for example, “…My muscle tone is wasting…” (survey response). Throughout the focus groups, the perception that a negative relationship existed between sitting time and musculoskeletal health was reiterated with the theme characterised by responses such as “…I’ve found that certain muscles aren’t being used so they’re not strong and you sort of start to seize up…” (focus group response).

General health

Following musculoskeletal complaints, general health was the next most commonly identified theme that was linked to sedentary behaviour. This suggests that participants believe that there is an association between increased sitting time and poor health. Often the theme was described as a generic statement such as “the more I sit, the unhealthier I become” (survey response), “sitting for long periods is not good for your health” (survey

response), “the more you sit, the more unhealthy you are” (survey response) or “when you’re sitting for long periods of time, it doesn’t help your body - the older you get too” (focus group response). More specifically, some participants linked sitting time with poor health outcomes such as cardiovascular disease or diabetes which was characterised by responses such as, “there is a direct relationship between time spent sitting (i.e. immobile) and increased risk of health problems including cardiovascular disease, joint/muscle problems, circulatory problems, weight gain, fatigue” (survey response).

Weight gain/obesity/body mass index

Participants described the emergent theme of weight gain/obesity/body mass index as a health concern and this was characterised by responses such as “since my job has become more sedentary I have put on a lot more weight” (survey response), “the more sedentary I am, the greater the excess weight I carry, the higher risk I have for health problems like heart disease and diabetes” (survey response), “I have had significant weight gain (about 10 kg) since being employed in a ‘desk job’…” (survey response) and ‘[the impact of sitting has a] “bad impact on your bum” (focus group response).

Other identified themes

Participants indicated that feeling tired, fatigued, or having less energy was a result of sedentary behaviour and was characterised by responses such as “sitting too much can cause me to be unmotivated and make me very lethargic…” (survey response), and “…I think you mellow out. When you sit down for a long time, you just feel like you don’t want to do any work…” (focus group response). The health theme of circulation and cardiovascular health received similar response rates and was characterised by responses such as “I believe sitting for long periods is bad for my circulation” (survey response) and “I think the effects of [sedentary behaviour] are physical and psychological. Physical in many ways so that could be temporalised health in terms of your circulation and that has literally flow on effects” (focus group response). Posture and/or biomechanics was identified and characterised by responses such as “sitting for too long can cause circulation problems” (survey responses) and “[sedentary behaviour] will cause stress on your spinal cord and causes bad body posture” (survey response).

Identified behavioural strategies

The focus groups explored potential interventions whereby the participants were asked to provide ideas that could be implemented into their workplaces to reduce sitting time. A variety of lower-cost options were identified. Alarms or alerts to stand were suggested such as “I’d like a message telling me to stop

and have a stretch" (focus group response). Using computer software which freezes the computer for a selected period of time such as "I think [organisation] has a computer program that shuts down your computer and stops you from being able to go on and working for a couple of minutes so you actually have to go and do something" (focus group response). Standing during or walking to meetings such as "…all of our meetings should be stand up and they won't take so long" (focus group response). Having cordless phones and having office competitions aimed at reducing sitting time characterised by responses such as "a competition, I think, would be a good way to get people start" (focus group response). Removing chairs from the morning tea rooms so that everyone must stand during their breaks. Other higher-cost suggestions included standing desks and having portable devices to work at "a standing desk" (focus group response) which was followed promptly by another participant suggesting there is a need to be able to transition between sitting and standing if required, characterised by the response "or the ability to go between as required" (focus group response).

Additionally, participants suggested that education would assist in reducing sedentary behaviour in the workplace. This was characterised by responses such as, "I think it's a bit about education, like educating people that [reducing

sedentary behaviour] is beneficial for them" (focus group response). Participants also suggested that they need to feel supported by managers or the organisation in changing their behaviour. Example responses included, "it needs to come from, or people up the top need to understand it first and what the benefits are to us…" (focus group response), "the education might have to start at the top [of the organisation]" (focus group response), "so [managers] are not wondering why you're taking extra-long because you're taking breaks…" (focus group response) and "the 'smoke break' thing is really frowned upon so, you know, getting up and going for a walk or you know going and having a conversation with someone, will be on the same par" (focus group response).

Barriers

Most of the intervention ideas were met with barriers for success. For example, when one participant suggesting "we could take all of the chairs out and we'd stand there and eat rather than sit" another participant remarked that "they would just sit on the desk (table)". A participant suggested to "set an alarm every hour or so" however when asked if that would be functional for everyone to use an alarm or prompt another participant said "I guess it depends on what you are doing. If the prompt comes up and I'm right in the middle of doing something that needs to be done, then no. But if I had the time, yes" (focus group response). Similarly, walking meetings were discounted as "it's too hot to

do that, you'd have to do it internally, you wouldn't be able to do it externally as meetings usually have to be confidential" (focus group response). Interestingly, two participants indicated that sitting was considered positive due to previous work experience and the chance to rest after exercise, "I've gone from a standing up for 10 hours a day job, so I enjoy the sitting…" (focus group response) and "if I'm exercising a lot, I like to sit down at work because I'm sore" (focus group response). Incorporating the higher-cost option of standing desks was met with "I wouldn't like that" (focus group response), "I would end up with a back ache" (focus group response) and "I don't think I could handle standing up all day" (focus group response).

Discussion

Overall, the majority of participants perceived a negative relationship between sitting time and their health with musculoskeletal complaints identified as the most prominent health concern followed by general health, and weight gain/obesity/body mass index. The focus group responses suggested that for an intervention to be successful, it should include education on the benefits of reducing sedentary behaviour and if an intervention was implemented, participants indicated that they require the behaviour change to be normalised by management. Specific intervention strategies identified in the focus groups

included computer software, walking or standing meetings, cordless phones, adjusting furniture and office competitions however the most prominent strategy surrounded education.

Gardner, Smith, Lorencatto, Hamer and Biddle[30] suggest that an intervention which is targeting the reduction of sedentary behaviour should include education. While some participants suggested that they preferred to sit as they were sore from exercising or that they enjoyed sitting, the lack of knowledge surrounding sedentary behaviour may influence their decisions. Tasdemir-Ozdes, Strickland-Hughes, Bluck and Ebner[31] highlighted that our beliefs about future health related events can influence or motivate behaviour change and therefore the participants may not perceive that sedentary behaviour can lead to poor health outcomes such as cardiovascular disease,[9,10,11] weight gain,[13] some cancers,[14] type 2 Diabetes,[10,15] breathing difficulties.[18] These statements reinforce the notion that education is imperative when implementing an intervention.

Owen, Salmon, Koohsari, Turrell and Giles-Corti[32] suggest there is a potential link between social support, role modelling, and social norms and the development of chronic diseases attributable to increased sedentary behaviour. This is especially true when dealing with work environments as social norms

can influence the feasibility of interrupting or reducing sedentary behaviour in a workplace[23] and therefore influence an individual's self-efficacy.[25] There is often a perceived need to justify absences from the desk or computer[23] with a concern of being viewed as not completing set tasks if not seated at a computer.[3] The current study reports similar findings as the participants indicated that they want breaks in sedentary behaviour to be a normal activity in the workplace without receiving criticism for being away from their desk which requires support from management and/or the organisation. Previous literature has highlighted that there needs to be a shift in culture within a workplace to support short breaks without criticism.[21] Based on the current findings and previous literature,[21] there needs to be support to reduce or interrupt their sitting time and create a work social environment that is accepting of changing sedentary behaviour with short breaks being encouraged by managers and/or the organisation.

Although the participants identified some ideas including external prompts such as alarms, short standing or walking meetings and/or computer software for reducing or interrupting sedentary behaviour in the workplace, many of the suggestions were discounted due to a number of barriers highlighting that there are many individual preferences to achieving successful behaviour change.

This finding suggests that a ‘one size fits all’ approach to behaviour change will be unlikely to succeed due to personal preferences,[21,22] which suggests multiple options should be offered in the intervention.[30] Therefore future interventions should include a variety of strategies that are individually tailored[33,34] to match the level of willingness to engage in behaviour change[35] and to provide the opportunity for participants to contribute to the development of the intervention as it may lead to the perceived control of the behaviour being targeted.[36]

The current study has limitations, such that the findings may only be representative of people working in regional Australia, the specific workplace and those who agreed to participate as they may be aware of some of the health implications of sitting compared to those who did not participate in the study.

Conclusions

Office workers were actively involved in the decision-making process of planning for an intervention targeting the reduction of sedentary behaviour. The workers perceived that sitting time negatively affected their health with the majority of responses related to musculoskeletal complaints, general health and

weight gain/obesity/body mass index. The findings suggest that an intervention targeting reducing sitting time should include education, having supportive managers which will contribute to changing the social norms of the workplace and having multiple strategies to address personal preferences could be implemented in this specific workplace however similar research is required for other worksites prior to implementing a workplace intervention to reduce sitting time.

Acknowledgements

The authors would like to thank the two anonymous reviewers for their invaluable feedback.

Declaration of Conflicting Interest

There are no conflicts of interest to declare.

Funding

No financial support was obtained for this study.

Ethical Approval

Ethical approval for the study was obtained from the James Cook University Human Research Ethics Committee (H5176).

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Table 1. Health themes identified from free text survey responses for the relationship between sitting time and health

Health concern	Total responses
1. Musculoskeletal complaints/conditions/function	44
2. General health	32
3. Weight/obesity/body mass index	30
4. Tired/fatigued/less energy	22
5. Circulation/ cardiovascular health	19
6. Posture/biomechanics	11
7. Fitness/physical ability/stamina	8
8. Activity level	7
9. Boredom/motivation	7
10. Eye health	6
11. Mental health/depression	5
12. Headaches	4
13. Rest/recovery/relax	4
14. Metabolism	4
15. Wellbeing (physical and mental)	4
16. Concentration/alertness	3
17. Life expectancy	3