The motivational profile does matter: an exploratory survey on the influence of remote office work on physical behavior during the COVID19 lockdown

Miriam Cabrita (✉ m.cabrita@rrd.nl)

Roessingh Research and Development <https://orcid.org/0000-0001-6757-9406>

Roos Bulthuis

Roessingh Research and Development

Monique Tabak

Roessingh Research and Development

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Abstract

Background: Most office workers were forced to work remotely due to the COVID-19 global pandemic, possibly leading to a reconfiguration of settled patterns of physical behavior, often characterized by a sedentary lifestyle. This study aimed to investigate the motivational profile, facilitators, and barriers that might have influenced a change in physical activity while working remotely due to the COVID-19 lockdown.

Methods: An online questionnaire was distributed in May-June 2020 including demographics, self-reported physical- and work behavior throughout the day before and during the lockdown, Sports Motivation Scale-II assessing motivation for being physically active, and rating on facilitators and barriers for engaging in physical activity during the lockdown. One-way ANOVA with Tukey post-hoc test was computed to investigate differences between those participants who become more-, less-, and equally active during the COVID-19 lockdown.

Results: Ninety-nine people (Female=66) completed the questionnaire. Forty-four percent of the participants considered themselves less active than before the lockdown. Respondents reporting becoming more physically active (28%) were more intrinsically motivated than the remaining participants. The most important facilitators for physical activity were 'good weather', 'no work-related travel', and 'flexible work schedules'. The most important barriers were 'no active transportation', 'closed facilities', and 'work fatigue'.

Conclusions: Strategies that adapt to the weather and fit the work schedule could facilitate physical activity among remote office workers. The results of this study will be used to design interventions to promote an active lifestyle among office workers, personalized to their motivation profile, needs, and preferences.

Background

Physical inactivity is the fourth leading global risk for mortality in the world (1). Urbanization, the increase in passive modes of transport, and the increase in sedentary behavior during occupational and leisure activities are some of the reasons pointed out for the global increase in physical inactivity. Office workers, also referred to as white-collar workers, are particularly susceptible to a sedentary lifestyle as their work requires long, and uninterrupted periods of sitting (2, 3). Prolonged sitting periods often lead to neck-, lower back- and shoulder pain (4, 5), with the prevalence of musculoskeletal symptoms among office workers being above 63% (5). Although some of these conditions are temporary, they often lead to chronicity and consequent socio-economic burden (6). Studies in physical activity patterns suggest that office workers, and in particular high-educated individuals, often fit a *weekend warrior* profile (7–9), characterized by trying to compensate for the low physical activity during the workdays with high engagement in moderate-to-vigorous physical activity during non-work days (7). While some studies report that compiling all the exercise activities in 1–2 sessions a week may be sufficient to reduce all-

cause mortality (10, 11), it remains unclear whether such exercise sessions can reverse the damage caused by long periods of sitting (12). In this line, many strategies to promote health and wellbeing among office workers target the disruption of long sitting periods at the office and the promotion of short sessions of light physical activity. While some of these interventions focus on workstation adaptation (e.g. (13, 14)), counseling sessions with coaches (e.g. (15)), or promote more sit-to-stand variation (e.g. (13)), a growing number of technology-based interventions, also called eHealth or digital health interventions, is being developed to promote breaks in sedentary behavior among office workers (e.g. (16, 17)). However, current interventions targeting the promotion of physical activity and interruption of inactivity among office workers do not consider situations of flexible work (i.e., working partly from home). As an example, while interventions at the workplace can rely on the role of peer pressure – for example by promoting walking-meetings or collective lunch walks – when working from home the individuals need to find the motivation themselves to incorporate active breaks in their daily work.

The COVID-19 outbreak caused abrupt changes in the lifestyle and wellbeing of the global population, also to those who were not infected with the virus. Many countries have required their citizens to stay at home during national lockdowns to minimize the spread of this infectious disease (18). As a consequence, office workers were asked to work from home whenever possible, facilities for sports and exercising were closed, and group activities were canceled. This reduced the opportunity to participate in physical activity and, combined with increased stress and anxiety, favored less active lifestyles (19, 20). However, fitness tracker companies reported an increase in the logging of indoor sport-related activities. For example, one of the global largest producers of activity trackers reported that the number of steps worldwide was reduced by 12% in April 2020 compared to the same month in 2019, but that steps from workout activities were increased by 24% (21). This change in the activity patterns suggests that some individuals have found strategies to be physically active while working remotely.

Perceived facilitators and barriers to engaging in physical activity may affect someone's physical behavior and susceptibility to change this behavior (22). The main facilitator for physical activity is the convenient availability of activities and facilities (23–25). Another facilitator could be having children, as parents want to serve as role models and spend active time with their children (26, 27). According to Borodulin and colleagues (28), barriers to physical activity may differ depending on employment status, age, and family status. A major barrier constraining physical activity among employed adults is a high work demand or lack of time (23, 24, 26, 27, 29–31). Other barriers found in literature are lack of facilities (23, 24, 26, 27, 29, 30), health reasons (23–25, 30–32), family obligations (26, 27) and lack of motivation (27, 28, 31, 32). Motivation to be physically active in the frame of the Self-Determination Theory (33) differentiates between six motivation profiles: a-motivation, external, introjected, identified and integrated regulations, and intrinsic motivation (34). A recent study showed that the motivation to engage in healthy behaviors may influence the preference for persuasive features included in technology-based applications (35). The study by van Velsen and colleagues showed that intrinsically motivated users appreciated all persuasive features, while externally regulated users were mostly motivated by particular persuasive features, such as showing progress, self-goal setting, rewards in the form of compliments, and health education (35).

In this paper, we hypothesize that the extent to which the individuals found strategies to incorporate physical activity in their daily life during the COVID-19 lockdown was influenced by (1) motivation to be active, and (2) perceived facilitators and barriers to incorporate physical activity while working from home. The research presented in this manuscript is very timely as the COVID-19 lockdown provides an opportunity to research how remote working influences physical behavior, as most office workers were forced to work from home. To date, the impact of flexible work (i.e. working partly from home) has been scarcely investigated in the literature, with some indication that flexible work does not impact physical activity but increases sedentary behavior (36). Considering that fully remote or flexible work has become the normal way of working for office workers in many countries, the results of this study are of high relevance to understanding how to define new strategies to promote physical activity in the daily life of office workers adapted to the remote working setting. Particularly, by identifying the facilitators and barriers perceived by office workers to engage in physical activity while working remotely during the COVID-19 lockdown, we could tailor health promotion interventions to tackle these questions and help the worker find strategies to reach an active lifestyle. The results of this study will be used in the development of technology-based interventions promoting an active lifestyle among office workers.

Methods

The objective of this study is to investigate the motivational profile, facilitators, and barriers that influenced an eventual change in physical activity while working remotely due to the COVID-19 lockdown. An online questionnaire was developed consisting of four sections:

1. Demographics of the participants (including gender, age, living situation, country of residence, and country of employment);
2. Self-reported change in physical activity during the COVID-19 lockdown. Participants were asked whether they perceived themselves as becoming more-, less-, or equally physically active compared to before the COVID-19 lockdown;
3. Motivational profile of the participant in regards to the engagement in physical activity, assessed with the Sports Motivation Scale-II (34);
4. Identification of facilitators and barriers for engaging in physical activity during COVID-19 lockdown. Participants rated to which extend each facilitator stimulated them to be active and to which extend each barrier limited them to be active when they were working from home (on a 1–5 Likert scale, with 1 is “completely disagree” and 5 is “completely agree”). The initial list of facilitators and barriers was drafted based on literature (23–32), selecting those factors that were relevant for remote office work. A list of 16 facilitators and 17 barriers in the categories ‘physical’, ‘psychological’, ‘work context’, and ‘home context’ was drafted. This list was piloted as a test questionnaire among 21 experts on the promotion of healthy behaviors who indicated whether each facilitator and barrier applied to their situation as an office worker. Based on the pilot study, a final list of 9 facilitators and 13 barriers was created in the categories ‘physical’, ‘psychological’, ‘working from home’, and ‘social distancing’.

The survey was distributed in May and June 2020 via social media and personal networks. Informed consent was collected before the start of the questionnaire. This study did not require the approval of the Medical Ethical Review Board, according to the Dutch Medical Research Involving Human Subjects Act (WMO) (37), as all subjects were competent individuals and the study did not involve any interventions or treatments. Only completed questionnaires were used in the analysis. Data from participants younger than 18 years old and who could not, at least partly, work from home during the COVID-19 lockdown were excluded. Data were processed and visualized using Microsoft Excel 2019 and SPSS version 19. The individual motivation profile scores in the six dimensions assessed by the SMS-II – intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and a-motivation – were computed calculating the average score of the corresponding three items of the scale. A score for extrinsic motivation was calculated combining the responses to the items on integrated regulation, identified regulation, introjected regulation, and external regulation, following the Self-Determination Continuum (38). The predominant motivational profile for each participant was calculated by identifying the profile with the highest score. For example, a participant who scored higher on intrinsic and extrinsic motivation than on a-motivation was considered as predominantly intrinsically motivated. To investigate the differences in the score of intrinsic motivation, extrinsic motivation and a-motivation, and the perceived change in physical activity during COVID-19 lockdown (more-active, equally-active, or less-active), we performed a one-way ANOVA with Tukey post-hoc test. For the statistical analyses, the level of significance was set at $p < 0.05$.

Results

In total, 127 people started the questionnaire. The data analysis comprised the responses of 99 participants (66 female), after cleaning up for incomplete questionnaires and unfit inclusion criteria. Almost half of the participants were in the age range 25-34 years (44%) and 19% of participants were aged between 35 and 44 years old. Most participants were living with a partner or with a partner and children (46% and 26% respectively). Other living situations included living alone (15%) or living in a student house or with parents (13%). Around 75% of the participants were living and working in the Netherlands. Those not living and working in the Netherlands listed Greece ($n = 8$), United Kingdom ($n = 3$), Germany ($n = 8$), Spain ($n = 2$), Portugal ($n = 1$), Belgium ($n = 1$), and Ireland ($n = 1$) as living and/or working country. Table 1 provides an overview of the demographic characteristics of the included participants.

Table 1: Basic characteristics of study participants.

Characteristic	N (%)
Gender	
Male	33 (33%)
Female	66 (67%)
Age	
18-24	13 (13%)
25-34	44 (44%)
35-44	19 (19%)
45-54	10 (10%)
55-64	13 (13%)
Living situation	
Alone	15 (15%)
Together with partner	45 (46%)
Together with partner and children	26 (26%)
Other	13 (13%)
Working Country	
The Netherlands	72 (72%)
Other	18 (18%)

Twenty-seven percent of the participants considered becoming more physically active during the lockdown – the *more-active* group. Twenty-eight percent did not perceive a change in physical activity level – the *equally-active* group, and 44% considered becoming less active – the *less-active* group. In general, participants scored high on introjected regulation (mean 5.08, SD 1.06), integrated regulation (mean 4.66, SD 1.43), identified regulation (mean 4.48, SD 1.49), and intrinsic motivation (mean 4.02, SD 1.50) and scored low on external regulation (mean 2.24, SD 0.99) and a-motivation (mean 2.19, SD 1.19). When comparing the motivational profile with the perceived change in physical activity during the COVID-19 lockdown, the *more-active* group scored significantly higher than the *less-active* group on intrinsic motivation (mean difference = 0.91, $p < 0.05$) and on identified regulation (mean difference = 0.89, $p < 0.05$). The *less-active* group scored significantly lower than the *equally-active* group on identified regulation (mean difference = -1.05, $p < 0.01$) and higher on a-motivation (mean difference = 0.84, $p < 0.01$). After grouping the components of extrinsic motivation (integrated regulation, identified regulation, introjected regulation, and external regulation) into a single score, the *equally-active* group scored significantly higher on this motivational profile than the *less-active* group (mean difference 0.56, $p < 0.05$). Figure 1 illustrates the comparison of the scores in intrinsic motivation, extrinsic motivation, and a-motivation per group of perceived change in physical activity during the COVID-19 lockdown.

The computation of the predominant motivational profile of each participant resulted in 45 participants given allocated to the *intrinsic-motivated* group, 45 participants to the *extrinsic-motivated* group, and 9 participants to the *a-motivated* group. The *a-motivated* group was mostly composed of participants who perceived becoming less active while working remotely (N=7, 78%). Almost half of the participants in the extrinsically motivated group reported becoming less active (N=20, 44%) followed by equally active (N=16, 36%). The intrinsic-motivated group was the most heterogeneous in terms of perceived change in physical activity with 17 participants reporting becoming less active (38%) and the other 17 reporting becoming more active (38%).

Table 2 summarizes the average scores given to the facilitators and barriers per group on reported change in physical activity during the COVID-19 lockdown. In general, the *equally-active* group scored the facilitators higher than the *more-active* and *less-active* group (mean = 3.09 compared to 3.04 and 2.72, respectively). In turn, the *less-active* group scored the barriers higher than the *equally-active* and *more-active* groups (mean = 2.63 compared to 2.02 and 1.90, respectively). The highest scored facilitators by the *more-active* group were (1) no work travel, (2) good weather, and (3) flexible work schedule. The highest scored barriers by the *less-active* group were (1) no active transportation, (2) closed sports facilities, and (3) time spent on household chores.

Table 2: Mean scores of facilitators and barriers to physical activity during the COVID-19 lockdown separated by a perceived change in physical activity.

	<i>less-active</i> (N=44)		<i>equally-active</i> (N=28)		<i>more-active</i> (N=27)		<i>all</i>	
	mean	SD	mean	SD	mean	SD	mean	SD
Facilitators								
Flexible work schedule	3,27	1,13	3,86	0,76	3,56	1,22	3,52	1,08
Less work obligations	2,57	1,17	3,18	1,25	2,56	1,22	2,74	1,23
Active for job	1,61	0,75	2,18	1,19	1,89	1,05	1,85	0,99
No work travel	2,84	1,16	3,11	1,20	4,00	0,92	3,23	1,20
Less social obligations	2,93	1,17	3,46	1,26	3,48	1,01	3,23	1,18
Access to facilities	2,57	1,25	3,39	1,29	3,48	0,89	3,05	1,24
Taking care of children	1,98	1,19	1,93	1,15	1,52	0,89	1,84	1,11
Online workouts	2,84	1,18	2,89	1,29	2,93	1,39	2,88	1,26
Good weather	3,86	0,85	3,79	0,83	3,96	1,09	3,87	0,91
Mean	2,72		3,09		3,04		2,91	
Barriers								
Work-related fatigue	2,86	1,21	2,36	1,19	2,37	1,28	2,59	1,24
No time due to job	2,77	1,12	2,21	1,23	2,00	1,11	2,40	1,19
Not with colleagues	2,48	1,27	1,64	1,06	2,04	1,19	2,12	1,23
No active transportation	3,77	1,24	3,00	1,39	1,74	0,98	3,00	1,47
Care ill family	1,43	0,70	1,21	0,42	1,33	0,62	1,34	0,61
Care for children	1,91	1,29	1,46	0,88	1,48	0,98	1,67	1,12
Poor health	1,59	0,95	1,43	0,74	1,26	0,53	1,45	0,80
Fear of breaking social distance	2,55	1,47	1,82	0,91	2,07	1,24	2,21	1,30
Closed sport facilities	3,66	1,64	2,50	1,37	2,33	1,47	2,97	1,63
No group activities	2,93	1,55	2,39	1,13	2,19	1,50	2,58	1,45
No social support	2,50	1,36	2,04	1,00	1,70	0,82	2,15	1,17
Time spent in household chores	2,98	1,34	2,54	1,23	2,33	1,27	2,68	1,31
Not allowed to go outdoors	2,80	1,51	1,65	0,69	1,87	1,22	2,22	1,34
Mean	2,63		2,02		1,90		2,26	

Figures 2 and 3 provide the average rating of facilitators and barriers, respectively, to physical activity during the COVID-19 lockdown, comparing among predominant motivational profiles. The facilitators and

barriers to physical activity during COVID-19 were perceived similarly by the *intrinsic-motivated* and *extrinsic-motivated* groups. The *a-motivated* group rated the facilitators considerably lower and the barriers considerably higher than the other two groups. 'Good weather' and 'flexible work schedule' were the first and second highest-rated facilitators by the three groups. 'No work travel' was in third place for the *intrinsic-motivated* (mean = 3.40, SD 1.16) and *a-motivated* (mean = 2.89, SD 1.36) groups. 'Less social obligations' was the third most important facilitator to physical activity for the *extrinsic-motivated* group (mean = 3.33, SD 1.17). 'No active transportation' was the highest-rated barrier for the *a-motivated* (mean = 4.33, SD 1.0) and *extrinsic-motivated* (mean = 3.07, SD 1.39) groups. The second most relevant barrier to the *a-motivated* group was the fear to risk social distancing (mean = 4.00, SD 1.12), followed by the time spent in 'household chores' and 'not allowed to go outdoors' (mean=3.89, SD 0.93). 'Closed facilities' and 'no-group activities' were the second and third most relevant barriers for the *extrinsic-motivated* group (means = 2.96 and 2.67, respectively).

Discussion

The objective of this study was to investigate the motivational profile, facilitators, and barriers that influenced an eventual change in physical activity while working remotely due to the COVID-19 lockdown. The results of the online survey show that the switch to remote work affected the physical behavior of 71% of the respondents, with 27% becoming more, and 44% becoming less physically active during the COVID-19 lockdown. This first conclusion follows the mixed results found in literature, where some studies report a decrease in global physical activity during the COVID-19 lockdown (39, 40), and others report an increase in indoor exercise activities (21).

Secondly, participants who reported becoming more active during the COVID-19 lockdown scored significantly higher on intrinsic motivation than the group who became less active. These results suggest that those who are intrinsically motivated to be physically active, not only have found strategies to deal with the constraint of working from home during the COVID-19 lockdown, but also made use of the facilitators to increase their activity level. This finding is in line with the idea that motivation and resilience are intertwined (41), and that intrinsic motivation fosters resilience. On the contrary, those who reported higher scores on a-motivation perceived the facilitators weaker and rated the barriers higher, and became less physically active during the COVID-19 lockdown. Our results are in line with other findings in the literature suggesting that individuals with more self-determined motivation profiles (leaning towards intrinsic motivation) were associated with higher participation in physical activity (42, 43).

Our findings have implications for the design of interventions to promote physical activity among office workers. Firstly, we highlight the importance of considering the motivational profile when designing personalized strategies to encourage physical activity while working from home. Whereas all individuals despite the predominant motivational profile considered 'good weather' and 'flexible work schedule' the most relevant facilitators to be physically active, only the intrinsic-motivated group seemed to be able to act upon these facilitators. When defining strategies to promote physical activity among remote office workers, one could think of interventions coupled to a weather forecast service. By knowing in advance

the days or time slots when the weather will be favorable to outdoor activities, the office worker can be encouraged to plan time on the agenda to include active breaks. Secondly, being able to set their own work schedule and removing the (passive) commuting time has a positive impact on daily physical activity. The flexible working hours provide an opportunity to include active breaks in a population that has a predominantly sedentary lifestyle and is often characterized by a weekend-warrior profile (7–9). In this line, interventions to promote physical activity among office workers should encourage the individual to set a plan that fits their (new) working routines. While the intrinsically motivated group might have the internal resources to do this planning by themselves, the extrinsic-motivated group, and in particular the a-motivated group, might benefit from external support in this direction. Digital health solutions can support planning, reminding, and nudging the individual – as seen in the examples above. The management team of the organizations also has an important role as a source of extrinsic motivation, for example, by encouraging structured team lunch walks at distance, telephone walking meetings (instead of video conference), or active breaks. In these cases, digital health solutions can include gamified elements to increase motivation (e.g. leaderboard or challenges), as well as provide the means to share experiences (e.g. share a picture of the surroundings of your walk). Moreover, our results suggest the importance of fostering intrinsic motivation when developing (technology-based) interventions to promote physical activity among office workers working from home. One strategy is to find and promote activities that provide inner satisfaction and pleasure to the individual. Individuals are more likely to engage in activities that are pleasurable and at the same time, are more likely to be open to new activities, and initiate new behaviors, while they feel satisfied (44).

Our results also suggest that for those lacking motivation to be physically active, represented by the a-motivated profile, it is particularly important to define strategies that include opportunistic physical activity in daily life. This a-motivated group, more likely to become less active during the switch to remote work, scored the ‘lack of active transportation’ considerably higher than the other barriers to physical activity. This suggests that active commuting, being an opportunistic form of physical activity might be the most important source of activity in the daily life of the a-motivated group. A specific strategy to promote physical activity among this group while working remotely passes through encouraging the planning of defined timeslots in the agenda corresponding to the time of active transportation to and from the workplace at the beginning and end of the day. The examples above mentioned are based on the theory that individuals are more likely to take an action if they have previously committed to perform that action (45).

Within certain considerations, the results of this study might simulate the experience of remote work beyond the COVID-19 lockdown, as three-quarters of the participants reported living in the Netherlands, where a ‘soft lockdown’ took place during the period in which this study took place. The soft lockdown means that sport- and entertainment facilities (e.g. cinemas and clubs) were closed, group activities were discouraged, but the population was incentivized to go outdoors alone or with members of the household while keeping social distancing. Individual activities, such as running, were also encouraged. While ‘closure of sports facilities’ is a temporary constraint caused by the COVID-19 lockdown, the lack of active transportation is an important barrier to consider when designing strategies to promote physical activity

among office workers working remotely. In the Netherlands, where most participants come from, cycling is a popular means of transport (46, 47) and 26% of all trips are made cycling (48). Without the need to cycle to work and with fewer social obligations, active transportation loosened its relevance on daily physical activity during remote office work. Future research should focus on translating the findings of this study into specific requirements for interventions promoting physical activity among office workers working from home and evaluate its effectiveness. Additionally, a larger-scale survey should be performed among remote office workers not constrained by the COVID-19 restrictions.

Conclusion

The results of the exploratory study suggest that, based on the experience during the COVID-19 lockdown, remote work can indeed provide facilitators to engage in more physical activity, although the motivational profile is important to act upon. Especially for individuals lacking the motivation to be physically active, making use of the flexible work opportunities together with the weather forecast services to include active breaks in the daily workday, and defining moments of the day to compensate for lack of active transportation to and from the workplace, are strategies likely to support office workers becoming more active, despite their sedentary occupational activity.

Abbreviations

COVID-19: coronavirus disease 2019

SMS-II: Sports Motivation Scale-II

Declarations

Ethics approval and consent to participate

The research was performed following the Declaration of Helsinki. Written informed consent was obtained from all subjects before starting the online survey. This study did not require the approval of the Medical Ethical Review Board, according to the Dutch Medical Research Involving Human Subjects Act (WMO) (37), as all subjects were competent individuals and the study did not involve any interventions or treatments.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contribution

MC contributed to the conception and design of the work, performed the analysis and interpretation of the data, and drafted the manuscript. RB contributed to the conception and design of the work, lead the data acquisition, and contributed to the analysis and interpretation of the data. MT has substantively revised the work. All authors read and approved the final manuscript.

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Figures

Figure 1

Average score of motivational profile to engage in physical activity and respective standard deviation per perceived change in physical activity during the COVID-19 lockdown. Extrinsic motivation encompasses integrated regulation, identified regulation, introjected regulation, and external regulation

Figure 2

Mean scores of the relevance of each facilitator to physical activity during the COVID-19 lockdown separated by predominant motivational profile: intrinsic-motivated (N=45), extrinsic-motivated (N=45),

and a-motivated (N=9). Participants were asked to rate how much they agreed with the facilitators on a scale from 1 (completely disagree) to 5 (completely agree)

Figure 3

Mean scores of the relevance of each barrier to physical activity during the COVID-19 lockdown separated by predominant motivational profile: intrinsic motivation (N=45), extrinsic motivation (N=45), and a-motivation (N=9). Participants were asked to rate how much they agreed with the barriers on a scale from 1 (completely disagree) to 5 (completely agree)