Consequences of implementing activity-based flexible offices in academia: a follow-up study of perceived changes in the physical and psychosocial work environment after relocation

Received 14 May 2023
Revised 13 October 2023
Accepted 3 November 2023

Susanna Toivanen
School of Health, Care and Social Welfare, Division of Sociology, Mälardalen University, Västerås, Sweden

Hanne Berthelsen
Faculty of Odontology/Centre for Work Life and Evaluation Studies, Malmö University, Malmö, Sweden, and

Tuija Muhonen
Department of School Development and Leadership/Centre for Work Life and Evaluation Studies, Malmö University, Malmö, Sweden

Abstract

Purpose – This study aims to investigate university staff relocation from multiple separate buildings to a new building with activity-based flexible offices (AFOs) at a University in Sweden. The aim was to assess staff perceptions of the physical and psychosocial work environment and whether there were any changes in these perceptions before and after the move.

Design/methodology/approach – A mixed-methods design was used, analyzing closed-ended survey data at two time points (T1, $n = 169$ and T2, $n = 160$) and open-ended responses ($n = 180$) at T2.

Findings – The main findings revealed that employees started working more from home and that there were significant decreases in perceptions of the physical and psychosocial work environment, as well as job satisfaction, after the move to the new premises.

Practical implications – A comprehensive analysis of existing work processes, tasks and collaborations is crucial when planning new university premises. The planning process needs to be done in close collaboration with different stakeholders with multiple perspectives.

The authors thank all respondents for providing data, and Josefin Björk for excellent assistance with the data collection. This work was financially supported by a University in Sweden, reference number 2019/1667.

Declaration of competing interest: The authors have no competing interests to declare.

Facilities
Vol. 41 No. 15/16, 2023
pp. 129-145
Emerald Publishing Limited
0263-2772
DOI 10.1108/F-05-2023-0043

Originality/value – Introduction of AFOs in an academic setting can lead to negative consequences for occupational health and efficiency.

Keywords Activity-based flexible offices, Activity-based working, Relocation, University campus, Work environment, Job satisfaction, Survey, Mixed methods, Copenhagen psychosocial questionnaire COPSOQ

Paper type Research paper

1. Introduction

In recent decades, activity-based flexible offices (AFOs) have become increasingly popular in both private firms and public organizations. AFOs are characterized by zone-divided open-plan layouts and desk sharing (Gerdenitsch *et al.*, 2018). Instead of having assigned rooms or desks, workers in AFOs share facilities and office spaces with their coworkers. This modern office design necessitates new ways of working that align with the concept of activity-based working (ABW), which emphasizes organizing work based on the needs of current activities and using a variety of tailored work environments within zone-divided AFOs (Engelen *et al.*, 2019).

Whether AFOs and ABW are suitable for academic work is still a topic of debate. Häne *et al.* (2020) argued that there seems to be resistance to introducing new types of office workspaces in academia, while others have claimed that resistance to change is a response to the inherently ambiguous and conflictual nature of organizational change associated with the design process that leads to the implementation of new ways of working in academia (Jemine *et al.*, 2022). Yet others question the appropriateness of ABW as a way of working in higher education, as it may fail to support employees' work processes and lead to negative experiences (Nooij *et al.*, 2023). However, in terms of facility management, AFOs are considered appropriate for office workplaces in universities, as they are assumed to increase staff interaction, provide areas for concentrated work tasks, improve staff health and well-being, reduce office space costs and enhance flexibility (Häne *et al.*, 2020). In the present study, we examined a faculty relocation from multiple separate buildings to a new building with AFOs at a University in Sweden.

1.1 Previous research into activity-based offices and activity-based working

Despite their popularity, the impact of AFOs on the physical and psychosocial work environment and workers' health-related outcomes is not fully understood, and research in this area is lacking (Haapakangas *et al.*, 2022). Distraction caused by the background environment, such as uncontrollable noise (Jahncke and Hallman, 2020) and lack of privacy (Marzban *et al.*, 2022) are among common work environment-related issues in AFOs. A recent review indicates that cellular offices are perceived more favorably than AFOs in terms of environmental satisfaction, social relations, personal space, cognitive performance, work output, job satisfaction and commitment, job characteristics and health and well-being (Masoudinejad and Veitch, 2022). Environments that support staff attention and focus are associated with increased job satisfaction, social relations and health and well-being (Masoudinejad and Veitch, 2022). As such, it is crucial to establish designated quiet zones within AFOs to facilitate focused work that requires concentration.

The implementation of AFOs is expected to result in cost reduction for organizations, efficient use of workspaces, increased interaction and communication among workers and changes in employee behavior to establish ABW as a way of working (Häne *et al.*, 2020). However, not all employees adapt easily to ABW, as might be expected by management (Appel-Meulenbroek, 2016). Research suggests that AFOs can be beneficial for work

performance and perceptions of the work environment when implemented with appropriate management support and organization (Engelen *et al.*, 2019; Wohlers and Hertel, 2016).

During the ongoing COVID-19 pandemic, the significance of space and built environments was highlighted, presenting both challenges and opportunities for the development of new workplaces (Wilkinson *et al.*, 2022). The closure of physical workplaces required a rapid shift to virtual work environments, predominantly from home. After the COVID-19 pandemic, it is anticipated that office employees will increasingly adapt to remote work and adopt hybrid working arrangements (Appel-Meulenbroek *et al.*, 2022). Employees' choices will be influenced by various factors, including office overcrowding, the availability of private spaces for concentration and meetings, and the nature of their work. Those in communication-intensive roles with short commutes are more likely to spend more time at the office, while employees with individually focused work tasks and longer commutes tend to work more frequently from home (Appel-Meulenbroek *et al.*, 2022).

1.2 Previous research into office design in academia

In general, the design of space in academia has received limited attention, despite its impact on work organization and work environment (Nooij *et al.*, 2023). Universities, in line with commercial offices, are undergoing changes in their workplace environments (Häne *et al.*, 2020; Backhouse *et al.*, 2019; Baldry and Barnes, 2012). Open-plan office spaces are being implemented in universities worldwide to optimize workspace utilization and foster collaboration (Backhouse *et al.*, 2019). In academia, a collaborative work climate is crucial for optimal task performance (Jensen *et al.*, 2021). A systematic review found that, in addition to management practices, leadership and psychosocial characteristics, work environment factors play a role in explaining the quality and quantity aspects of academics' publication productivity (Aboagye *et al.*, 2021). Therefore, providing working environments that support academic work and prioritize employees' work processes can enhance performance, which, in turn, is essential for maintaining positive self-esteem and mitigating stress (Hobfoll *et al.*, 2018; Nooij *et al.*, 2023).

Traditional academic workplaces, such as cellular offices, are well-suited for supporting various activities of academic work, including solitary research, lecture preparation, peer meetings, student supervision and administrative tasks (Hopland and Kvamsdal, 2020). A study conducted among university employees in Norway found that those working in cellular offices reported higher satisfaction with their office space compared to those in shared offices (Hopland and Kvamsdal, 2020). A follow-up study of relocation to AFOs at a University in Sweden showed no improvement in the physical or psychosocial work environment after relocation (Berthelsen *et al.*, 2018). In fact, staff reported lower job satisfaction in AFOs compared to their previous individual and shared offices, and even expressed a higher likelihood of seeking new jobs. Additionally, they reported a decline in social community and reduced social support from colleagues and supervisors. Adapting to new ways of working in terms of ABW was not easy for the staff, as they tended to choose the same place in the new AFOs if possible and increased their remote work from home compared to before relocation (Berthelsen *et al.*, 2018).

Against this backdrop, the overarching objective of our study was to gain a deeper understanding of the consequences for the work environment of implementing AFOs in academia. We investigated how staff members perceived the physical and psychosocial work environment and whether there were any changes in these perceptions before and after the move to the new premises.

2. Methods

2.1 Study design

This study was built on surveys conducted among university staff at a University in Sweden before (Time 1) and after (Time 2) moving to new premises. The study used a mixed-methods design (Leech and Onwuegbuzie, 2009) combining statistical analyses of closed-end survey responses at Time 1 and Time 2 with a systematic content analysis of open responses at Time 2. A mixed-methods design was adopted because we considered that the quantitative method (closed survey questions) and the qualitative method (open answers in the survey) would complement each other, providing a more comprehensive understanding (Greene, 2007, p. 101). By adopting a mixed-methods design, we aimed to obtain a greater breadth and depth of understanding, as well as corroboration of our findings, while also overcoming the weaknesses inherent in using either approach alone (Leech and Onwuegbuzie, 2007). The rationale behind the mixed-methods approach was that the use of multiple approaches can lead to new insights and perspectives.

Mixed-methods approaches can be located on a continuum ranging from a monomethod design (no mixed methods) to a fully mixed-methods design, with a partially mixed-methods design positioned somewhere between these two poles (Johnson and Onwuegbuzie, 2004; Leech and Onwuegbuzie, 2009). Leech and Onwuegbuzie (2009) developed a typology of mixed-methods research based on three dimensions:

(1) level of mixing of the methods;

(2) timing in terms of either the concurrent or sequential application of the methods; and

(3) emphasis on/priority of the different methods, that is, the degree of dominance or otherwise of one method over the other.

In terms of Leech and Onwuegbuzie's (2009) typology, the design of our study can be classified as a "partially mixed concurrent dominant status design." That is, we conducted both parts of the studies concurrently at Time 2, and the closed questions have a dominant status, as the data were collected at two different time points. The closed questionnaire responses were analyzed first. Thereafter, the open answers were analyzed, and then the results were mixed (integrated) in the concluding discussion (Leech and Onwuegbuzie, 2009). In this way, the different methods were used to elaborate, enhance and broaden our overall analysis.

2.2 Study context and participants

The context of the present study was a university relocation to a new campus building in a city in Sweden. Before the move, the campus comprised several buildings in the center of the city. A new campus was constructed, not far from the old buildings, to relocate all functions into one building. University management wanted to create more functional premises where all activities were gathered under one roof which would promote collaboration and a flexible way of working. In 2015, a strategic decision was made to design the new premises as AFOs as they were deemed to be more adaptable and sustainable for the future compared to traditional cell offices. However, this decision sparked protests within the organization. Employees and union representatives expressed concerns with AFOs and argued that they would not be able to carry out their work effectively in this design. This led to central negotiations with the union demanding a reconsideration of the AFO decision. In 2017, following an architectural competition, plans for the new premises were presented. Staff members raised concerns about the inadequate number of quiet rooms, prompting negotiations to revise the plans and incorporate more areas that support attention and focus. The construction of the new campus commenced in 2017.

The first survey was conducted among the staff in September 2019 (Time 1) about seven months before the planned relocation. However, when the campus building was ready for the move in April 2020, the outbreak of the COVID-19 pandemic delayed the relocation process. The relocation was finalized gradually in the fall of 2021, after the COVID-19 restrictions had been withdrawn for campus operations. The second survey was conducted in May 2022 (Time 2). Mailing lists were used to distribute a link to an online survey to all staff of the university before (Time 1) and after (Time 2) moving to the new building. In total, 169 staff members participated in 2019 (62%), and 160 staff members participated in 2022 (51%). This research has been approved by the Swedish Ethical Review Authority under approval number 2019-03439.

2.3 Measures

The questionnaire for the present study took as its starting point a previous study performed in 2015–2016 at another University in Sweden (Berthelsen *et al.*, 2018). It included a section on demographics, followed by questions addressing aspects of the work environment. At the end of the questionnaire at Time 2, the participants were also given an opportunity to provide additional comments and reflections on an open-ended question.

Psychosocial work factors were operationalized by the Swedish version of the Copenhagen Psychosocial Questionnaire [COPSOQ; (Berthelsen *et al.*, 2020; Burr *et al.*, 2019): social community at work (three items), social support from superior (two items) and colleagues (two items), possibilities for development (three items), commitment to the workplace (three items), influence over one's work (four items), quantitative demands (three items), work–family conflict (two items), job satisfaction (four items) and work engagement (three items)]. The items were rated on a Likert scale comprising five response alternatives and scored 0–25–50–75–100. Scale scores were calculated as the average of the item scores within each scale, provided that at least half of the items were answered (range 0–100). When interpreting scale score differences in relation to organizational changes, the concept of a "minimal important score difference" can be used, in addition to statistical significance. Differences of 5–10 points on most COPSOQ scales (scale 0–100) reflect relevant noticeable differences in the working environment (Pejtersen *et al.*, 2010; Kristensen, 2010).

Four items on the possibility of decorating the workplace, being worried about disturbing others, having the opportunity to concentrate at work, and room for humor and laughter at the workplace, with five responses on a Likert scale, were taken from Berthelsen and colleagues (2018). Two additional items addressing how well the office environment/teaching rooms positively contributed to being able to perform work tasks satisfactorily were included in the present study. The problems in the physical work environment were investigated using five items with five response options on a Likert scale, for example, whether the respondent is bothered by a lack of availability for privacy (Berthelsen *et al.*, 2018; Bodin Danielsson, 2010). Three items about the extent to which workplace premises facilitate contacts within the group, contribute to group feeling, and to job satisfaction were taken from Bodin Danielsson (2010) and supplemented by two items about whether premises facilitate contact with other groups and contribute to cohesion in the workplace (Berthelsen *et al.*, 2018). The items were rated on a five-point Likert scale. Suitability of the workplace in relation to different activities (i.e. work requiring concentration, meetings, collaboration, etc.) was assessed by eight items with five response options on a Likert scale formulated for inclusion in the present study.

At the end of the questionnaire, we included an open-ended question:

Q1. Do you have other opinions or comments?

The participants could respond with their own words, with a maximum of 500 characters.

2.4 Statistical analysis

The data were analyzed using IBM SPSS version 26. The analysis included descriptive statistics in terms of mean and standard deviations for psychosocial work environment scales in 2019 and 2022, and frequency distributions for other variables. Differences between the 2019 and 2022 responses for parametric data were analyzed using a *t*-test. Differences in nonparametric data were analyzed using a chi-squared test. The scales' internal consistency was evaluated with Cronbach's alpha.

2.5 Qualitative analysis

All open responses were analyzed systematically with the aim of obtaining insights that could validate and enrich the statistical findings. The analysis was conducted according to the following four steps:

(1) The researchers read all open answers;

(2) based on this, a coding frame was developed;

(3) all comments and reflections were assigned codes in accordance with the coding frame by one of the authors; and

(4) and were validated by the other members of the research group (O'Cathain and Thomas, 2004).

3. Findings

3.1 Results from the closed-ended responses, T1 compared with T2

3.1.1 Background characteristics. As can be seen in Table 1, there were no differences related to the participants' gender, age or position between Time 1 and Time 2. A major shift was seen, from 61% working in their own office at Time 1 to 93% working in AFO at Time 2. During the same period, a change was seen related to where the actual work took place. The proportion of respondents working at the office three days or more decreased from 82% at Time 1 to 50% at Time 2 ($p \leq 0.001$), while respondents began working more from home (Table 1).

3.1.2 The physical work environment. All included perspectives in relation to the physical environment were perceived as significantly worse after the move to the new premises compared to before (see Table 2). For example, while 74% of the respondents reported that the office environment positively contributed to a high or very high extent to their ability to perform work tasks satisfactorily before the move, this was only the case for 21% after the move. The proportion of respondents who were often or always bothered by the general noise level, being observed, or a colleague's conversations consistently increased from less than 10% to as many as 31–40%. The workplace was perceived as less suitable, for example, for work requiring concentration, creative work, collaboration with colleagues and having meetings after the move than before. Finally, ergonomic conditions (sitting comfort and work position) deteriorated between Time 1 and Time 2. In addition, access to quiet rooms, hybrid rooms, and storage space was found to be problematic among as many as one-third to one-half of the respondents.

3.1.3 The psychosocial work environment. The psychosocial scales and their reliability at Time 1 and Time 2 are reported in Table 3. After relocating to the new premises (Time 2), the sense of being part of a work-related community, influence over one's work, possibilities for development and job satisfaction were lower than at Time 1. In contrast, no significant differences between Time 1 and Time 2 were seen for social support, quantitative demands, and conflict between work and family. The statistical analysis showed that the internal homogeneity of psychosocial work environment scales was satisfactory at both Time 1 and Time 2.

Characteristics	Time 1 ($N = 169$) %	Time 2 ($N = 160$) %	p
Gender			0.217
Woman	60.9	68.1	
Man	36.1	28.1	
Other/missing	3.0	3.8	
Age groups (years)			0.862
Under 25 years	0.6	0.00	
25–34	7.1	6.9	
35–44	18.9	18.8	
45–54	37.3	36.9	
55–60	21.3	23.1	
61–64	8.9	9.4	
65+	2.4	5.0	
Missing	3.6	0.0	
Position			0.651
Leader	6.5	8.8	
Tech./adm. Staff	26.0	27.5	
Teachers/researchers	65.7	61.3	
Missing	1.8	2.5	
Office type			<0.001
Own office	60.9	2.5	
Shared office	34.3	3.1	
Open office/own desk	3.6	0.6	
Activity-based flex office	0.0	93.1	
Missing	1.2	0.6	
Working from home			<0.001
Not at all	39.6	9.4	
1. One day/week	27.2	11.9	
2. Two days/week	17.2	32.5	
3. Three days/week	3.6	24.4	
4. Four days/week	0.6	14.4	
5. Five days/week	1.2	5.0	
Missing	10.7	2.5	
Working at the office			<0.001
Not at all	0.0	1.9	
1. One day/week	2.4	18.1	
2. Two days/week	10.1	23.8	
3. Three days/week	21.9	32.5	
4. Four days/week	18.9	7.5	
5. Five days/week	40.8	10.0	
Missing	5.9	6.3	

Source: Authors' own creation

Table 1. Background characteristics at Time 1 and Time 2

3.2 Results of the open-ended question (T2)

A total of 74 participants responded to the open general question at Time 2. Women were more likely to provide comments than men (54% versus 33%, $p = 0.04$), while there were no statistically significant differences in relation to age or occupational group. Some

Items	Time 1 %	Time 2 %	p
Possibility of decorating the workplace (to a small/very small extent)	4.9	95.0	<0.001
Worried about disturbing others (to a high/very high extent)	9.7	39.2	<0.001
Opportunity to concentrate at work (often/always)	76.0	50.9	<0.001
Room for humor and laughter at the workplace (to a high/very high extent)	84.8	75.5	0.034
Possibility of performing work tasks of satisfactory quality (to a high/very high extent)	79.0	66.0	0.008
The office environment contributes positively to task performance (to a high/very high extent)	73.5	21.4	<0.001
The design of the teaching premises contributes positively to task performance (to a high/very high extent)	57.7	25.2	<0.001
Bothered by			
Lack of opportunity for privacy (often/always)	12.7	39.6	<0.001
Being listened to (often/always)	6.0	37.0	<0.001
Being observed (often/always)	3.0	31.2	<0.001
The general noise level (often/always)	4.8	39.6	<0.001
Colleague's conversation/phone call (often/always)	7.9	33.8	<0.001
Workplace design regarding			
Convenience (quite/very bad)	4.8	26.9	<0.001
Sitting comfort (quite/very bad)	5.4	26.3	<0.001
Work position (quite/very bad)	4.2	25.5	<0.001
Access to storage space (quite/very bad)	3.6	51.9	<0.001
Access to quiet rooms (quite/very bad)	–	38.7	
Access to hybrid rooms (quite/very bad)	–	30.6	
Workplace premises regarding			
Contributes to group feeling (not at all/to some extent)	42.5	75.9	<0.001
Facilitates contacts within the group (not at all/to some extent)	32.3	78.5	<0.001
Facilitates contacts with other groups (not at all/to some extent)	59.8	70.3	<0.001
Cohesion at the workplace (not at all/to some extent)	38.8	74.4	<0.001
Personal job satisfaction (not at all/to some extent)	26.1	72.8	<0.001
Suitability of workplace			
Work tasks requiring concentration (to a small/very small extent)	10.2	55.4	<0.001
Informal interaction with colleagues (to a small/very small extent)	7.2	32.3	<0.001
Collaboration with colleagues (to a small/very small extent)	4.8	29.9	<0.001
Creative work (to a small/very small extent)	12.1	42.7	<0.001
Private/confidential conversations (to a small/very small extent)	16.9	64.1	<0.001
Telephone meetings (to a small/very small extent)	13.3	56.1	<0.001
Meetings with guests (to a small/very small extent)	12.7	29.4	<0.001
Meetings with students (to a small/very small extent)	15.2	37.3	<0.001

Source: Authors' own creation

Table 2. Comparison of different aspects related to the physical work environment at Time 1 and Time 2

participants wrote several comments (covering up to four different areas at the most), while others wrote only one. Some ($n = 11$) responses were related to the questionnaire items and clarifications as to why the participant had responded in a certain way (not included in the analysis). However, the responses were mainly related to the questionnaire topic itself and to reflections about the current office situation. There were a few ($n = 11$) more positive or optimistic comments, but the majority ($n = 158$) expressed different challenges in which the move to AFOs had resulted. The remarks were categorized in the following overarching

themes: Deteriorations in physical environment, Discrepancy between work and environment, Rationale for working from home, Deteriorations in social environment, Lack of territoriality, Difficulties in managing the workspaces, Job dissatisfaction, Lack of confidentiality and Positive/optimistic comments (Figure 1). We illustrate the themes with quotes from the responses: "Faculty member" refers to teachers and researchers, while "Staff member" refers to administrative and supportive staff.

3.2.1 Deterioration in the physical work environment. Several participants were concerned about the premises not offering any privacy; there was a lack of screens between the desks, and the glass walls contributed to the feeling of being constantly observed. This even included the coffee area. The transparency of the office area was disturbing and made it difficult to concentrate:

> The semi-quiet zones are good, but you are more or less unconsciously interrupted by other people when they move around the room (for example, passing the place where you are sitting); it is not the same way when you do not see the person in question. (Woman, Staff member)

Table 3. Reliability of the scales (Cronbach's alpha) and differences in mean scale scores (range 0–100) for Time 1 and Time 2 regarding psychosocial work environment factors (*t*-tests)

Scales	Time 1 Mean	Time 1 Std	Time 2 Mean	Time 2 Std	*p*	Time 1 Cronbach's alpha	Time 2 Cronbach's alpha
Social community at work	84.5	14.3	73.4	19.8	*0.00*	0.81	0.80
Social support from superior	79.1	21.5	81.3	21.6	0.36	0.85	0.83
Social support from colleagues	84.1	16.0	80.9	20.1	0.11	0.80	0.85
Possibilities for development	78.7	16.4	73.6	20.4	*0.01*	0.78	0.85
Commitment to the workplace	71.6	18.1	69.0	21.1	0.23	0.70	0.84
Influence	54.2	15.6	50.2	16.0	*0.02*	0.73	0.73
Quantitative demands	47.0	18.7	47.5	18.8	0.79	0.79	0.72
Work–family conflict	39.1	23.4	43.4	27.1	0.13	0.88	0.91
Job satisfaction	68.8	16.6	61.6	19.2	*0.00*	0.79	0.74
Work engagement	73.0	16.8	70.1	18.1	0.14	0.87	0.86

Source: Authors' own creation

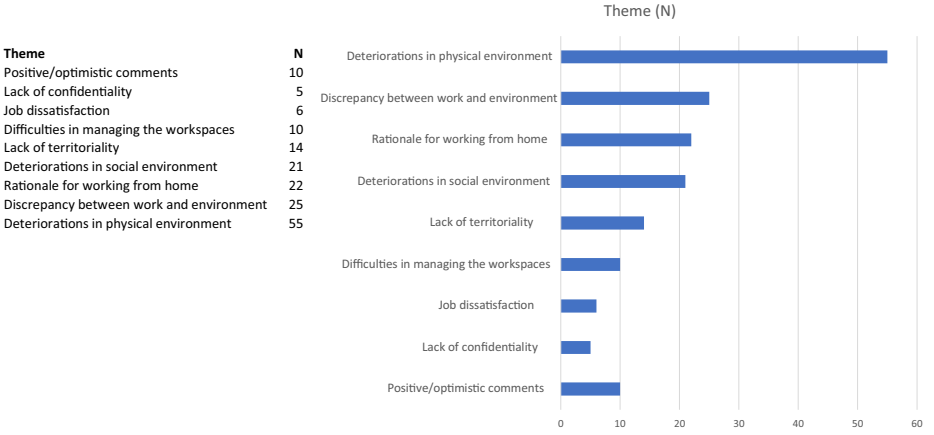

Figure 1. Main themes from the open-ended answers ($n = 169$) and their distribution

Source: Authors' own creation

Several remarks were related to disturbing and high noise levels caused by ventilation, making it especially difficult for those with a hearing impairment. The sound insulation between the rooms was also considered poor when recording tutorials, for example, or participating in video conferences. The noise level in the open spaces was experienced as exhausting, as sound traveled between the floors. In addition, the participants described the lunchroom as a noisy and draining environment:

> The campus does not provide the energy that I would like to have, and I am very tired after a day on campus. There are very many visual and sound impressions, that is, the environment does not contribute to calmness or creativity. The noise level is horrible some days. (Woman, Staff member)

Some participants pointed out a lack of so-called focus rooms that could be booked in advance. Others were concerned that there was insufficient space on the teaching premises, which was perceived as a major stress factor for both staff and students. The computer rooms were often crowded and considered nonfunctional from a teaching point of view. The proximity to students also deteriorated, as there was no longer a natural place to meet them:

> The premises have contributed to poorer contact, proximity, and service level in relation to the students. (Non-binary gender, Staff member)

Quite a lot of criticism focused on furnishings. The furniture was described as uncomfortable, with low sofas and chairs, and could not be adjusted to employees' individual needs.

> Several workplaces are completely insanely planned with stools that are not ergonomic, etc. (Woman, Faculty member)

Some comments related to the physical working environment were connected to academic identity, i.e. that there were no physical objects indicating what kind of work was being conducted in the building. Others missed having somewhere to store their books and materials.

3.2.2 Discrepancy between work and environment. Participants felt that AFO was not at all compatible with their work tasks in the university. The move to the new building resulted in time- and energy-consuming transitions or micro logistics, as expressed by the participants. The coatroom was in one place, personal closets were in a second place, and the workplaces were in a third place. As they did not have their own workplaces, it took longer to start the workday:

> I am sad not to have a permanent workplace where I can leave my books and papers and continue right from the beginning the next day. It takes about 10–15 minutes to start my workday: pick up work materials, find free space, find a chair I like and set it up, and get ready at my desk. (Woman, Faculty member)

> It feels unsustainable to move around to different places; it becomes inefficient with the time it takes to find somewhere to sit. Then, it takes time to get started again, and things must be constantly dragged around, and the feeling is that you are constantly disturbed and lose concentration. (Woman, Faculty member)

Further transitions may be needed during the workday, depending on the tasks at hand. The packing and repacking of things and searching for an available workplace several times during the day were described as stressful and even negatively impacting cognitive ability. One of the participants raised a question concerning the cost of all the time wasted in this way.

3.2.3 Rationale for working from home. The questionnaire results showing that participants were working from home to a greater extent were corroborated by the comments. Participants felt that they needed to work from home to perform within the expected timeframe. Working from home was described as more efficient, as it was easier to concentrate due to fewer disturbances:

> All work that requires concentration and focus is done from home nowadays. (Woman, Faculty member)

In addition, uncertainty about whether there would be a suitable place available at the campus led to choosing to work from home to a greater extent than before relocation.

3.2.4 Deterioration in the social environment. The social work environment became poor, partly because people were working from home to a greater extent, a feeling expressed by one of the participants as "no one is at work anymore!" However, even when they were on campus due to ABW, participants did not know where to find their colleagues. Thus, the opportunity to spontaneously discuss work-related issues with colleagues deteriorated:

> The campus is a sterile environment where there are no natural meeting places. On the new campus, all social groupings have been shattered. It is quiet and desolate. It also feels unnatural not to be "allowed" to talk to a colleague who happens to come by. (Woman, Faculty member)

There was a lack of contact, social interaction and cohesion ("we-feeling"), and the workplace was perceived as uninspiring and lonely. Feelings of loneliness could also be combined with feelings of being replaceable:

> The feeling of being alone and replaceable is paralyzing on campus. (Man, Faculty member)

3.2.5 Lack of territoriality. Territoriality contributes to psychological comfort, i.e. feelings of belonging and ownership, which is violated in ABW. Some participants found it very hard that they did not have their own workspace and that their department did not have a designated area:

> It's horrible not to have a place of your own and spatial belonging when you go to work. (Woman, Faculty member)

> I love my job, but I can't perform tasks satisfactorily on campus. I need a firm anchorage, that is, a desk, a bulletin board, and a chair that is designed according to my needs. I'm happy to share a room, but need a permanent workplace if it were just in a closet. (Woman, Faculty member)

It was also forbidden to decorate or otherwise make the workplace more personal; nothing was allowed to be put on the walls:

> I want a personal place that I can also personalize. Where I can have my things and my colleagues close and where we colleagues can find each other, and others can find us. (Woman, Faculty member)

3.2.6 Difficulties managing workspaces. To manage the workspace, several participants stated that they always booked a room when they were on campus so that they could work undisturbed. These so-called focus rooms seemed to be quickly booked, so there was a need for more rooms of this kind, as mentioned previously. On the other hand, quiet zones seemed to be underutilized:

> Focus rooms are quickly booked up full days, while the so-called quiet zones have many empty places. (Woman, Faculty member)

The rules concerning the different work zones were perceived as unclear, e.g. how much one was allowed to talk in a semiquiet zone and in a quiet zone. Furthermore, some people

always occupied the same place and seemed to find it difficult if somebody else had taken "their" place. There was also a tendency to occupy temporary meeting rooms for a whole day, making it difficult for others to make phone calls:

> Temporary meeting rooms are often taken, so you must stand in the hallway to take a phone call or even go to the bathroom to be able to talk undisturbed. (Woman, Staff member)

3.2.7 Reduced job satisfaction. The work environment was considered as deteriorated, which resulted in decreased job satisfaction. Participants expressed feelings of alienation and loneliness, as if they were guests at the workplace:

> It's not fun to go to work—my job satisfaction is gone. (Man, Faculty member)

Some maintain that they love and enjoy their work very much, but that the current premises have negatively affected their work.

3.2.8 Lack of confidentiality. The problem with confidentiality was raised by managers, researchers, and other staff members with specific assignments who continually needed to handle confidential conversations and material:

> As a manager, you handle confidential information about employees almost every day. Is there really any ethical way to do that, other than to constantly stay in a focus room? (Man, manager)

> How do I handle confidentiality and not accidentally show things I should not to others, for example, when I need to go for lunch and leave research material or examination paper corrections on the desk? (Woman, Faculty member)

3.2.9 Positive remarks. Some participants ($n = 6$) expressed that they really appreciated the new campus, they thought it was a nice social environment, had a nice atmosphere and good ateliers for design students, and contributed to improving collaboration with colleagues and the social work environment:

> For me, these are great facilities to work in. Several students say the same—that they are lifted by the design of the premises. (Woman, Faculty member)

> I feel that working in activity-based workplaces has improved collaboration with colleagues and the social work environment. You can see who is on site and have coffee together, both with the closest colleagues and with other professional categories. (Woman, Faculty member)

Others ($n = 4$) were more cautiously positive, while still finding it difficult to fully adapt to ABW.

Although an open environment was perceived as social, it did not automatically lead to more collaboration between colleagues:

> I appreciate the atmosphere and environment at the new campus, but have not found my way into activity-based working. (Woman, Manager)

> It is socially nice [in general] [...] But it does not mean that one starts collaborating with colleagues from other departments or academies at the coffee machine. (Woman, Faculty member)

The results of the closed-ended and open-ended questions are integrated and discussed in the next section.

4. Discussion

The overarching aim of the present study was to achieve a deeper understanding of the consequences for the work environment of implementing AFOs in academia. The first

survey was conducted in 2019 before relocation, and the second survey in 2022 after relocation from mainly own or shared offices with a few colleagues to AFOs in a new university building. The main findings from the analyses of both closed-ended and open-ended survey responses showed that employees started working more from home and that central parts of the physical and psychosocial work environment, as well as job satisfaction, decreased remarkably after the move to the new premises.

The shift toward working more from home after relocation to AFO was evident in both closed-ended and open-ended responses. This finding is in line with a previous study conducted in another Swedish University setting (Berthelsen *et al.*, 2018). The open answers in the current study revealed that working from home was perceived as offering better opportunities for efficiency in task performance compared to the AFO solution on the university premises. In relation to a general shift among office workers toward working more from home after the pandemic, Masoudinejad and Veitch (2022) similarly pointed out in their conclusion that people have realized that the home office may offer better opportunities, for example, for work that requires concentration. When designing office environments, it is crucial to pay great attention to work processes (Nooij *et al.*, 2023; Häne *et al.*, 2020). According to Häne *et al.* (2020), individual concentrated work is an essential part of academic work, which AFOs can sustain. However, our findings were in line with Engelen *et al.*'s (2019) systematic review, which suggested that AFOs are unfavorable for concentration and privacy. Our study showed that employees experienced problematic noise levels and many disturbances throughout the day in the new AFO environment. This compromised their chances of concentrating and being creative. In addition, the difficulties in finding an appropriate workspace – including packing and unpacking work items – were perceived as time-consuming and further limiting the opportunities for doing satisfactory work efficiently when working on the university premises.

Interaction with colleagues is an important aspect of work life, and a collaborative work climate is highly important for task performance in academia (Jensen *et al.*, 2021). However, our findings are in direct opposition to Häne *et al.*'s (2020) findings on increased staff interaction in AFOs in university settings and with the theoretical model by Wohlers and Hertel (2016), which emphasizes the benefits of open work environments in AFOs for fostering communication and collaboration. As staff moved to working more from home and being less present at the office, it seemed unavoidable that fewer social interactions would be a consequence. The effects of this were clearly reflected in a decrease in social community at work of a proportion that can be considered an important, recognizable change (Kristensen, 2010). In line with the statistical findings, in the open responses, the participants elaborated on how the "we-feeling" had disappeared, and even expressed feelings of loneliness and alienation when working on campus, further aggravated by a lack of suitable physical spaces for informal interaction. In addition, the statistical findings showed that the staff reported poorer possibilities for development after relocation. In this way, our findings indicated that the perceived incongruence between the physical work environment and the nature of the work might have led to a vicious circle, as the potential social benefits of interacting with colleagues were compromised; accordingly, working on campus was even less attractive. The importance of the work environment and management practices for academic productivity was highlighted in a recent review (Aboagye *et al.*, 2021). In the current study, the level of quantitative demands in the work was considerably higher both before and after the relocation compared to benchmarks for the Swedish labor market (Berthelsen *et al.*, 2020). This, combined with the perception of a less suitable work environment for daily tasks, feeling less of a work-related social community, a lower influence in daily work, fewer opportunities for development and lower job satisfaction,

probably increased the risk that the relocation came with a price in the form of negative effects for academic productivity. Being able to perform well at work is crucial for maintaining positive self-esteem to protect oneself against stress (Hobfoll *et al.*, 2018). This may explain the urge among staff to find a way to cope with the demands of being effective and doing a good job despite the undermined opportunities for socializing with colleagues, as our findings suggest.

With regard to the concrete findings of deterioration related to the physical and psychosocial work environment, there are many similarities but also differences in the findings across the present study and the previous study from another University in Sweden (Berthelsen *et al.*, 2018). In both studies, almost all aspects related to the physical work environment consistently showed a negative change from before to after relocation to the AFO environment. For example, in both studies, the staff perceived that the workplace design concerning seat comfort and work position had worsened. Further, they felt more bothered by being listened to/observed/general noise levels and experienced less opportunity to concentrate at work. In addition, the present study showed a negative development of perceived suitability of the workplace for everyday work tasks, such as confidential conversations, creative work, student counseling and other meetings. Regarding psychosocial work factors, a decline in the sense of taking part in a work-related community and in job satisfaction after relocation was seen in both studies, while factors such as social support from superiors, quantitative demands and work–family conflict were more stable. However, lower levels of influence and possibilities for development were found only in the present study, while a negative development in social support from colleagues and commitment to the workplace was seen only in the previous study (Berthelsen *et al.*, 2018). Our interpretation is that while quantitative demands and work–family conflict have only little to do with the change in office environment, relocation to AFO has a negative impact on the social community at work and the employees' satisfaction with their job. Finally, other negative changes in the psychosocial work environment may be more dependent on previous experiences, expectations and the implementation process.

4.1 Limitations and strengths

During the same period in which our study took place, the COVID-19 pandemic swept over the world; this added new challenges and possibilities to the development of new workplaces in academia (Wilkinson *et al.*, 2022). Thus, a relevant consideration is whether our main findings can be attributed to the change in the office environment or if they should rather be interpreted as a natural consequence of the pandemic (Appel-Meulenbroek *et al.*, 2022). In contrast to many other countries, Sweden handled the spread of the virus by using a "soft-touch strategy" that did not include restrictive lockdowns. The Swedish strategy was largely based on public health recommendations, such as voluntary working from home if possible and minimizing social contacts (Josefsson, 2021). While, for example, elementary schools were kept open, universities introduced wide use of digital learning methods, making it possible for staff and students to work from home to a greater extent. In line with these recommendations, more people worked from home during the pandemic in Sweden (Bohman *et al.*, 2021). It could be that, accelerated by the pandemic, it was more acceptable to work from home after the most critical COVID period. Still, our finding of employees working more from home after relocation to ABW is consistent with experiences from a corresponding relocation process at another university that took place before the pandemic (Berthelsen *et al.*, 2018). Moreover, the detailed reflections in the written comments corroborate our main findings as related to changes in the office environment.

The two-wave cross-sectional design is a limitation, as it does not allow us to draw causal conclusions. It is an advantage that the survey was mainly based on items from the internationally recognized COPSOQ instrument, which has been validated for use at workplaces as well as for research (see e.g. Berthelsen *et al.*, 2020; Burr *et al.*, 2019) in combination with items used in previous similar research projects. However, the questions concerning the extent to which the respondents felt bothered by noise, etc. (Berthelsen *et al.*, 2018; Bodin Danielsson, 2010), were formulated in a way that may induce an increased risk of negativity bias. Nevertheless, using these questions in their original form made it possible to compare with findings from previous research. The study design has some strengths. For example, including both quantitative data and rich data from open-ended responses is an advantage. Close-ended questions limit the respondent to the set of alternatives being offered, while open-ended questions allow the respondent to express an opinion without being influenced by the researcher (Foddy and Foddy, 1993, p. 127). The advantages of open-ended questions include the possibility of discovering the responses that individuals give spontaneously, thus avoiding the bias that may result from suggesting responses to individuals, a bias that may occur in the case of close-ended questions. In this way, triangulating two types of data reduces the risk of common method bias. Furthermore, this approach allowed us to follow the change from before and after with more detailed insights and explanations than if only one data source were included. This proved to be especially important considering the pandemic. However, integrating even other sources such as interview data or administrative data on staff turnover and sickness absence could have strengthened the confidence on the study results further.

4.2 Implications for practice

The findings of this study highlight the importance of an adaptation period after the new premises are taken into use. This is crucial for identifying needs for modifications and support to staff, for instance, in relation to noise level and implementation of new ways of working. Our study has important implications for decision-makers in relation to the planning of future office environments in academic settings. The discouraging findings of staff choosing to work more from home after the relocation demonstrate the crucial need to consult and collaborate with building stakeholders, namely, the staff, before implementing a trending design strategy to a major construction project. Therefore, the initial analysis of existing work processes, tasks, and ways of working needs to be done in close collaboration with different stakeholders to understand potential future implications from multiple perspectives, including aspects of the work environment, management and office design. It is important to address the needs of future stakeholders as well, so the environment can support them in performing their core tasks at work. Such an approach holds a potential to support staff well-being and productivity, and to impact construction costs dramatically for the better. We believe that while the concrete findings are case dependent, the implications for practice as outlined here are most likely directly transferable to other similar contexts.

5. Conclusion

We observed a decline in both the physical and social work environment aspects, as well as reduced job satisfaction following the relocation to new premises with AFOs. This study partially corroborates the findings of a previous similar study (Berthelsen *et al.*, 2018). In conclusion, our results raise questions about the suitability of AFOs in their current configuration for providing an optimal work environment for staff and their performance in academic settings.

References

Aboagye, E., Jensen, I., Bergström, G., Brämberg, E.B., Pico-Espinosa, O.J. and Björklund, C. (2021), "Investigating the association between publication performance and the work environment of university research academics: a systematic review", *Scientometrics*, Vol. 126 No. 4, pp. 3283-3301.

Appel-Meulenbroek, R. (2016), "Editorial: Modern offices and new ways of working studied in more detail", *Journal of Corporate Real Estate*, Vol. 18 No. 1, pp. 2-3.

Appel-Meulenbroek, R., Kemperman, A., van de Water, A., Weijs-Perrée, M. and Verhaegh, J. (2022), "How to attract employees back to the office? A stated choice study on hybrid working preferences", *Journal of Environmental Psychology*, Vol. 81, p. 101784.

Backhouse, S., Newton, C., Fisher, K., Cleveland, B. and Naccarella, L. (2019), "Rethink: Interdisciplinary evaluation of academic workspaces", *Revisiting the Role of Architecture for 'Surviving' Development, Proceedings of the 53rd International Conference of the Architectural Science Association*.

Baldry, C. and Barnes, A. (2012), "The open-plan academy: space, control and the undermining of professional identity", *Work, Employment and Society*, Vol. 26 No. 2, pp. 228-245.

Berthelsen, H., Muhonen, T. and Toivanen, S. (2018), "What happens to the physical and psychosocial work environment when activity-based offices are introduced into academia?", *J. Corp. Real Estate*, Vol. 20 No. 4, pp. 230-243.

Berthelsen, H., Westerlund, H., Bergström, G. and Burr, H. (2020), "Validation of the copenhagen psychosocial questionnaire version III and establishment of benchmarks for psychosocial risk management in Sweden", *International Journal of Environmental Research and Public Health*, Vol. 17 No. 9, p. 3179.

Bodin Danielsson, C. (2010), "The office – an explorative study architectural design's impact on health, job satisfaction and well-being", Stockholm, KTH, pp. 13-122.

Bohman, H., Ryan, J., Stjernborg, V. and Nilsson, D. (2021), "A study of changes in everyday mobility during the covid-19 pandemic: as perceived by people living in Malmö, Sweden", *Transport Policy*, Vol. 106, pp. 109-119.

Burr, H., Berthelsen, H., Moncada, S., Nübling, M., Dupret, E., Demiral, Y., Oudyk, J., Kristensen, T.S., Llorens, C. and Navarro, A. (2019), "The third version of the Copenhagen psychosocial questionnaire", *Safety and Health at Work*, Vol. 10 No. 4, pp. 482-503.

Engelen, L., Chau, J., Young, S., Mackey, M., Jeyapalan, D. and Bauman, A. (2019), "Is activity-based working impacting health, work performance and perceptions? A systematic review", *Building Research and Information*, Vol. 47 No. 4, pp. 468-479.

Foddy, W. and Foddy, W.H. (1993), *Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research*, Cambridge university press, Cambridge.

Gerdenitsch, C., Korunka, C. and Hertel, G. (2018), "Need–supply fit in an activity-based flexible office: a longitudinal study during relocation", *Environment and Behavior*, Vol. 50 No. 3, pp. 273-297.

Greene, J.C. (2007), *Mixed Methods in Social Inquiry*, John Wiley and Sons, New York, NY.

Haapakangas, A., Hallman, D.M. and Bergsten, E.L. (2022), "Office design and occupational health–has research been left behind?", *Scandinavian Journal of Work, Environment and Health*, Vol. 49 No. 1, pp. 1-4.

Häne, E., Monero Flores, V., Lange, S., Bébié Gut, P., Weber, C. and Windlinger Inversini, L. (2020), "Office workplaces in universities and hospitals: literature review", *Institute of Facility Management Working Paper, Department Life Sciences Und Facility Management*, Zurich University of Applied Sciences, Switzerland.

Hobfoll, S.E., Halbesleben, J., Neveu, J.-P. and Westman, M. (2018), "Conservation of resources in the organizational context: the reality of resources and their consequences", *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 5 No. 1, pp. 103-128.

Hopland, A.O. and Kvamsdal, S. (2020), "Academics' preferences for office spaces", *Facilities*, Vol. 39 Nos 5/6, pp. 350-365.

Jahncke, H. and Hallman, D.M. (2020), "Objective measures of cognitive performance in activity based workplaces and traditional office types", *Journal of Environmental Psychology*, Vol. 72, p. 101503.

Jemine, G., Pichault, F. and Dubois, C. (2022), "New ways of working in academia: maneuvering in and with ambiguity in workspace design processes", *M@n@gement*, Vol. 25 No. 4, pp. 16-30.

Jensen, I., Bjorklund, C., Hagberg, J., Aboagye, E. and Bodin, L. (2021), "An overlooked key to excellence in research: a longitudinal cohort study on the association between the psycho-social work environment and research performance", *Studies in Higher Education*, Vol. 46 No. 12, pp. 2610-2628.

Johnson, R.B. and Onwuegbuzie, A.J. (2004), "Mixed methods research: a research paradigm whose time has come", *Educational Researcher*, Vol. 33 No. 7, pp. 14-26.

Josefsson, K.W. (2021), "Perspectives of life in Sweden during the COVID-19 pandemic", *Journal of Clinical Sport Psychology*, Vol. 15 No. 1, pp. 80-86.

Kristensen, T.S. (2010), "A questionnaire is more than a questionnaire", *Scandinavian Journal of Public Health*, Vol. 38 No. 3_suppl, pp. 149-155.

Leech, N.L. and Onwuegbuzie, A.J. (2007), "An array of qualitative data analysis tools: a call for data analysis triangulation", *School Psychology Quarterly*, Vol. 22 No. 4, p. 557.

Leech, N.L. and Onwuegbuzie, A.J. (2009), "A typology of mixed methods research designs", *Quality and Quantity*, Vol. 43 No. 2, pp. 265-275.

Marzban, S., Candido, C., Mackey, M., Engelen, L., Zhang, F. and Tjondronegoro, D. (2022), "A review of research in activity-based working over the last ten years: lessons for the post-COVID workplace", *Journal of Facilities Management*, Vol. 21 No. 3.

Masoudinejad, S. and Veitch, J.A. (2022), "The effects of activity-based workplaces on contributors to organizational productivity: a systematic review", *Journal of Environmental Psychology*, Vol. 86, p. 101920.

Nooij, B., van Teunenbroek, C., Teelken, C. and Veenswijk, M. (2023), "Intended versus implemented workspace: a systematic literature review of the implementation of activity-based working in higher education", *Facilities*, Vol. 41 Nos 7/8.

O'Cathain, A. and Thomas, K.J. (2004), "'Any other comments?' open questions on questionnaires–a bane or a bonus to research?", *BMC Medical Research Methodology*, Vol. 4 No. 1, pp. 1-7.

Pejtersen, J.H., Bjorner, J.B. and Hasle, P. (2010), "Determining minimally important score differences in scales of the Copenhagen psychosocial questionnaire", *Scandinavian Journal of Public Health*, Vol. 38 No. 3_suppl, pp. 33-41.

Wilkinson, J., MacDonald, K., Diamond, F. and Sum, N. (2022), "How built spaces influence practices of educators' work: an examination through a practice lens", Taylor and Francis pp. 207-211.

Wohlers, C. and Hertel, G. (2016), "Choosing where to work at work – towards a theoretical model of benefits and risks of activity-based flexible offices", *Ergonomics*, Vol. 60 No. 4, pp. 1-20.

Corresponding author
Susanna Toivanen can be contacted at: susanna.toivanen@mdu.se