The Role of Switching Frequency, Task Variety and Motivation in Activity-Based Working: When Does the Switch Fit?

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Abstract

Activity-Based Working (ABW) is an emergent trend in organizations. It concerns a nonterritorial type of workspace, where employees are supposed to switch between a variety of workstations tailored to fit their needs during their various work activities. Despite the potential benefits of ABW (e.g., space efficiency), outcomes for ABW office users (e.g., satisfaction with the workspace) are rather mixed. We argue that this may be due to the fact that research on ABW fails to take the psychological perspective into account when studying the situational and personal conditions which can help employees to make good use of the ABW offices. Based on person–environment fit theory and self-determination theory, we argue that employees who frequently switch workstations may experience a better fit between their needs and the workplaces ABW offers, thus reporting not only higher satisfaction with the workspace, but also higher performance, and higher work engagement. However, we expect these relations to be conditional upon the variety in employees' work situation and their personal motivation to switch. The results of our study, based on a sample of 206 employees, supported a significant three-way interaction among switching frequency, task variety, and autonomous motivation to switch on perceived need–space fit and related outcomes. Based on our findings, we provide suggestions how organizations can efficiently modernize their buildings according to the ABW concept, for the benefit of employees and organizations alike.

Keywords: Activity-based working; Desk-sharing offices; Need–space fit.

Over the last decades, new trends in architecture and technology enabled companies to allow telework, causing employees to work from home and come less often to the office (e.g., Demerouti et al., 2014). The outbreak of the Covid-19 pandemic further increased the telework rate (Marzban et al., 2022) and created the opportunity for organizations to reduce the high workspace-related expenses. However, this also forced the organizations to rethink how to use the remaining office space. In response, a large number of companies has been undertaking a shift to Activity-Based Working (ABW) spaces. The way ABW is implemented can vary, but it indicates a nonterritorial office space, where employees do not have assigned desks, but switch workstations in pursuing a good match between the task at hand and the space they need to work in (Ashkanasy et al., 2014; Pierce & Brown, 2019; Wohlers & Hertel, 2017). With a usual capacity of 70% of the traditional office, ABW represents an efficiency-bound, cost-cutting strategy for companies. It is also seen as a way to adapt workspaces to employees' task-related needs (e.g., need for concentration vs. need for collaboration), which would enhance employees' satisfaction and performance (Danielsson & Bodin, 2008; Engelen et al., 2019).

Yet, the research findings on the outcomes of ABW are mixed. While some studies found that employees in ABW offices report higher satisfaction than colleagues in traditional offices, other studies concluded that employees complain more about their work environment after a relocation to an ABW office and report lower levels of performance and work-related well-being (Appel-Meulenbroek et al., 2011; Candido et al., 2019; De Been & Beijer, 2014; Kim et al., 2016). One explanation that has been put forward for the unexpected negative effects of ABW workplaces is that employees do not use the ABW offices as they should: Too often they choose the same place to work and do not switch workstation when their task characteristics change (e.g., Hoendervanger et al., 2016; Rolfö & Babapour Chafi, 2017). Hence, they violate the nonterritorial desk-sharing policies, which can prevent them from experiencing the benefits of ABW. In other words, although the ABW principles posit that the flexible offices should promote an optimal fit between the individual task-related characteristics and the workspace characteristics (Gerdenitsch et al., 2018), employees' switching behaviors do not always lead to the intended correspondence between task and space. To date, however, the research on ABW failed to account for such behavior.

ABW appears as an open and rather underexamined research field. The majority of studies have been conducted from the perspective of ergonomics, architecture, and corporate real estate. They focused on environmental and physical factors (Babapour Chafi & Rolfö, 2019; De Been & Beijer, 2014; Hoendervanger et al., 2016), and largely neglected the psychological angle (except e.g., Babapour Chafi & Rolfö, 2019; Wohlers & Hertel, 2017).

This is cumbersome as, in fact, a transition to ABW does not only involve a change in the internal design of the office, but it especially requires employees to change their behavior (Bäcklander et al., 2021). To reach a more nuanced understanding of employees' behavior and subjective experience in the ABW environments, it is therefore necessary to take a psychological perspective and also consider job-related and person-related factors of employees working in an ABW setting. The current study aims to engage in such an endeavor and examines under which conditions switching between different workstations in an ABW environment really "works", in the sense that it enhances positive work-related outcomes.

First of all, we argue that switching workstations can be beneficial because it enhances employees' perceived need–space fit. This proposition builds on the person–environment fit literature, which posits that perceived fit is the key construct to predict relevant work-related outcomes, such as satisfaction with the workspace, performance, and work engagement (Appel-Meulenbroek et al., 2019; Caplan, 1987). Second, we posit that fit will be achieved to a different degree depending on the presence of two conditions: task variety and autonomous motivation to switch. The degree of task variety plays a crucial role in making meaningful switches across the range of workstations, as the employees should switch depending on the changes in their activity (Wohlers & Hertel, 2017). Furthermore, in line with self-determination theory (Deci & Ryan, 2000), we argue that people are more likely to perceive need–space fit and experience positive outcomes of switching when they are autonomously motivated to switch workstations and do not feel coerced in switching. Taken together, this study tests whether task variety and autonomous motivation moderate the association between switching frequency and three work-related outcomes (i.e., satisfaction with the workspace, performance, and work engagement), via perceived need–space fit.

Activity-Based Working: Between office design and human behavior

Differently from the traditional offices, employees in ABW offices are provided with a range of workstations that are supposed to optimally support a variety of work-related activities. Employees are expected to switch workstations during the workday according to their individual purposes and needs, in a flexible and desk-sharing manner. However, research is inconclusive about the effectiveness of the ABW design, since the studies addressing this topic provided mixed evidence about its implications for employees' satisfaction with the work environment, performance, and work engagement in ABW (Engelen et al., 2019; van der Voordt, 2004). Notably, multiple aspects may influence these outcomes, including instrumentality, aesthetics and symbolism (Vilnai-Yavetz et al., 2005). Instrumentality is

defined as the usability of the space and the goals it allows to attain, that is it refers to the extent to which the space supports or hampers the work activity of those who work there. Aesthetics refers to the pleasantness of the design, while symbolism is linked to the associations and affordances the space elicits. Aesthetics and symbolism are certainly important, but, given our interest in effectiveness in ABW offices, we will specifically focus on the use of the office space and its implications from the employee subjective point of view (i.e., instrumentality).

Evidence on the effectiveness of ABW settings is mixed. One part of research reports on successful implementations of ABW. For instance, ABW workplaces are perceived as efficiently tailored to the work activities and suitable for sustaining employees' concentration and other needs (Appel-Meulenbroek et al., 2011). Employees are found to report higher satisfaction with the ABW environment, higher productivity and higher well-being at work in offices with no fixed desks compared to offices with fixed desks (Candido et al., 2019; Kim et al., 2016). Employees also become more satisfied with the physical space and perform better after a relocation to an ABW flexible office (Rolfö, 2018). Furthermore, an experimental study with wearable devices found that switching workstations in the newly designed office reduced the incidence of sedentary behavior, resulting in lower perceived bodily discomfort (Foley et al., 2016).

However, other studies drew less enthusiastic conclusions about the advantage of ABW. For instance, De Been and Beijer (2014) found that employees in a flexi office were less satisfied with productivity, concentration and privacy than employees in individual, shared or combi offices, while there was no significant difference in satisfaction with communication and interaction. Others found that employees in ABW offices report high level of distraction and complain about noise in the open spaces (Appel-Meulenbroek et al., 2011; Jahncke & Hallman, 2020; van der Voordt, 2004). Relocating offices to an ABW environment may even cause a decrease in intra-group communication and interactions (Haapakangas et al., 2019; Rolfö et al., 2018; Wohlers & Hertel, 2018).

These inconsistent findings in this relatively new stream of research require further investigation. Accordingly, this study aims to examine why and when the switching frequency —which is considered the key element for efficiency and effectiveness of ABW (Bäcklander et al., 2021; Haapakangas et al., 2018)—triggers positive outcomes. Specifically, we take employees' perceived fit into account.

Need–space fit

ABW is designed to enhance the fit between what employees need to accomplish their tasks and the workstation they can pick to work (Engelen et al., 2019; Wohlers & Hertel, 2018). More in detail, the ABW design assumes that employees may have different needs depending on their tasks at hand. For instance, when employees need focus and silence, they are supposed to look for a quiet, individual space where they can concentrate and be protected from the noise of a shared open environment. When employees need to work on a project together with team members, they are expected to opt for a teamwork space equipped with screens and boards, or a lounge room for less formal discussions. In short, the "good functioning" of ABW workplaces relies on the fit between employees' needs and what the space supplies, that is what the space affords (Gibson, 2015). However, this requires that the employees switch from one workstation to another according to their tasks (see also Bäcklander et al., 2021).

According to person–environment fit theory (P–E fit; Caplan, 1987; Edwards, Caplan, & Harrison, 1998), employees experience good fit within the organizational context when there is a correspondence or complementarity between the job environment and the person. A good fit leads to positive outcomes, such as a better job satisfaction, performance and psychological well-being, whereas a misfit is likely to become a source of strain for the employee (Appel-Meulenbroek et al., 2019; Edwards et al., 2006). Employees may subjectively assess the degree to which they feel there is a match between them and environment (Edwards et al., 2006). Such a perceived fit is considered directly related to strain and a meaningful predictor of employee level outcomes (Edwards et al., 1998). We therefore focus on perceived P–E fit.

Previous research has already stressed the importance of fit when examining cases of relocation to new work environments. At the theoretical level, "task–environment fit", a form of need–supply fit, has been suggested to be able to offset the negative impact of distractions on job satisfaction, performance and well-being in ABW spaces (Wohlers & Hertel, 2017). Yet, this theoretical proposition was not fully supported empirically (Gerdenitsch et al., 2018). Rather, research reported that perceived fit mediates or explains the impact of the combination of work setting privacy and task complexity on work-related outcomes: Specifically, perceived fit increases when private work settings are used for complex tasks by people with higher need for privacy, which then leads to higher satisfaction and task performance (Hoendervanger et al., 2019).

However, despite the emphasis on fit in former research, many observations in the ABW context show that employees' switching behaviors do not always lead to the intended

correspondence between the needs of the employees and the space characteristics (e.g., Babapour Chafi & Rolfö, 2019; Hoendervanger et al., 2016). For instance, Babapour Chafi and Rolfö (2019) highlighted that employees often break the desk-sharing rules in the work environments of four Swedish ABW offices. Hoendervanger et al. (2016) found that employees often switch workstation for non-activity-related reasons. Using the workstations regardless of the task one performs hinders the opportunity to achieve the desired fit in ABW offices. While a higher fit would lead to positive outcomes such as job satisfaction or work engagement, a weaker fit would negatively impact these work-related outcomes and contribute to employees' discomfort (Appel-Meulenbroek et al., 2019).

Whereas Wohlers and Hertel (2017) refer to such a match as "task–environment fit", we coin the specific term "need–space fit". With this term, we indicate the correspondence between what employees need or deem necessary to fulfill their tasks and the workspace they perceive. Specifically, based on the P–E fit literature, we hypothesize that need–space fit in ABW is associated with satisfaction with the workspace, perceived performance, and work engagement (see Figure 1). Examining the three outcome variables enables to observe the extent to which employees have positive attitude towards their workspace, their productivity, and their work-related well-being. Each of the aspects involved by these outcomes informs research about an important element of instrumentality of the ABW offices, as they mainly refer to work activities, and functions and use of the workspace (Vilnai-Yavetz et al., 2005). Thus, we hypothesize:

Hypothesis 1. *Need–space fit is positively related to satisfaction with the workspace, perceived performance, and work engagement.*

The importance of task variety and motivation to switch for need–space fit

Within an ABW context, switching between different work stations is assumed to lead to higher need–space fit. However, we argue that whether or not the switching frequency leads to perceived need–space fit in the ABW context depends on other aspects of the situation and the person. With regards to the situation, the availability of different physical spaces may not be enough for employees to achieve a good fit by switching workstations. In line with this argument, Wohlers and Hertel (2017) also consider task variety as an important task-related moderator of the impact of the ABW features on work-related outcomes. Task variety is defined as the degree to which a job involves a range of different activities (Morgeson & Humphrey, 2006). Employees whose job involves only one type of tasks may not find any real advantage

in switching workstations during a usual working day. Rather, employees need to have a certain degree of task variety in order that they can meaningfully choose among the alternative spaces in the office. Hence, only employees experiencing task variety may benefit from using different workstations and be more likely to perform well and feel good at work in the ABW environment (Wohlers & Hertel, 2017).

Thus, we assume that when a job consists of several types of work activities, it is easier for the employees to feel that switching workstation is conducive to a good match for their needs. By contrast, if task variety is low, the switching frequency required in the ABW office might be perceived more as a stressor than as an advantage, as it does not contribute to enhance need–space fit. Hence, employees might just look for a place where they feel comfortable and sit at the same place for the whole working day, regardless of the desk-sharing rules. Thus, we posit:

Hypothesis 2. *Task variety moderates the relationship between switching frequency and need–space fit, so that when task variety is higher, the relationship is more strongly positive.*

Yet, the moderating role of task variety on the relationship between switching frequency and need–space fit (see Figure 1) is likely to depend on personal factors too, which explains why the impact of the characteristics of the physical work environment can largely differ among the employees working in the same context (Hoendervanger et al., 2016). To address this aspect, we include one important personal factor, that is autonomous motivation to switch (Deci & Ryan, 2000), defined as the employee motivation to meaningfully use the spaces provided in the ABW environment (Appel-Meulenbroek et al., 2011; Haapakangas et al., 2022). We therefore argue that employees not only need to perceive an *external* reason to switch (i.e., task variety), but they should also have an *internal* drive to do so (i.e., autonomous motivation to switch). That is, they also need to be spontaneously or autonomously motivated to change workstation in order to recognize that when there is great task variety at work, it is useful for them to take advantage of the range of workstations at the office.

To date, there have been only some attempts to investigate motivation to switch in the ABW environment, mostly in terms of reasons for switching. For instance, in their theoretical contribution, Wohlers and Hertel (2017) stressed the importance of understanding the reasons why employees chose different workstations, since the mere introduction of the ABW rules does not ensure that employees will endorse the switching behavior as expected (Babapour et al., 2018; Hoendervanger et al., 2016; Rolfö & Babapour Chafi, 2017). Furthermore,

Hoendervanger et al. (2016) examined the reasons why employees (do not) switch workstations by providing their respondents a list of predetermined reasons. They found that the most frequent reasons to switch were socially driven (e.g., stay close to colleagues) or preference-based (e.g., the favorite workstation has already been occupied) and the most frequent reason not to switch was the annoyance caused by moving their belongings from a place to another (Hoendervanger et al., 2016). Similarly, Babapour et al. (2018) found that a common reason for people to "dwell" at the same workstation was the proximity to particular colleagues or the discomfort perceived in working from other locations. Thus, switching is often the result of reasons other than pursuing the match between the task at hand and the characteristics of the workspace. This hampers the opportunity to achieve need–space fit and gain the expected benefits from the ABW design.

Rather than examining a laundry list of particular reasons why people may switch, we focus on autonomous motivation to switch as more profound personal factor influencing people in their switching frequency. Autonomous motivation implies that individuals engage in a certain activity because they see value in it or feel pure interest or enjoyment, in contrast to controlled motivation which implies that individuals engage in a certain activity because they feel externally or internally pressured to act by conditions such as material rewards, fear of punishment, social judgement (Deci & Ryan, 2000). According to self-determination theory (SDT; Deci et al., 2017; Deci & Ryan, 2000), people are more likely to enjoy and reap the benefits of a specific behavior when they are autonomously motivated to engage in it. Consequently, autonomous motivation is likely to be helpful in examining whether the employees feel they take advantage of the office space by deliberately choosing their workstations rather than feeling pressured to change workstations because this is prescribed by the rules.

Some preliminary evidence—mainly based on qualitative studies—suggests that if employees feel more autonomy and discretion when choosing the spaces to work in an ABW office, they are more compliant with the ABW rules and become more satisfied with the workspace (Appel-Meulenbroek et al., 2011; Babapour Chafi & Rolfö, 2019; Bäcklander et al., 2021). Involving the employees in the process of transformation of the office is therefore expected to enhance their autonomous motivation to use the workspace as intended by the ABW design, as this may help them to either gain control in the way the office is set up or see value in the choices that were made (Deci & Ryan, 2000; Wohlers & Hertel, 2017). Appel-Meulenbroek et al. (2011) and Rolfö et al. (2018) therefore recommended to involve employees more by exploring their opinion about the way ABW spaces would be used and what would

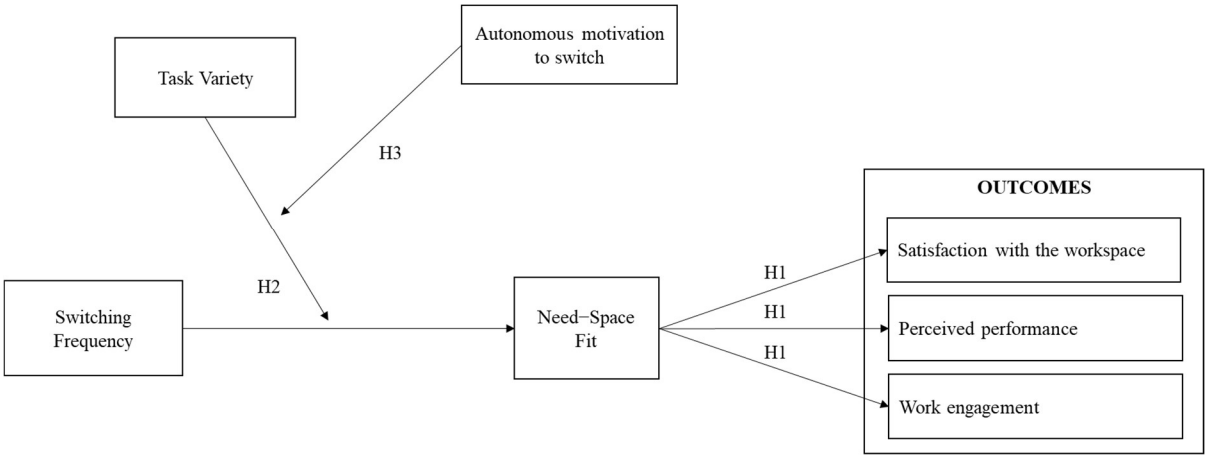
drive them to switch workstation when transforming the office to an ABW office. In a similar vein, Bäcklander et al. (2021) showed that self-leadership and work-related autonomy in ABW environments are related to positive outcomes for employees (i.e., less cognitive stress, higher performance).

Thus, we assume that autonomous motivation to switch matters in supporting need–space fit in ABW offices. Specifically, if employees autonomously endorse a switching behavior in ABW (i.e., personal factor), the switching frequency can enhance their perceived need–space fit, under the condition of a suitable degree of task variety (i.e., situational factor). Hence, we argue that when employees switch because they have various task in their job and because they autonomously want to switch workstation, it is more likely that they achieve need–space fit. This is advanced through a three-way interaction:

Hypothesis 3. Autonomous motivation moderates the moderating effect of task variety on the relation between switching frequency and need–space fit, so that when autonomous motivation and task variety are higher, the relationship is more strongly positive.

The research model is displayed in Figure 1.

Figure 1. The theoretical model.



Method

Procedure and Sample

We recruited participants via the online platform Cloud Research in April–July 2020. All participants were employees in an ABW environment, which was defined at the beginning of the questionnaire as follows: “Activity-Based Working is an emergent working style based

on a nonterritorial workplace. Employees have no assigned seating, but they can switch across different workstations according to the task at hand. The various workstations provided in the office are intended to support work activities optimally. An Activity-Based workplace typically has design features such as individual and team desks, quiet rooms, phone booths, meeting rooms, lounge areas." We then asked respondents whether they worked in such a workplace and only respondents who responded positively could fill in the survey. Moreover, the participants reported to have various types of working spaces (e.g., team spaces, single desks, social areas) available in their office, with 83.1% of the sample reporting 4 or more different spaces available.

The initial dataset of 306 respondents was cleaned to guarantee a good data quality. First, 89 participants were removed since they completed the survey unrealistically fast (i.e., in less than a third of the estimated time needed). Second, another 11 participants were also removed as their reported age differed from the age declared to Cloud Research by 10 years or more. Such a marked gap was considered suspicious. The final dataset consisted of 206 responses.

All the participants were from the US. In total, 64.6% were women and their average age was 40.2 years (*SD* = 14.1 years). They were employed in services 22.3%; industry 11.7%; education 11.2%; health and social 10.2%; other 44.6%. Most of the sample (63.1%) has been working in an ABW environment for less than 5 years; 20.9% for 5-10 years; 3.9% for 11-15 years; 4.4% for 16-20; 7.8% declared they have been working in an ABW environment for more than 20 years.

Measures

Switching Frequency. We assessed switching frequency as the number of times an employee changes workstation during a typical working day at the office, using one face valid item "How often do you switch workstation on average per day?". Respondents answered on a 9-point frequency scale, from 0=*No switches* to 8=*More than seven switches*.

Task Variety. Task variety was assessed using the corresponding 4-item scale from the Work Design Questionnaire (Morgeson & Humphrey, 2006). A sample item was: "The job requires the performance of a wide range of tasks". Respondents answered on a Likert scale from 1=*Strongly disagree* to 5=*Strongly agree*.

Autonomous motivation to switch. Autonomous motivation to switch workstation was assessed through 10 items based on the Multidimensional Work Motivation Scale (MWMS; Gagné et al., 2015). We adapted the stem in order to target the employee behavior of switching

workstations and ask “Why do you switch workstations during the working day?”. Sample items are: “Because I personally consider it important to switch workstation”, “Because I have fun switching workstation”. Respondents answered on a 7-point scale from 1=*Not at all* to 7=*Completely*.

Need–Space Fit. The measure of fit between employee needs and space characteristics was adapted from the 3-item scale used in Cable and DeRue (2002). The content of the stem was adjusted to target employee workspace and the question asked was “How much do you agree with the following statements regarding the workspace in your office?”. The items used are: “There is a good fit between what my workspace offers me and what I’m looking for to do my job”, “The things that I look for in my workspace are fulfilled very well by my present working space” and “The workspace I’m currently working in gives me just about everything that I want from a workspace”. Respondents answered on a Likert scale from 1=*Strongly disagree* to 5=*Strongly agree*.

Satisfaction with workspace. The overall satisfaction with workplace was measured through a single item, asking participants: “All things considered, how satisfied are you with the workspace?” (Zagreus et al., 2004). Respondents answered on a 7-point scale, from 1=*Extremely dissatisfied* to 7=*Extremely satisfied*. The use of a single-item to measure satisfaction in research has been found valid and in most cases more accurate than multiple-item scales (e.g., Cheung & Lucas, 2014; Mayhew et al., 2007; Wanous et al., 1997).

Perceived performance. We measured self-rated performance through 3 items used in Griffin, Neal, and Parker (2007). A sample item is “How often do you carry out the core parts of your job well, in a typical working week in the office?”. Respondents answered on a 5-point scale, from 1=*Very little* to 5=*A great deal*.

Work Engagement. We used the 3-item version of the Utrecht Work Engagement Scale (UWES-3; Schaufeli, Shimazu, Hakanen, Salanova, & De Witte, 2019). The three items were: “At my work, I feel bursting with energy”, “I am enthusiastic about my job”, and “I am immersed in my work”, for the subscales of vigor, dedication, and absorption, respectively. Respondents answered on a 7-point frequency scale, from 1=*Never* to 7=*Always*.

Since the study was carried out by means of survey-based data collection with self-report measures, we checked the possible presence of common method bias, to prevent the risk of a main measurement error in the analysis (Podsakoff et al., 2003; Podsakoff et al., 2012). We assessed the common method variance performing a confirmatory factor analysis, in which we compared a simple model (i.e., single-factor model) to a complex model, including five factors (i.e., a model in which all items loaded on their expected factors according to our hypothesized

measures; Kock et al., 2021). Common method bias affects the data if the single-factor model fits the data as well as the hypothesized model. Our hypothesized complex model (chi-square = 622.64, *df* = 220, $p < .000$, RMSEA = .09, SRMR = .05, CFI = .90, TLI = .89) fitted the data better than the simple model (chi-square = 2105.50, *df* = 275, $p < .000$, RMSEA = .18, SRMR = .19, CFI = .56, TLI = .52). Since the difference in the chi-square indexes between the two models was significant (chi-square diff. = 1482.90, *df* diff. = 55, $p < .000$), we could conclude that the single-factor model did not fit the data better than the hypothesized model, thus meaning that there was no significant common method bias effect in the study. Furthermore, the (standardized) factor loadings of the variables ranged from .76 to .92 (see Table A1 in the Appendix).

Results

Table 1 shows the means, standard deviations, reliability coefficients, and correlations among our study variables. Switching frequency, task variety, and autonomous motivation showed a positive correlation with need–space fit.

Table 1. Means, Standard Deviations, Correlations and Cronbach's alphas (in the diagonal) (N=206).

Variable	*M*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Switching Frequency	2.2	2.0	/						
2. Task Variety	4.1	0.8	.13	(.88)					
3. Auton. Motiv. to Switch	3.7	1.8	.37**	.27**	(.97)				
4. Need–Space Fit	3.9	0.9	.17*	.41**	.28**	(.87)			
5. Work Engagement	5.0	1.3	.19**	.55**	.46**	.36**	(.86)		
6. Performance	4.2	0.8	.12	.51**	.05	.40**	.51**	(.83)	
7. Satisfaction with workspace	5.5	1.5	.07	.51**	.28**	.48**	.54**	.37**	/

*. Correlation is significant $p < .05$ (2-tailed).

**. Correlation is significant $p < .01$ (2-tailed).

For the further steps of the analysis, we used the PROCESS macro v3.5 for SPSS (Hayes, 2017). Hypothesis 1 was given support, as the regressions of the three outcomes on need–space fit were all significant and positive (satisfaction with the workspace: $b = .76$, $SE = .10$; performance: $b = .33$, $SE = .05$; work engagement: $b = .48$, $SE = .09$; $p < .001$ for all the three outcomes), as shown in Table 2.

As for Hypothesis 2, we specifically selected Model 1 on PROCESS as it tests the simple moderating effect among the variables. Table 2 (upper left side) shows the overview of the regression coefficients of the moderation, also including the main effects of the variables. Both

switching frequency and task variety showed a significant main effect on need–space fit (switching frequency: $b = 1.54$, $SE = 0.45$, $p < .001$, 95% CI [0.65, 2.44]; task variety: $b = 0.56$, $SE = 0.17$, $p < .01$, 95% CI [0.22, 0.90]). Task variety significantly moderated the effect of switching frequency on need–space fit. The coefficient was negative ($b = -0.35$, $SE = 0.10$, $p < .001$; 95% CI [-0.55, -0.15]) meaning that when task variety is low, higher switching frequency associates with higher need–space fit whereas when task variety is high, higher switching frequency associates with lower need–space fit. This disconfirms the positive moderation formulated in Hypothesis 2.

To test Hypothesis 3, we selected Model 11 on PROCESS, which allows the analysis of a *moderated moderated mediation*. In a moderated moderated mediation, the moderating effect of a variable W on an indirect effect of a variable X on a variable Y depends on the values assumed by a second moderator Z (Hayes, 2018). Specifically, we hypothesized that the indirect effect of switching frequency (X) on the three outcomes (Y) via need–space fit (i.e., the mediator M) is moderated by task variety (W) and that such a moderating effect is dependent on autonomous motivation to switch (Z). More in detail, the relationship described in the model is a first stage moderated moderated mediation, since the effect of need–space fit on the outcomes is seen as a linear function of a primary (W) and a secondary (Z) moderator, namely task variety (W) and autonomous motivation to switch (Z), respectively (Hayes, 2018). In other words, the moderating effect is hypothesized in the first part of the model.

The results revealed the presence of a significant moderated moderation ($R = .51$; $R\text{-}sq = .26$; $MSE = .69$; $F = 9.74$; $df1 = 7.00$; $df2 = 198.00$; $p = .000$) for which autonomous motivation to switch moderates the moderating effect of task variety on the relation between switching frequency and need–space fit. Thus, Hypothesis 3 gains support. The coefficient of the moderated moderation is included in Table 2.

Table 2. Ordinary least squares regression coefficients (with standard errors) from a first stage moderated moderated mediation model.

Variable		Outcomes					
		M: Need–Space Fit	**Y_1: Satisfaction with workspace**		**Y_2: Performance**	**Y_3: Work Engagement**	
Constant		1.21(.73)	2.57(.40)***		2.88(.22) ***		2.91(.37)***
Switching Frequency	$a_1 \rightarrow$	1.54(.46)**	$c' \rightarrow$	-.01(.05)	$c' \rightarrow$	.02(.03)	$c' \rightarrow$	.09(.04)*
Task Variety	$a_2 \rightarrow$	.56(.17)**						
Autonomous Motivation to Switch	$a_3 \rightarrow$	.29(.27)						
Switching Frequency x Task Variety	$a_4 \rightarrow$	-.35(.10)**						
Switching Frequency x Autonomous Motivation to Switch	$a_5 \rightarrow$	-.37(.12)**						
Task Variety x Autonomous Motivation to Switch	$a_6 \rightarrow$	-.05(.06)						
Switching Frequency x Task Variety x Auton. Motiv. to Switch	$a_7 \rightarrow$	.09(.03)**						
Need–Space Fit			$b \rightarrow$	.76(.10)***	$b \rightarrow$	.33(.05)***	$b \rightarrow$	.48(.09)***
	R	0.51		0.49		0.41		0.39
			Index	**95% bootstrap CI[a]**	**Index**	**95% bootstrap CI[a]**	**Index**	**95% bootstrap CI[a]**
Moderated moderated mediation			.07(.02)	[.03, .11]	.03(.01)	[.01, .05]	.04(.02)	[.01, .08]
Conditional moderated mediation								
by Task Variety (W) among	Lower (Z=1.38)		-.18(.06)	[-.30, -.06]	-.08(.03)	[-.15, -.02]	-.11(.05)	[-.22, -.03]
	Average (Z=3.88)		-.01(.03)	[-.07, .05]	-.01(.01)	[-.03, .02]	-.01(.02)	[-.05, .03]
	Higher (Z=5.75)		.11(.05)	[.03, .21]	.05(.02)	[.01, .10]	.07(.03)	[.01, .15]
by Auton. Motiv. to Switch (Z) among	Lower (W=3.00)		-.08(.03)	[-.15, -.03]	-.04(.02)	[-.08, -.01]	-.06(.02)	[-.11, -.02]
	Average (W=4.13)		-.02(.01)	[-.04, .02]	-.01(.01)	[-.02, .01]	-.01(.01)	[-.03, .01]
	Higher (W=5.00)		.04(.02)	[.01, .08]	.02(.01)	[.00, .04]	.03(.01)	[.00, .06]

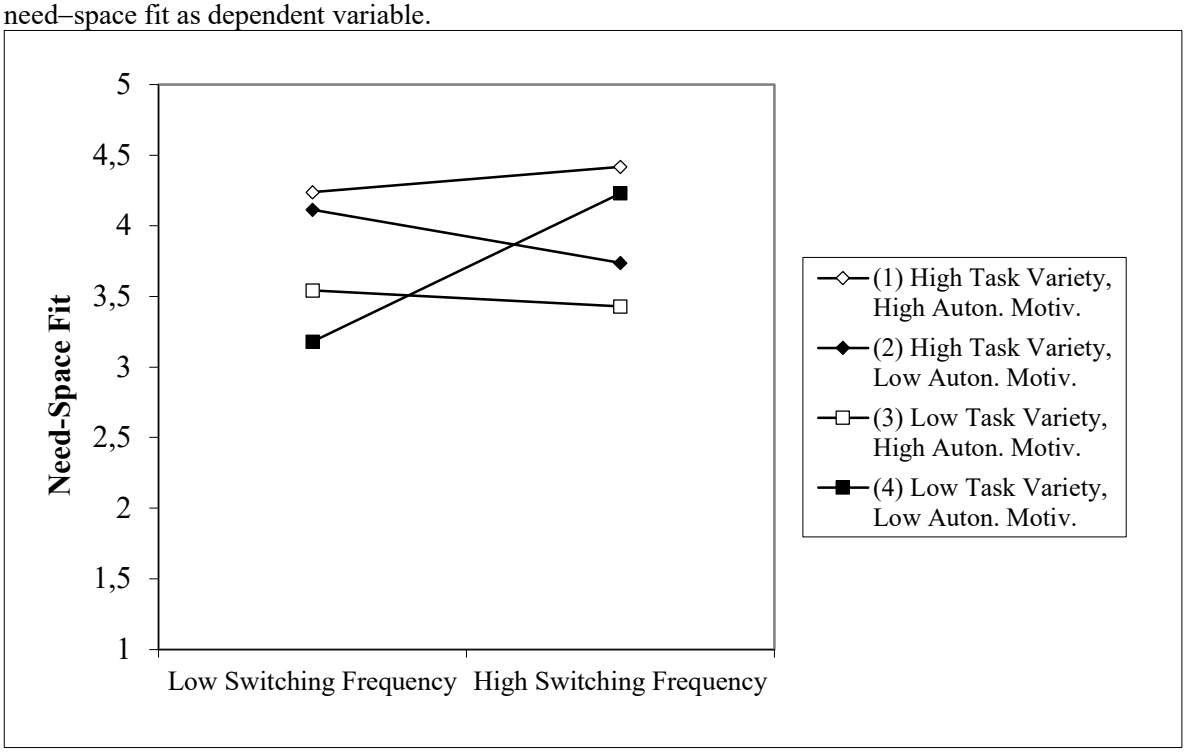
[a] Percentile bootstrap CI based on 5000 bootstrap samples.

W and Z values for conditional moderated mediation are the 16th, 50th, and 84th percentiles.

* $p < .05$; ** $p < .01$; *** $p < .001$

The three-way interaction is graphically depicted in Figure 2. From the slopes plotted, it is apparent that the interaction effects associate with need–space fit in different directions, and that higher switching frequency is not always associated with higher need–space fit. The positive association between switching frequency and need–space fit is found when task variety and autonomous motivation to switch are simultaneously high or simultaneously low.

Figure 2. Three-way interaction plot of switching frequency, task variety, and autonomous motivation with need–space fit as dependent variable.



Precisely, with the pattern high task variety–high autonomous motivation (slope 1) and the pattern low task variety–low autonomous motivation (slope 4), the higher the switching frequency the higher need–space fit. By contrast, the effect of switching frequency changes when the two moderators show opposite levels (i.e., high vs. low, in slopes 2 and 3). With the pattern high task variety–low autonomous motivation (slope 2) and the pattern low task variety–high autonomous motivation (slope 3), the lower the switching frequency the higher the need–space fit. As can be seen in Figure 2, the slope of high task variety and low autonomous motivation to switch (slope 2) is greater than the slope of low task variety and high autonomous motivation to switch (slope 3). As expected, the highest slope corresponds to the condition under which both the two moderators

show high levels (slope 1). However, the slope difference tests did not reveal any significant differences within the pairs of slopes, as displayed in Table 3 (Dawson & Richter, 2006).

Table 3. Slope differences test for need–space fit.

Pair of slopes	Slope difference	t-value	p-value	95% CI
(1) and (2)	0.14	0.17	0.867	[-1.49, 1.76]
(1) and (3)	0.07	0.11	0.914	[-1.25, 1.40]
(1) and (4)	-0.22	-0.19	0.849	[-2.45, 2.02]
(2) and (3)	-0.07	-0.25	0.803	[-0.58, 0.45]
(2) and (4)	-0.36	-1.06	0.288	[-1.01, 0.30]
(3) and (4)	-0.29	-0.60	0.552	[-1.25, 0.67]

The results for the second part of the model concerning the three outcomes (i.e., satisfaction with workspace, performance, and work engagement) are shown in Table 2 (upper right side). The indices calculated on the first stage of the moderated moderated mediation model (from the predictors to the mediator) are the same displayed in Table 2, since they refer to the three-way interaction described above. This part is equal across all the outcomes, as it refers to the X→M path, while the results differ to a certain extent in the second part of the model, the M→Y path.

As shown in Table 2 (lower side), the indices of moderated moderated mediation for satisfaction with workspace, performance, and work engagement are all significant, as the bootstrap CIs do not contain zero. This implies that, for all the three outcomes, the moderation of the indirect effect of switching frequency (X) by task variety (W) differs between individuals with different levels of autonomous motivation to switch (Z). Thus, the moderated moderated mediation of need–space fit on the three outcomes formulated in Hypothesis 3 gains support. Given this positive evidence, we can further probe the moderated moderated mediation through the indices of conditional moderated mediation (Hayes, 2018).

First, with regards to satisfaction with workspace, the indirect effect of switching frequency moderated by task variety shows significant differences between individuals with lower and higher level of autonomous motivation, but not for the average-autonomously-motivated individuals. From the indices of conditional moderated mediation (see Table 2, lower side), it is evident that, when task variety is high, the indirect effect of switching frequency on satisfaction with workspace is attenuated in low-autonomously-motivated people (-.18, 95% bootstrap CI [-.30, -.06]) compared to high-autonomously-motivated people (.11, 95% bootstrap CI [.03, .21]), in that the

latter show higher satisfaction with workspace. In other words, for those who frequently switch workstations, perceived fit and then satisfaction with the workspace are higher when both their task variety and autonomous motivation to switch are high, in comparison to those who frequently switch workstation, have great task variety but are low autonomously motivated.

As can be seen in Table 2 (lower side), the indices of conditional moderated mediation are reported with respect to the moderating effect by both task variety and autonomous motivation to switch. In our analysis, we assumed task variety as primary moderator and autonomous motivation to switch as secondary moderator. Consequently, we advanced that the moderation of the indirect effect of switching frequency on the outcomes by task variety is conditioned on values of autonomous motivation (Hayes, 2018, p. 21).

The results for the other two outcomes examined in our study (i.e., performance and work engagement) mirrored the findings for satisfaction with the workspace. Concerning the second outcome, self-rated performance, the indirect effect of switching frequency moderated by task variety is significantly different for individuals with lower and higher level of autonomous motivation to switch, but not for the average-autonomously-motivated individuals. As can be seen from the indices of conditional moderated mediation in Table 2 (lower side), higher task variety attenuates the indirect effect of switching frequency on self-rated performance in low-autonomously-motivated people (-.08, 95% bootstrap CI [-.15, -.02]), whereas higher task variety increases such an indirect effect in high-autonomously-motivated people (.05, 95% bootstrap CI [.01, .10]).

Third, also with regards to work engagement, we report that the indirect effect of switching frequency moderated by task variety is significantly different for individuals with lower and higher level of autonomous motivation, but not for the average-autonomously-motivated individuals. The indices for the conditional moderated mediation reveal that higher task variety attenuates the indirect effect of switching frequency on work engagement in low-autonomously-motivated people (-.11, 95% bootstrap CI [-.22, -.03]), whereas higher task variety increases such an effect in high-autonomously-motivated people (.07, 95% bootstrap CI [.01, .15]).

Discussion

With our study, we aimed at deepening our knowledge on ABW offices by taking a psychological perspective on this topic. In doing so, we provided a test of some basic assumptions

relating to employees' switching frequency in ABW environment. In line with our prediction, we found that the perceived need–space fit was associated with employees' satisfaction with the workspace, self-rated performance, and work engagement. Thus, the perceived fit between employees' needs and workspace characteristics sustains how employees think about their workspace, their perceived productivity and mental well-being at work (Zamani & Gum, 2019). Recent research on ABW has also found support for a positive effect of fit on employee outcomes, such as workspace satisfaction and productivity, mainly based on the study of environmental variables (e.g., Babapour et al., 2018; Gerdenitsch et al., 2018). Our findings provide further support to this effect, adding the examination of more psychological variables (i.e., task variety and autonomous motivation to switch). Perceived fit therefore proves to be a crucial factor to assess in the physical workplace.

With regards to switching frequency, our results indicate that changing workstations during the day can help employees to take advantages of the variety of spaces in the office. Regular switching across workstations represents the pivotal element of the ABW concept as it can make easier for employees to explore the workspace supply and find the most suitable space to do their job (Van Koetsveld & Kamperman, 2011). In other words, the more frequently employees switch across workstations, the more likely the environmental features are in accordance with their needs.

Furthermore, we found support for the hypothesized moderated moderated mediation of need–space fit with switching frequency, task variety, and autonomous motivation to switch, meaning that the three-way interaction was significant. Specifically, as expected, the best condition for employees to perceive that need–space fit is achieved occurs when the switching frequency is associated to the two further elements. The first element concerns a practical reason, that is the extent to which employees have task variety in their job (Wohlers & Hertel, 2017). The opportunity to perform different work tasks is a substantial reason that makes the flexible use of different workstations meaningful. The second element concerns an inner endorsement of the switching behavior, that is autonomous motivation to switch. Regularly changing workstation because one volitionally decides to do so fosters the employee compliance to the ABW rules. Hence, a primary conclusion is that employees tend to perceive their workspace as more suitable for their work in an ABW environment when they switch workstations more frequently, have various job activities, and are autonomously motivated.

Two other interesting results deserve to be mentioned. First, we also found that frequently switching workstation can foster need–space fit even when employees report low task variety and low motivation to switch. Thus, for employees whose job offers a quite monotonous type of activities and who are not internally motivated to switch workstation, the mere change in workstation can favor their perception of need–space fit in the ABW environment. This may occur because, even when they switch workstation just because of the formal rule at the office or because they just merely follow their colleagues, employees have the opportunity to find more comfortable or enjoyable conditions for their work activities (e.g., escaping temporarily noisy areas, being around the colleagues they like the most), which might improve their awareness of their physical workspace (Babapour Chafi et al., 2020). Nevertheless, this would bring into question how companies make decisions regarding ABW and emphasize that they need to be more conscious of what new work settings entail for their employees.

A second aspect to highlight concerns the main effect of task variety on need–space fit. Although we considered task variety as a situational condition moderating the relationships between switching frequency and need–space fit, interestingly, task variety is directly related to need–space fit. The association between task variety and need–space fit was the strongest one among the associations between the study variables. Notably, employees reporting high task variety and low autonomous motivation to switch also reported a better perception of fit than employees reporting low task variety and high autonomous motivation to switch, regardless of their switching frequency conditions. Such results stress that task variety is key to the effectiveness of ABW and is more important than autonomous motivation in determining employees' perception of suitability of the office environment: Task variety can provide a practical reason to feel that a change of workstation is needed during the working day. This also implies that not all the jobs may benefit from ABW to the same extent (Gerdenitsch et al., 2018) and calls for future research to investigate the specific relevance of task variety in the ABW environments.

Limitations and future research

Despite its contribution, this study is subject to limitations. First, the study was carried out basing on a cross-sectional design and self-report measures. Although common method bias was not a concern in this study, no conclusions on causality of the relationships were examined. Future research could investigate the casual relationships among the variables considered by means of

longitudinal designs or diary studies to gauge possible fluctuations in the measures over time. Also, further studies could use objective measures of the variables involved in this study, such as switching frequency and performance. For example, wearable devices can be employed to assess office users' movements in the workspace when they switch workstations (e.g., Foley et al., 2016).

Second, the data collection was conducted via online survey, reaching a sample of US employees. We could not control the type of office where the participants worked, but we relied instead on the instructions and definition of the ABW environment provided at the beginning of the questionnaire. Also, since the data were collected after the outbreak of the Covid-19 pandemic, in April 2020, the responses from our sample may be influenced by the situation that US was facing during the period. In fact, US at that time lacked a homogeneous strategy to regulate the presence at the office, but at least half of the US workers was working some time home during the period of our data collection (Guyot & Sawhill, 2020).

Third, we used a single-item to assess satisfaction with the workspace. Although the use of a single item for measuring satisfaction is common in many fields of research including research on work environments (e.g., Gerdenitsch et al., 2018; Mayhew et al., 2007), we are aware that using a composite scale to assess satisfaction may lead to more variability in the answers and allow researchers to provide more proper information on validity and reliability of their instruments (Scarpello & Campbell, 1983; Wanous et al., 1997).

Fourth, no significance emerged from the analyses of the slope differences in the three-way interaction, which might be due to the limited sample size. Although we found a significant three-way interaction among the variables of interest, we are prevented from drawing any strong conclusions about the direction of the relationships tested. Accordingly, future research on ABW needs more methodologically sound design in order to produce stronger and more reliable results (e.g., longitudinal studies, subjective and objective measures, more heterogeneous samples).

Our analysis addressed some relevant questions bringing in new variables to the discussion on ABW, but alternative routes are possible for further developing the research. Different variables may be observed in association with need–space fit and the outcomes included in the study. Some specific job characteristics such as skill variety or job autonomy might play a relevant role in our model (Hackman & Oldham, 1976). For example, job autonomy has already been described as a dimensions boosted in flexible offices and has been found to significantly impact employee's outcomes in the ABW environment (e.g., Hoendervanger et al., 2018). Also, alternative

perspectives on motivation can be examined, for instance, by drawing upon frameworks alternative to SDT. Furthermore, with regards to the measures employed in the current study, some alternatives are possible. For example, we assessed need–space fit with a scale adapted from Cable and DeRue (2002), but different scales can be used to measure fit at workplace, such as the scale used by Bankins, Tomprou, and Kim (2020) which includes four types of person–space fit, corresponding to the four functions the workspace serves (i.e., instrumental, collaborative, aesthetic, identity). This would allow a more precise assessment of fit at the workplace and highlight possible differences among the four dimensions in the subscales.

Additionally, future research should refine our limited knowledge of the impact of individual differences in ABW-related outcomes. The change of context and adoption of a new behavior can be challenging to a different extent for people. For example, some employees might feel more uncomfortable than others in giving up the old habits and adapting to the novelty of the desk-sharing rules, due to individual differences in their need for structure or privacy (Babapour Chafi & Rolfö, 2019; Hoendervanger et al., 2018; Van Yperen et al., 2014). Thus, more research is needed to examine the influence of individual characteristics or preferences in the ABW environment and their interaction with frequency of switching, task variety, and motivation.

Finally, in this study, we chose to focus in particular on the instrumentality dimension of the physical work environment, since we were interested in the concept of need–space fit. However, other dimensions such as aesthetics and symbolism might also be relevant in predicting how employees think, perform and feel in an ABW environment (Elsbach & Pratt, 2007; Vilnai-Yavetz et al., 2005). For example, the degree to which employees like the design of the different workspaces (i.e., a feature of aesthetics) or the meaning attached to different workstations (i.e., a feature of symbolism) might equally impact switching frequency or the outcomes studied. Furthermore, employees may inadequately use concentration rooms when such spaces are perceived as unpleasant or using them is seen as asocial. Including these dimensions was beyond the scope of this study, but it would suggest interesting avenues for future research.

Practical implications

As companies are now experiencing a strong pressure towards ABW, our findings can provide some useful suggestions for a more sensitive approach to the workspace renovation.

First, the spur toward a change in the work environment has become even more urgent with the recent massive shift to telework. Due to the outbreak of the Covid-19 pandemic, many

companies were pressured to rethink the actual use of space in their buildings and assess the real needs of their workforce in the physical work environment. Hence, ABW is expected to become more attractive to those organizations which aim to reduce their office space to save squared meters and budget. Although such a need is comprehensible from a business perspective, it is important that cutting the cost of the office floor would not constitute the leading reason for the change: Employees' satisfaction and comfort remain meaningful factors and values at the workplace (e.g., Haapakangas et al., 2018).

Second, according to our findings, the combination of frequent switching across workstations, high task variety in the job, and high autonomous motivation to switch creates the optimal conditions for employees to perceive that the ABW office fits their work activities. Consequently, managers and other decision-makers within the organizations which are opting for ABW spaces should check in advance and together with the human resources experts whether such conditions are fulfilled. Specifically, it is necessary to consider the degree to which task variety is currently present in a usual working day and clearly explain to the employees both the added value and requirements of the new work setting. It is important to provide employees with information on the convenient use of each type of workspace and the potential benefit of changing workstation along the change of tasks (Rolfö, 2018; Sivunen & Putnam, 2019). Making the functionality of ABW and switching across the workstations explicit for the employees will nurture their autonomous motivation to switch.

Finally, task variety seems to have a crucial role in setting a precondition for the good functioning of the ABW design, as shown by the main effect of this variable found in the study. Accordingly, we suggest that organizations carefully evaluate the extent of task variety in employees' jobs, when they consider to shift their workspace to the ABW setting. The ABW concept may not be appropriate for every kind of job and every type of office environment. Each organization thus needs to assess the internal conditions and evaluate benefits against the risk of an office renovation, in order to avoid stress or dissatisfaction among the office users.

Conclusion

The present study highlighted the relevance of some factors so far overlooked in the recent research on ABW. First, findings showed that task variety is an important requisite to consider when companies adopt a flexible work environment. This implies that ABW might not be ideal for

all job types. Specifically, jobs which involve greater variety of tasks may more easily benefit from the relocation to an ABW environment in comparison to monotonous jobs. Second, drawing on SDT for the first time in this field, we found that autonomous motivation to switch can ease the adaptation to nonterritorial offices as it enhances the expected switching frequency in the desk-sharing workplace. Third, findings also emphasized that when frequent switching behavior, high task variety, and high autonomous motivation co-occur, this can create the optimal conditions for a successful implementation of ABW in terms of satisfaction with the workspace, perceived performance, and work engagement.

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Appendix

Table A1
Factor loadings of the items of the scales included in the study.

	Estimate	SE	Z-value	p	Std. estimate
Task Variety					
task_variety_1	1.00				0.77
task_variety_2	1.02	0.08	12.17	0.000	0.83
task_variety_3	0.98	0.08	12.11	0.000	0.83
task_variety_4	0.89	0.08	11.71	0.000	0.80
Autonomous Motivation to Switch					
auton_motivation_1	1.00				0.83
auton_motivation_2	1.03	0.07	15.60	0.000	0.86
auton_motivation_3	1.03	0.07	14.81	0.000	0.83
auton_motivation_4	1.04	0.07	15.71	0.000	0.86
auton_motivation_5	0.98	0.07	13.68	0.000	0.79
auton_motivation_6	1.04	0.07	15.85	0.000	0.87
auton_motivation_7	1.04	0.06	16.22	0.000	0.88
auton_motivation_8	1.02	0.06	16.00	0.000	0.87
auton_motivation_9	1.07	0.07	16.33	0.000	0.88
auton_motivation_10	1.08	0.06	17.04	0.000	0.91
Need–Space Fit					
need_space_fit_1	1.00				0.83
need_space_fit_2	1.12	0.08	14.05	0.000	0.91
need_space_fit_3	1.01	0.08	12.16	0.000	0.77
Perceived Performance					
performance_1	1.00				0.77
performance_2	0.97	0.09	11.07	0.000	0.80
performance_3	0.93	0.08	10.96	0.000	0.79
Work Engagement					
work_engagement_1	1.00				0.79
work_engagement_2	1.10	0.08	14.20	0.000	0.92
work_engagement_3	0.84	0.07	11.63	0.000	0.76