

Exploring environmental cues to instigate physical movement in the workplace

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ABSTRACT

Background: With the increase of sedentary jobs and the health risks associated with a sedentary lifestyle, finding novel methods to increase physical activity should be a priority. Environmental cues within the workplace can serve as cues to action for initiating light physical activity.

Aim: To qualitatively explore the environmental cues that can instigate light physical activity within an office workplace context. Identification of these cues can inform behaviour change programmes designed to promote habitual physical movement within the workplace.

Method: Purposive sampling was used to recruit full-time sedentary office workers who self-report as having a highly sedentary job. Interviews followed a semi-structured design and thematic analysis was used to explore environmental cues within commercial, home, and mixed office settings.

Results: Forty-three office workers were interviewed, 16 from a commercial office, 12 from a home office, and 15 with a flexible work arrangement whereby they worked from both a commercial and home office. The findings of this study indicate that across all three groups the main instigator of movement was influenced by office layout (e.g. getting up for beverages and taking bathroom breaks), social environment (e.g. informal and formal meetings), and taking active breaks, both job-related (e.g. printing and filing) and non-job-related (e.g. household chores).



Conclusions: These findings provide valuable insight for behaviour change programmes utilising environmental cues to inform habit-based interventions designed to instigate movement within the workplace.

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Introduction

The prevalence of sedentary behaviour and associated health risks, such as heart disease and diabetes, are a global health concern and compounded by the increase of sedentary jobs (Bull et al., 2020; World Health Organization, 2015). Forty-four percent of Australian adults describe their workday as mostly sedentary (Australian Bureau of Statistics, 2018). As a substantial portion of peoples' day is spent at work, increasing the amount of general movement within the workday seems valuable to combat health risks. This is particularly relevant in sedentary work settings, such as office jobs (Parry et al., 2013). Office workers are at a particularly high risk of developing health concerns such as altered curvature of the spine, varicose veins from poor circulation, and vision issues associated with computer usage (Emanuele, 2008; Hemingway et al., 1997; Hito-sugi et al., 2000; Loh & Redd, 2008). Developing methods to increase physical activity with the aim of reducing sedentary behaviour within office workers seems warranted. It is common to think of physical activity and sedentary behaviour as two ends of the same spectrum, however these two behaviours are distinct from one another in terms of both effect on health and determinants (Hamilton et al., 2008; Owen et al., 2011; Spence et al., 2017). Although evidence suggests that sedentary behaviour does not displace physical activity (Pearson et al., 2014), some form of movement will likely replace sedentary behaviour, such as light physical activity (Janssen et al., 2020). This transfer is important to explore to further our understanding around movement behaviours within at-risk groups.

Traditionally, theories aimed at explaining behaviour have focused on reflective processing (e.g. attitudes, intentions); however, a focus on such variables alone explain a modest amount of behaviour (Ajzen, 1991; Rhodes & de Bruijn, 2013). Similarly, dual processing models that account for automatic processing have shown to augment the findings of reflective constructs when predicting behaviours such as physical activity (Rhodes & de Bruijn, 2013; Triandis, 1977). Automatic constructs, such as habit, work by prompting behaviours through repeated association with context specific cues (Lally & Gardner, 2013). Simple behaviours have been suggested to be more conducive to developing habits in comparison to more complex behaviours, such as physical activity (Gardner, 2022; Gardner et al., 2014). Little research has investigated habit development around simple behaviours that can facilitate the initiation of more complex behaviours. In the initial phases of habit development, cues can provide prompts towards goal-oriented behaviour (Janz & Becker, 1984), which over time can become non-conscious instigators of movement. Developing a habitual response towards preidentified cues in the environment can lessen the cognitive demand associated with complex physical activity (Rhodes & De Bruijn, 2010).

In a pilot test using the Ten Top Tips approach, Hamilton et al. (2019) aimed to increase the step count of sedentary office workers through developing habitual movement. The study focused on using small changes in participants' environments to initiate behaviour and revealed positive findings for habit development towards increased physical activity, although this study only looked at a university office environment. In contemporary society, a substantial portion of office workers are either working from a home office environment or have a flexible working arrangement whereby they are working from mixed environments. Thus, it is important to understand how different workplace

settings may influence habit formation. Limited research has explored environmental cues towards increasing light physical activity across a variety of workplace settings. Using a formative research approach, the current study aims to qualitatively explore the environmental cues that can instigate light physical activity relevant to those working from a commercial office, a home office, or a mixture of both settings. Identification of these cues can inform interventions aimed at developing habits towards increasing physical activity in the workplace.

Method

Participants were recruited via online purposive sampling through social media platforms, University broadcast emails, and a pool of first-year university students. The pool of first-year university students was used as a recruitment tool as it is common for students to partake in university studies alongside full-time employment (Australian Bureau of Statistics, 2020). Study advertisements included a link to an online questionnaire where interested parties could provide their demographic data and contact details to enable arranging an interview at the convenience of the participants. Participants were screened based on three criteria: 18 years or older; self-described as having a highly sedentary job (sit for at least 75% of their working day); and worked full-time in either a commercial office, home office, or a mixture of both environments. Participants were excluded if they had any medical conditions that prevented them from engaging in physical activity. Physical activity was defined as any bodily movement produced by skeletal muscles that results in energy expenditure and increases heart rate and breathing, such as lifting, carrying light loads, climbing stairs or walking (Caspersen et al., 1985; Ross et al., 2020). Participants were offered a \$30 Department store voucher for their participation upon completion of the interview. No prior relationships were knowingly established between participants and members of the research team. Full ethical approval was granted by the Griffith University Human Ethics Committee (GU:401/2020).

Interviews were conducted remotely over the phone between March 2020 to May 2021 in southeast Queensland with no other researchers or non-participants present. To control for environmental disruptions due to COVID, participants were asked about the stability of their workplace environment. The current study was guided by the COREQ (Consolidated criteria for reporting qualitative research) check list (Tong et al., 2007). Interviews followed a semi-structured interview guide that consisted of open-ended questions pertaining to individuals' beliefs and cues towards engaging in light intensity physical activity within the workplace. The interview guide was developed based on previous literature that has utilised environmental cues to elicit habit formation (Hamilton et al., 2019) and guided by the belief elicitation components said to underly the TPB constructs (Ajzen, 1991; Hamilton & White, 2010). Interviews ranged between 23 and 70 min, on average taking 43 min. Forty-three interviews were conducted over the phone and recorded using TapeACall software, with one interview conducted using Microsoft Teams software due to a hearing impairment, and all interviews were transcribed verbatim for data analysis. Participants were notified of recording prior to the interview and consent to participate was obtained both upon registration using a check box and verbally at the beginning of the interview. All interviews were conducted

by primary author KJ, a female PhD candidate with honours level experience and post-graduate training in qualitative research. Participants were notified that the study was part of a larger project and would be used to form part of the primary author's PhD thesis, centred on behavioural science and specialising in health psychology.

Interviews were analysed using a thematic analysis in NVivo version 26 qualitative analysis software (Braun & Clarke, 2006). Data were collected, coded, and analysed using an iterative process, where recruitment ceased when the data no longer added anything new to the overall analysis. Transcripts were not provided to participants for review or comment and participants did not provide feedback on findings. Within the data, broad categories were identified, with data sorted into common themes. Initial data coding was conducted by author KJ, with author JB reviewing the codes and deidentified interview transcripts to ensure coding stability. Themes were reviewed and refined by authors KJ and JB, and finalised in consultation with author KH.

Results

Seventy-two people completed the online questionnaire, including demographic questions and contact details. Of these 72, 19 did not respond to the follow-up email and 10 were excluded due to not meeting study criteria. The sample used for analysis consisted of 43 adults, participant characteristics are reported in Table 1. Discussions about moving in the workplace were structured around identifying cues within the existing environment that instigated movement. The identified cues are meticulously delineated in the results section, exhibiting an acute level of specificity. This precision is paramount to mitigating any potential misinterpretation, ensuring a comprehensive understanding of the distinct cues that instigate physical movement within the workplace. The categories identified across interviews were similar; thus, the most salient themes are presented, with participant quotes identified with participant number, sex,

Table 1. Participant characteristics.

	<i>N</i> = 43	Percentage of <i>N</i>
Gender		
Female	28	65.10%
Male	15	34.90%
Age		
Range	20–64	
Mean	38.07	
SD	12.63	
Workplace		
Commercial Office	16	37.21%
Home Office	12	27.91%
Mixed Environment	15	34.88%
Education		
Junior School Certificate	3	6.98%
Senior School Certificate	3	6.98%
TAFE or Diploma Certificate	11	25.58%
University Degree	25	58.14%
Length of Working Day (Hours)		
Range	6–12 h	
Median	8 h	
Time Spent Sedentary (Hours)		
Range	5–10 h	
Mean	7.5 h	

that I have to' (P19_F_35_Mixed). Some WFO participants also mentioned encouragement from leadership and reaching out to colleagues could help to remind them to move whereas for the WFH and Mixed groups receiving or making phone calls and doing non-work-related tasks (e.g. 'Having errands to run at home', P34_F_40_WFH; 'Um sometimes to play with the dog, sometimes it's to tell the dogs off for barking at the neighbours', P02_M_28_WFH) could act as movement reminders.

In response to the question of what participants got up from their desks to do, the main themes related to aspects of **office layout, social environment, and taking active breaks**. Across all groups, the two most common responses were getting up for food and drinks, followed by taking bathroom breaks. This was reflected by responses like: 'To make a cup of coffee, or buy a coffee, to go to the bathroom, to answer the office door' (P27_F_35_WFO), and: 'Quite often I will go to the bathrooms that are furthest away so I can get a bit more of a walk' (P35_M_31_WFO). Following these, reasons such as attending informal meetings (e.g. walking to a colleague's desk), job related tasks (e.g. printing, getting the mail), intentional movement (e.g. getting up to stretch), and attending formal meetings were discussed by all three groups. For the WFH and Mixed groups, breaking up the day with non-job-related tasks (such as performing household chores like vacuuming) was a common response. For example, one participant responded with, 'Cooking is the thing that I get up to do. Or some cleaning sometimes and answering the door' (P43_M_43_Mixed). Following this, attending to pets, receiving or making phone calls, and adjusting the environment (e.g. open and closing doors) were common responses. This was highlighted by statements such as, 'Whenever I answer my mobile, I tend to go out, to do something different. I tend to go outside and walk in the driveway just to see the sun and just walk around' (P34_F_40_WFH). Divergent from the other groups, participants in the WFH groups discussed family responsibilities, such as school pick up, as a common reason to move away from the desk.

Discussion

The results of the current study found commonalities in cues across all three groups (commercial office, home office and a mixture of both), as well as between types of movement. The most common overarching themes can be grouped around office layout, social environment and taking active breaks. Within the theme of office layout, the most common sub-theme across all groups involved using somatic sensations to cue movement behaviour within the office environment. This involved activities such as walking to the kitchen to get beverages and food, going to the bathroom, and taking intentional breaks to move as a means to alleviate physical discomfort. Specifically, participants in this study spoke about intentionally using bathrooms that were further away as a means to increase their movement. Furthermore, several participants identified that they used a glass at their desk, instead of a water bottle, to instigate frequent movement from the behaviour of filling their glass. These findings were also seen in De Cocker et al. (2015), where participants identified intentional water consumption to increase movement through bathroom breaks. Furthermore, participants discussed building job-related tasks (e.g. printing, getting the mail) into their day as a way to increase their movement. These findings provide important information for future research on choice architecture. Choice architecture stipulates that one can influence behaviour

non-consciously by purposefully altering environments (Marteau, 2018). As an example, designing office layouts with bathrooms, kitchens, and resource rooms located at a distance from the main working stations to instigate physical movement.

Within the current study, another common theme identified was the impact of the social environment within the office. This was highlighted through discussions around attending both informal and formal meetings, the use of colleagues as reminders to move, and encouragement from leadership. For example, for those who reported having a social work environment, participants discussed that they would actively walk to their colleague's desks to have discussions rather than sending emails or using the phone as a means to increase their movement. This was in comparison to participants who reported a lower social work environment, where they discussed feeling more social pressure to remain seated during the day. These findings are supported by previous literature that has explored the influence of workplace culture on sedentary behaviour (Ryde et al., 2020). The influence of social norms on these behaviours is also consistent with previous literature for groups in highly social settings. Within an adolescent sample, Hamilton and White (2007) explored an extended theory of planned behaviour model with the incorporation of additional variables including the social variable of group norms on physical activity. Their findings indicated that both subjective norms and group norms significantly predicted the intention to engage in physical activity. Although Hamilton and White (2007) focused on an adolescent sample, similarities in social contexts can be drawn between the school environment and the workplace environment (Rudd, 1997). These findings highlight the importance for organisations to foster a healthy workplace culture, where employees feel supported in breaking up their sedentary behaviour. Organisations can aim to encourage these behaviours through positive reinforcement and social comparison (Olander et al., 2013).

Also, results of the current study revealed participants were taking active breaks during their day as a means to increase movement. This was identified through discussions around performing non-work-related tasks (e.g. household chores), attending to pets, and receiving and making calls. A consistent trend for participants working from a home environment was incorporating household chores such as cleaning, doing the dishes, cooking or doing laundry, throughout the workday. Participants discussed how doing these chores provided a break from their desks and a chance to move whilst also being productive, findings that are consistent with previous research (Olsen et al., 2018). Most participants discussed how working from home meant that their environment was smaller and more compact (i.e. there are fewer steps from the desk to the kitchen or the bathroom) and that therefore it was simple to perform these tasks within their day without impeding upon their work commitments.

Furthermore, current findings indicated the belief in the usefulness of taking scheduled active breaks to increase movement. Previous literature that has qualitatively explored the utility of active breaks have found benefits such as reduced stress, enhanced work enjoyment, increase in health awareness, and an enhanced workplace culture (Taylor et al., 2013). Also, having knowledge (or not) around the benefits of active breaks was either a facilitator or barrier to taking such breaks. Other barriers included the need for more variety of physical movement activities, the need for increased managerial support, and a lack of confidence in incorporating active breaks into the working day (Hargreaves et al., 2020; Taylor et al., 2013). Based on the findings from previous literature, along

with the reports in the current study, there appears a need to educate employees on both the benefits of incorporating active breaks within the working day, along with education on the types of activities that can be performed. Such an approach would support building self-efficacy around incorporating active breaks within the workday.

Differences amongst the groups within the current study appeared to be related to the different opportunities within the context of each environment. For example, where participants working from commercial offices were using their social environment to instigate movement, those working from a home environment were using their autonomy around how they spent their time to complete household responsibilities. These differences suggest that the home office provides a unique opportunity for active breaks, in comparison to a commercial office where employees are restricted to work-related tasks and structured breaks. It is important to identify both differences and similarities within each environment as habit formation is dependent on context specific cues held consistent within the environment (Hagger, 2019). Understanding the environmental consistencies can help to determine which cues are held consistent across multiple environments and potentially lead to resilient habits in future (Van Osselaer et al., 2004).

The current study has limitations that need to be considered when interpreting the results. First, the interviews were conducted during the COVID-19 global pandemic, which resulted in a number of changes within socioeconomic environments. Although we accounted for workplace changes within the interview by confirming the stability of participants' workplace environments, there is no way to assess the full impact of the global instability during that time. Another factor to consider is that most participants resided in Queensland, Australia. During this period of time, Queensland experienced mild restrictions in comparison to other Australian states as well as other countries, suggesting that these findings may be influenced by the state laws and restrictions during this time and may not best represent future workplace environments. Based on these limitations, future research should aim to explore these themes within a stable global context, to better understand the influences underlying these behaviours. Furthermore, based on the current findings, future behaviour change programmes could emphasise encouraging employees to build job related tasks that require movement into their day as a means to break up sedentary behaviour whilst not detracting from work tasks. Similarly, future programmes should aim to provide education around the benefits of incorporating active breaks and provide examples of activities that can be performed throughout the working day.

Despite these limitations, a strength of the current study is that it explored workers' cues in varied workplace environments. Given workplace changes in contemporary society, especially as a result of COVID-19, it is important to understand how these differences can influence behaviour and, furthermore, how these behaviours can become habitual. This study is a component of a broader PhD programme of research, with an overarching objective of understanding the attitudes and beliefs of sedentary office workers, serving as formative research to inform a behaviour change programme. Although investigating office workers who engage in less sedentary behaviour has merit, it is important to acknowledge the possibility of differences in their attitudes and beliefs compared to highly sedentary individuals. Such differences could potentially hinder a comprehensive understanding of the psychological factors influencing this health risk behaviour. Therefore, exploring the attitudes and beliefs of less sedentary office

workers in this context could be an avenue for future research. Nonetheless, this study offers valuable insights into workplace environments by identifying cues that can be harnessed for habit-based interventions aimed at promoting physical activity within the workplace. Based on these findings, when looking at developing movement habits based on pre-existing cues within the environment, across all three groups it appears that the most salient cue revolves around getting drinks and food. These results can be used to inform future interventions by providing an insight into the most common actions that already exist and can then be used to initiate further movement, helping combat the global sedentary behaviour crisis.

Ethics declaration

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and was approved by an Institutional Review Board/Ethics committee. See details under Methods. The study received an exemption from an Institutional Review Board/Ethics committee; See details under Methods.

Credit statement

Kailas Jenkins: Conceptualisation, Methodology, Investigation, Data Curation, Formal analysis, Writing – Original Draft, Writing – Review & Editing, Project Administration.

Jena Buchan: Conceptualisation, Methodology, Writing – Review & Editing, Supervision.

Ryan Rhodes: Conceptualisation, Methodology, Writing – Review & Editing, Supervision.

Kyra Hamilton: Conceptualisation, Methodology, Writing – Review & Editing, Supervision, Resources, Project Administration.

Details of author contributions

Authors KJ, JB and KH contributed to the conception, design, data-collection, analysis, and writing of the manuscript; all authors participated in the drafting and finalisation of the manuscript.

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