

# Reducing sedentary behaviour in office workers – motivational factors and barriers

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**Abstract.** The office workplace is considered a significant risk setting for long-term sedentary behaviour, which can lead to various adverse health consequences. Therefore, this article examines the obstacles and external factors that motivate office workers, who spend a significant part of their workday sitting, to engage in physical activity. This cross-sectional study analysed data from an anonymous survey of 232 Latvian office workers. Our results indicated that most respondents would be motivated to engage in physical activity during working hours, if employer provided motivational system (mean score 4.04 out of maximal 5 points), a specialist-led physical activity classes (4.01) or exercising together with colleagues (3.91) would be implemented at their workplace. Respondents in the following subgroups agreed more that employer provided motivational system would encourage them to be more physical activity at work: all age groups (between 3.93 and 4.18), both ‘time of sitting’ subgroups (between 4.00 and 4.07), men (3.93) and in-office workers (4.07). However, women (4.06) and remote workers (4.08) agreed more, that physical activity classes led by a specialist would be the most motivational. In contrast, highly intense work tasks were the main barrier for office workers not to be involved in physical activities at work, as it was the obstacle for 59% of the respondents. These findings can be helpful in implementing and organising health promotion interventions for office workers.

## 1 Introduction

Around the world, more than 27% of adults do not meet the recommended levels of physical activity by the World Health Organization [1]. One of the reasons is the transition to sedentary behaviour due to increased use of digital technologies and transport, remote communication, sedentary lifestyle with lack of physical activity, as well as change over to more sedentary occupations, such as, white-collar workers [2, 3]. Sedentary behaviour is defined as any behaviour, sitting, or reclining, where energy expenditure is 1.5 metabolic equivalent task (MET) or less [4]. This behaviour has been increasing around the world. This fact has been confirmed by the research of Yang *et al.*, who performed a serial cross-sectional study and estimated the total sitting time increased among adults from 5.5 h/d in 2007 to 6.4 h/d in 2016 [5].

Other researchers have found the modern trend of prolonged sitting. Ussery *et al.* reported that 25.7% (95% CI 23.0%-28.5%) of respondents were sitting more than 8 hours per day [6]. The data from the Special Eurobarometer 412 study in 2013, where around 1000 members of each European Union (EU) State participated, have shown that 18.5 percent were sitting 7.5 hours or more per day, ranging from 8.9 percent in Spain to 32.1 percent in the Netherlands and self-reported sitting time was consistent within most EU countries [7]. However, the highest risk for sedentary lifestyle is in white collar or office workers. Several researchers have found that people, who work in the office, were sitting six to nine hours during their working hours [8-11].

Therefore, sedentary behaviour is becoming a serious public health concern due to proven negative effects on people's health. Many researchers have found that prolonged sitting increases all-cause mortality and the risks of many non-communicable diseases, for instance, cardiovascular diseases, diabetes mellitus, hypertension, obesity, and certain cancers [12-15]. The World Health Organization has announced that physical inactivity is the fourth leading risk factor for global mortality, accounting for 6% of global mortality which places a significant financial burden on health services and society as a whole [1, 16].

Physical exercise has been proven to show high effectiveness on improvement of employees' mental and physical health, as it increases work ability and promotes significant changes to lifestyle and wellbeing of workers. Physical activity also reduces mortality rates and increases life expectancy, as well as improves function of the musculoskeletal, cardiovascular, and nervous systems. Physical exercises at the workplace may reduce cardiovascular risk factors of employees by reducing the level of cholesterol, body weight, percentage of body fat and body mass index as well as diabetes mellitus manifestation [17-19]. Thus, to implement effective and evidence-based health promotion interventions, particularly interventions that promote physical activity among office workers, it is essential to recognize motivational factors and barriers related to involvement in physical movement.

Various studies have analysed the sitting time of office workers [8-11], however, there is a limited number of studies examining motivational factors and obstacles for office employees to engage in physical activity at the workplace. Therefore, the aim of this study was to identify obstacles and external factors that motivate office workers, who spend a significant part of their workday sitting, to engage in physical activity and analyse these factors in different age, gender, sitting time at work, and work mode (in-office or remotely) subgroups.

To achieve the aim of this study, research tasks were set: 1) to create a questionnaire about motivational factors and barriers regarding physical activity at work, based on a previously conducted study that included a focus group of office workers [20]; 2) to conduct a survey of office employees, according to the research design (office workers, aged 18-64, etc.); 3) to analyse the results, identifying barriers and external factors that motivate office workers to be more physically active, in the entire study population and comparing in subgroups (age, gender, sitting time at work, and work mode).

## 2 Methods

A cross sectional study was conducted by collecting data from an anonymous online survey of Latvian office workers, which was carried out from April to May of 2022. The questionnaire was developed based on the previous, semi-structured interviews of Latvian office employees conducted at the beginning of 2022, in which focus groups were interviewed about sedentary behaviour and motivational factors [20]. Questionnaires in Latvian language were distributed electronically via social media and sent by email to publicly accessible contacts of Latvian companies and enterprises.

For this study, participants were recruited if they met the following inclusion criteria: age between 18 and 64 years, spent most of their working hours sitting and most of the time used a computer for work purposes. In total, 238 office workers were recruited from various fields such as IT, healthcare, business, communication, education, etc. Six respondents, who did not meet inclusion criteria, were excluded from the further analysis, therefore, answers of 232 respondents were analysed statistically.

External motivational factors for engagement in physical activity at the workplace were assessed by 5-point Likert scale, where one point corresponded to answer “disagree”, respectively, 5 points corresponded to answer “agree” and mean score and standard deviation was calculated for every study subgroup. The higher score indicated higher motivation by the factor. Then, comparative analysis of mean values between subgroups and factors, as well as frequency analysis was conducted.

The results were analysed by IBM SPSS Statistics program, version 29.0. Descriptive statistics was used to characterise parameters like mean values for each motivational factor. To analyse data in detail, subgroups were created and differences between them were compared. Respondents’ age was divided into three subgroups: 19-30, 31-44, and 45-64 years old. The time of sitting at work was divided into two subgroups: respondents who were sitting 6 hours or less and respondents who were sitting 7 hours or more. Regarding the place of work, in-office and remote workers were compared.

Frequency analysis, Chi-square test, and Kruskal Wallis test were applied to the data. For analysis of particular motivational factor, the data were adjusted for gender, age groups, place of work or time of sitting. Motivational factors were analysed by comparing data between subgroups. Obstacles for engaging in physical activity were examined by performing frequency analysis in different age, gender, work mode, and sitting time subgroups. Cross-tabulation method and the chi-squared test were used to determine whether differences between subgroups were statistically significant. The statistical significance level was set at  $p = 0.05$ .

The participation in this study was voluntary. The participants were informed about the aim and details of the study concept, and by anonymously filling out the survey form provided informed consent. Ethical approval for this study was obtained from the Ethics Committee of Rīga Stradiņš University.

### 3 Results

Most of the respondents were females (78.3%), 19.8% were males and 0.9% chose not to disclose their gender. The average age of participants was  $38.7 \pm 11.6$  years. The majority was occupied in state administration (14.7%), education or science (12.9%) and health or social care (9.5%). Most participants were working in the office (42.2%), 22% remotely, and 35.8% in hybrid mode. The results showed that 38.4% of respondents spent 7-8 hours sitting during their working hours, and 20.3% spent more than 8 hours sitting at work.

According to received answers, the most beneficial employer-provided motivating factor that would help the respondents to engage in physical activity at their workplace was a motivational system that would provide benefits for employees, for instance, extra holiday (mean score of answers was  $4.04 \pm 1.16$  points). Other popular choices of respondents were employer provided physical activity classes led by physical activity specialist ( $4.01 \pm 1.22$ ) and employer introduced routine to take a walk after lunch ( $3.86 \pm 1.16$ ; Table 1). Slightly less motivating but still quite popular answers were exercising with colleagues ( $3.91 \pm 1.28$ ), comparing physical activity level with colleagues ( $3.52 \pm 1.37$ ), coffee and snack machines located farther away from their workplace ( $3.35 \pm 1.35$ ), and physical activity inclusion in the work to-do-list ( $3.35 \pm 1.20$ ; Table 2).

**Table 1.** Employer provided motivating factors to engage in physical activity at work (mean score of answers by 5 grade Linkert scale ± standard deviation (SD), not weighted for all respondents and weighted for gender, age groups, place of work, and time of sitting during work).

	Motivational system	Physical activity classes led by a specialist	Routine to take a walk after lunch	A space where to do standing activities	To take a walk after every meeting	Schedule of physical activity opportunities	Standing desk	A room for exercising	Dyna- mic work- place	Information about risks of prolonged sitting
All respondents, unweighted	Mean	<b>4.04</b>	<b>3.86</b>	<b>3.69</b>	<b>3.72</b>	<b>3.73</b>	<b>3.63</b>	<b>3.16</b>	<b>3.17</b>	<b>2.87</b>
	±SD	1.161	1.216	1.159	1.183	1.174	1.246	1.253	1.336	1.276
Gender	Mean	<b>3.93</b>	<b>3.54*</b>	<b>3.72</b>	<b>3.87</b>	<b>3.59</b>	<b>3.09***</b>	<b>3.13</b>	<b>3.07</b>	<b>2.72</b>
	±SD	1.340	1.410	1.259	1.002	1.240	1.458	1.408	1.436	1.294
Female	Mean	<b>4.05</b>	<b>4.06*</b>	<b>3.86</b>	<b>3.67</b>	<b>3.74</b>	<b>3.82***</b>	<b>3.16</b>	<b>3.21</b>	<b>2.89</b>
	±SD	1.145	1.187	1.147	1.210	1.174	1.203	1.242	1.321	1.278
19-30	Mean	<b>4.18</b>	<b>4.00</b>	<b>3.71</b>	<b>3.71</b>	<b>3.61</b>	<b>3.83</b>	<b>3.06*</b>	<b>3.09</b>	<b>2.82</b>
	±SD	1.176	1.177	1.262	1.310	1.288	1.171	1.323	1.444	1.201
31-44	Mean	<b>3.93</b>	<b>3.92</b>	<b>3.88</b>	<b>3.71</b>	<b>3.73</b>	<b>3.60</b>	<b>3.04*</b>	<b>3.25</b>	<b>2.89</b>
	±SD	1.277	1.340	1.111	1.125	1.162	1.353	1.329	1.367	1.374
45-64	Mean	<b>4.01</b>	<b>3.97</b>	<b>3.92</b>	<b>3.69</b>	<b>3.78</b>	<b>3.59</b>	<b>3.36*</b>	<b>3.11</b>	<b>2.84</b>
	±SD	1.061	1.199	1.162	1.104	1.121	1.297	1.112	1.217	1.233
In-office	Mean	<b>4.07</b>	<b>3.95</b>	<b>3.79</b>	<b>3.69</b>	<b>3.62</b>	<b>3.67</b>	<b>3.17</b>	<b>2.98</b>	<b>2.82</b>
	±SD	1.142	1.263	1.212	1.311	1.197	1.242	1.324	1.443	1.303
Remote	Mean	<b>3.98</b>	<b>4.08</b>	<b>3.86</b>	<b>3.71</b>	<b>3.82</b>	<b>3.67</b>	<b>3.08</b>	<b>3.20</b>	<b>2.84</b>
	±SD	1.235	1.158	1.211	1.040	1.222	1.359	1.224	1.379	1.412
6 hours or less	Mean	<b>4.07</b>	<b>3.94</b>	<b>3.76</b>	<b>3.78</b>	<b>3.60</b>	<b>3.59</b>	<b>3.27</b>	<b>3.20</b>	<b>2.95</b>
	±SD	1.028	1.064	1.176	1.116	1.192	1.302	1.147	1.350	1.234
7 hours or more	Mean	<b>4.00</b>	<b>3.98</b>	<b>3.90</b>	<b>3.65</b>	<b>3.79</b>	<b>3.72</b>	<b>3.08</b>	<b>3.15</b>	<b>2.79</b>
	±SD	1.280	1.361	1.165	1.205	1.174	1.272	1.348	1.345	1.309

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Table 2.** Other motivating factors to engage in physical activity at work (mean score of answers by 5 grade Likert scale  $\pm$  standard deviation (SD), unweighted for all respondents and weighted for gender, age groups, place of work, and time of sitting during work).

		Exercising together with colleagues	Physical activity level comparison between colleagues	Vending or coffee machines located far from the workplace	Physical activity inclusion in the work to-do-list	To receive notifications via computer	Expert advise about the risks of prolonged sitting	To receive notifications via smartwatch	To receive notifications via mobile phone	Reminder written on the paper
All respondents, unweighted	Mean	<b>3.91</b>	<b>3.52</b>	<b>3.35</b>	<b>3.35</b>	<b>3.08</b>	<b>3.04</b>	<b>2.95</b>	<b>2.89</b>	<b>2.78</b>
	$\pm$ SD	1.282	1.374	1.348	1.202	1.293	1.308	1.263	1.342	1.228
Gender	Male	<b>3.67</b>	<b>3.70</b>	<b>3.50</b>	<b>3.13</b>	<b>3.20</b>	<b>2.85</b>	<b>2.93</b>	<b>3.07</b>	<b>2.78</b>
	$\pm$ SD	1.317	1.297	1.346	1.455	1.222	1.414	1.200	1.389	1.315
Female	Mean	<b>3.95</b>	<b>3.49</b>	<b>3.33</b>	<b>3.37</b>	<b>3.07</b>	<b>3.08</b>	<b>2.96</b>	<b>2.85</b>	<b>2.79</b>
	$\pm$ SD	1.271	1.393	1.358	1.174	1.312	1.302	1.282	1.343	1.218
Age groups	Mean	<b>3.80</b>	<b>3.55*</b>	<b>3.35*</b>	<b>3.39</b>	<b>3.06</b>	<b>3.27</b>	<b>2.97</b>	<b>2.74**</b>	<b>2.88</b>
	$\pm$ SD	1.427	1.326	1.398	1.226	1.369	1.184	1.265	1.305	1.398
	Mean	<b>3.89</b>	<b>3.64*</b>	<b>3.52*</b>	<b>3.23</b>	<b>3.02</b>	<b>2.88</b>	<b>2.74</b>	<b>2.87**</b>	<b>2.64</b>
31-44	$\pm$ SD	1.342	1.490	1.324	1.288	1.296	1.377	1.233	1.340	1.185
	Mean	<b>3.97</b>	<b>3.39*</b>	<b>3.18*</b>	<b>3.36</b>	<b>3.20</b>	<b>2.96</b>	<b>3.19</b>	<b>3.07**</b>	<b>2.86</b>
	$\pm$ SD	1.080	1.253	1.332	1.172	1.211	1.333	1.251	1.392	1.134
In-office work	Mean	<b>3.92</b>	<b>3.41</b>	<b>3.22*</b>	<b>3.15*</b>	<b>3.02</b>	<b>2.95</b>	<b>2.99</b>	<b>2.85</b>	<b>2.73</b>
	$\pm$ SD	1.306	1.384	1.366	1.303	1.362	1.380	1.335	1.417	1.240
	Mean	<b>3.78</b>	<b>3.51</b>	<b>3.59*</b>	<b>3.57*</b>	<b>3.14</b>	<b>3.08</b>	<b>2.88</b>	<b>2.73</b>	<b>2.92</b>
Remote work	$\pm$ SD	1.354	1.467	1.381	1.095	1.335	1.362	1.284	1.336	1.224
	Mean	<b>3.91</b>	<b>3.64</b>	<b>3.47</b>	<b>3.45</b>	<b>3.11</b>	<b>3.06</b>	<b>3.08**</b>	<b>3.16</b>	<b>2.84</b>
	$\pm$ SD	1.232	1.299	1.256	1.195	1.221	1.168	1.185	1.292	1.191
Time of sitting	Mean	<b>3.88</b>	<b>3.46</b>	<b>3.29</b>	<b>3.24</b>	<b>3.08</b>	<b>3.00</b>	<b>2.86**</b>	<b>2.72</b>	<b>2.74</b>
	$\pm$ SD	1.326	1.416	1.411	1.252	1.337	1.422	1.304	1.362	1.268

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

Further, responses on motivational factors were analysed by gender. For almost all employer-provided motivating factors, women agreed slightly more that these factors would motivate them to engage in physical activity at work compared to men ( $p > 0.05$  for all factors except “Schedule of physical activity opportunities”, where  $p < 0.001$ , and “Specialist-led physical activity classes”, where  $p < 0.05$ ). For only one factor men agreed slightly more than women – a space where they could do physical activities while standing would be beneficial for them to be more active while working (mean score for men was  $3.87 \pm 1.00$  vs. women  $3.67 \pm 1.21$ ,  $p > 0.05$ ; Table 1). As for other workplace related factors, women agreed more than men that exercising with colleagues (mean score for men  $3.67 \pm 1.32$  vs. women  $3.95 \pm 1.27$ ,  $p > 0.05$ ) and physical activity inclusion in the work to-do-list ( $3.13 \pm 1.46$  and  $3.37 \pm 1.17$  respectively,  $p > 0.05$ ) would help with being more active at work. However, men were more motivated by comparing physical activity level among colleagues (in men  $3.70 \pm 1.30$ , but in women  $3.49 \pm 1.39$ ,  $p > 0.05$ ) and by vending machine location farther from the workspace (in men  $3.50 \pm 1.35$  points and in women  $3.33 \pm 1.36$ ,  $p > 0.05$ ; Table 2).

Regarding age groups, younger respondents aged between 19 and 30 years agreed more that employer provided motivational system ( $4.18 \pm 1.18$ ) and classes led by a specialist ( $4.00 \pm 1.18$ ) would be more motivational for them to engage in physical activity at work, compared to other age groups ( $p > 0.05$ ). Office workers aged 31-44 years were more motivated to be physically active by employer provided standing desk ( $3.76 \pm 1.39$ ;  $p < 0.01$ ) and dynamic workplace ( $3.25 \pm 1.37$ ;  $p > 0.05$ ) compared to other age groups. Nevertheless, a walk after lunch ( $3.92 \pm 1.16$ ;  $p > 0.05$ ) and after every meeting ( $3.78 \pm 1.12$ ;  $p > 0.05$ ), as well as an exercising room in the office ( $3.36 \pm 1.11$ ;  $p < 0.05$ ) were more motivational for 45-64 years old participants, compared to other age groups (Table 1). Analysing other workplace motivational factors by age groups, 19-30-year-olds agreed more on physical activity inclusion in the work to-do-list ( $3.39 \pm 1.23$ ,  $p > 0.05$ ) and expert advice about the risks of prolonged sitting ( $3.27 \pm 1.18$ ,  $p > 0.05$ ). Participants between 31 and 44 years felt significantly more motivated by comparing physical activity level with colleagues ( $3.64 \pm 1.49$ ;  $p < 0.05$ ) and vending machine location farther from the workplace ( $3.52 \pm 1.32$ ;  $p < 0.05$ ). But for 44-64 years old office workers, doing physical activities with colleagues ( $3.97 \pm 1.08$ ) and receiving reminder via computer ( $3.20 \pm 1.21$ ) or smartwatch ( $3.19 \pm 1.25$ ) would help to be involved in more physical activities during work, compared to other age groups ( $p > 0.05$ ; Table 2).

Some differences were found in the responses regarding the motivation to move between in-office and remotely working respondents. Those participants, who were exclusively working in the office, agreed more that employer provided motivational system would help them to engage in physical activities during work, compared to the remote workers (for in-office workers mean score was  $4.07 \pm 1.14$ , but for remotely working –  $3.98 \pm 1.24$  points,  $p > 0.05$ ). Though, remote workers agreed slightly more that specialist-led activity classes (for in-office workers –  $3.95 \pm 1.26$  points; remotely working –  $4.08 \pm 1.16$ ,  $p > 0.05$ ), a walk after lunch (in-office –  $3.79 \pm 1.21$ ; remotely –  $3.86 \pm 1.21$ ,  $p > 0.05$ ) and after every meeting (in-office –  $3.62 \pm 1.20$ ; remotely –  $3.82 \pm 1.22$ ;  $p > 0.05$ ) would encourage them to be more physically active during working hours compared to in-office workers (Table 1). Other workplace motivational factors, such as doing physical activities together with colleagues, was slightly more agreed among in-office workers (in-office –  $3.92 \pm 1.31$ ; remotely –  $3.78 \pm 1.35$ ,  $p > 0.05$ ). Nonetheless, participants who were working only from home agreed more that comparing physical activity with colleagues (in-office –  $3.41 \pm 1.38$ ; remotely –  $3.51 \pm 1.47$ ,  $p > 0.05$ ), coffee or snack machine location farther from the workplace (in-office –  $3.22 \pm 1.37$ ; remotely –  $3.59 \pm 1.38$ ,  $p < 0.05$ ), and physical activity inclusion in to-do-list (in-office –  $3.15 \pm 1.30$ ; remotely –  $3.57 \pm 1.10$ ,  $p < 0.05$ ) would be more motivational to engage in physical activity at work (Table 2).

Analysing answers by time of sitting at work, more respondents, who were sitting 6 hours or less, reported that more stimulating for them would be motivational system provided by employer (for those who sat 6h or less mean score was  $4.07 \pm 1.03$  points; 7 h and more –  $4.00 \pm 1.28$ ), and a space in the office for physical activities ( $3.78 \pm 1.12$  and  $3.65 \pm 1.21$  respectively), than for participants who were sitting 7 hours or longer ( $p > 0.05$ ). Though, respondents, who were sitting at work 7 hours and longer, would be more motivated by specialist-led classes (6h or less –  $3.94 \pm 1.064$ ; 7 h or more –  $3.98 \pm 1.361$ ;  $p > 0.05$ ) and regular walk after lunch (6h or less –  $3.76 \pm 1.18$ ; 7 h or longer –  $3.90 \pm 1.17$ ;  $p > 0.05$ ) to encourage them to be more active during working hours (Table 1). Overall, a tendency was observed for all other motivational factors studied that respondents who sat less would engage in physical activities more than those who were sitting longer hours (Table 2).

Alongside motivational factors, it was important to analyse which barriers limit office workers from engaging in physical activities. The main barrier for not being physically active at work was highly intense work tasks (59%). This factor was more prone among women (63%), than men (50%). Moreover, for 13% of women and 7% of men work specifics was an obstacle for engaging in physical activity during work, but more men (13%) and only 2% of women did not see the reason to be physically active at work. The specifics of work prevented 19-30 years old office workers from being physically active during working hours more frequently (17%) than in other age groups, but laziness, health problems or an unsuitable work environment were not an obstacle for anyone from the younger age group to be active at work. The participants between 31-44 years of age more frequently (7%) than in other age groups did not see the reason to be physically active at work, while in the 45-64 age group, health problems prevented them more from being active (5%) and these respondents more frequently did not like other colleagues paying attention to their activities (11%). For remote workers, too many work meetings disturbed them from being engaged in physical activities (12%), but it was an obstacle for 3% of in-office workers only ( $p < 0.05$ ). Though 8% of in-office workers and none of the remote workers did not like colleagues paying attention to their activities ( $p < 0.05$ ), seeing this as a barrier for being physically active during work. Too intense work interfered with being more active at work in all groups of participants, but especially for employees who sat 7 hours or more (70%) compared to those who sat 6 hours or less (47%) during their working hours ( $p < 0.001$ ). On the other hand, those employees who sat up to 6 hours were more hindered from being physically active due to health problems (4%) and the fact that they did not like other colleagues paying attention to their activities (15%), compared to those employees who sat for 7 hours or more (1%).

## 4 Discussion

The current study examined office workers' possible motivations and existing barriers to engage in physical activity at work. Unlike other research, this focussed on differences between gender, age groups, place of work and time of sitting during working hours. It was observed that men wanted privacy to engage in physical activities at work and they were motivated by competition among their colleagues' physical activity levels. In a study by Stephenson *et al.*, several employees agreed that office competition was a motivational factor, but it might also pay unwanted attention to the best and worst from the score board [21]. Nonetheless, women were more motivated by communication and togetherness as they were more likely to engage in physical activities with colleagues or in classes led by a specialist. Similarly, as in Gilson *et al.* research, where several employees noted that exercising classes during or after business hours would motivate them to be more active [22].

Office employees, who sat 7 hours and longer, agreed stronger than their colleagues, who were sitting 6 hours or less, that specialist-led physical activity classes and a walk after lunch and every meeting would motivate them to engage in physical activity at work. It showed that they either did not find relevant activities from the provided or were too tired from too intense work that it interfered with agreeing on those questions. Similar findings were shown in many studies, where office workers' heavy workload and lack of time was a significant barrier to be physically active as work demands were prioritised over being active [21, 23, 24]. Some researchers have reported that between 33% and 50% respondents named 'lack of time' as the main obstacle to involvement in physical activity at work [25, 26], and 21% due to heavy workload [25]. In addition, some respondents noted that it is hard to break concentration by standing up for a job that requires strong focus [22].

One of the barriers for exclusively in-office employees was attention from colleagues, therefore, they would appreciate a room in the office where they could exercise and do physical activity together with colleagues. Several researchers have found that employees fear being judged by their colleagues, penalised for not being productive or receiving a negative reaction from their managers, thus discouraging them from standing up and being active in the workplace. Many participants disclosed that by taking breaks they would be perceived as having questionable work ethics [21, 22, 24, 27]. Nevertheless, remote workers agreed more that they would be motivated to be physically active by specialist-led classes, but the question arose, where those classes would take place as individual classes at each employee's home would be too expensive for employers. As well, participants who are working from home, agreed more that comparing physical activity levels with colleagues would motivate them to be more active, as well as, standing desks. Height-adjustable or standing desks are a good option and an acceptable strategy to decrease sitting time among workers that has been observed in numerous articles. However, some researchers noted that the cost of the desks is a barrier to provide them for every employee as there is no guarantee that they will use them. As per Wallmann-Sperlich *et al.* research, the use of standing desks decreased from 45.5% to 36.4% in four months. Many office workers noted also that the use of standing desks could be disruptive, awkward, irritating, and intrusive to their colleagues [22-24, 27-29].

For younger age group (19–30-year-olds) employer-provided motivational system and specialist-led classes were the most agreed motivational factors. As per Ojo *et al.* study, some employees believed that a reward system that motivates them to sit less and be more active would work and the rewards could be a credit for some sort of treat or leaving early from work [24]. However, the participants between 31 and 44 of age, more than other age groups, did not see the reason to engage in physical activity during work, but also more agreed that standing desks would motivate them to be more active. In addition, this age group, more than others, agreed that it would be motivational for them to receive information about risks of prolonged sitting. In literature, researchers have found varied responses – for some they saw this knowledge as beneficial, others saw it as a part of wider intervention, but some argued that it is not necessary as knowledge does not always lead to action [21, 23, 24]. For participants aged 45-64, more than for other age groups, reminders received via mobile phone or smartwatch were seen as motivational, but reminders showing on computer screens have mixed views in our research. Positive side was that it is easy to implement, employees can have structured breaks, and it is a reasonable way to break a period of sitting [21-23]. But the negative side was that it is easy to override or ignore, as well as the notifications can get irritating and that some participants see it as an invasion of individual freedom [21-24].

Other possible motivational factors that were not covered in our study but can be included in our future research are standing meetings, standing desk with a software or activity trackers. Smart phones or activity trackers may be seen as a motivational tool, but



some marked a problem that with time the novelty wears off and people stop following it. However, previously mentioned standing desks are connected with a software which displays a notification on screen when it is time to raise or lower the desk. Approximately 83% of participants, who had used this desk, reported that their standing time has been increased and 75% indicated that they would 'probably' or 'definitely' continue to use it [23, 30].

In order to break sedentary behaviour, the main aim is to assure that office employees stand up more frequently. Some researchers have concluded that for office workers to sit less, standing at work has to be 'normalised' by a policy or statement created by the employer that they support micro-breaks and no judgement from other colleagues should be received [21, 24].

A significant limitation in the present study is the low sample size and uneven gender group distribution, which might lead to internal and external bias of the results. Therefore, larger sample size would be beneficial for the future research in order to obtain more statistically significant results. Nevertheless, this study draws hypotheses and ideas for future research perspectives.

## 5 Conclusions

To our knowledge, this study was the first to investigate different motivational factors between place of work and possibly between sitting time and the specific age groups. Our findings reveal that the main obstacle for respondents to engage in physical activity during work were highly intense work tasks in general (59%) and in all analysed subgroups. Nonetheless, most respondents agreed that employer provided motivational system, specialist-led physical activity classes and exercising together with colleagues would motivate them to be more physically active at work. All age and 'time of sitting' groups, as well as males and in-office workers agreed more that employer provided motivational system would help them to do more physical activity during work. However, females and remote workers more agreed that physical activity classes led by a specialist would be the most motivational. The results of this study suggest that many office workers are willing to be physically active at work if specific external factors are provided (for example, motivational system, standing desks or physical activity classes). However, it is important to understand that every office employee is an individuality and it is beneficial to find what motivates each of them by involving them in choosing the ways to decrease sedentary behaviour.

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