Short communication

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The relationship between office type and job satisfaction: Testing a multiple mediation model through ease of interaction and well-being

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Objectives This cross-sectional study investigated the associations between office type (cellular, shared-room, small open-plan, and medium-sized open-plan) and employees' ease of interaction with coworkers, subjective well-being, and job satisfaction.

Methods A brief survey including measures of office type, ease of interaction with coworkers, subjective well-being, and job satisfaction was sent electronically to 1500 Swedish real-estate agents, 271 of whom returned usable surveys. The data were analyzed using a regression-based serial multiple mediation model (PROCESS Model 6), which tested whether the relationship between office type and job satisfaction would be mediated by ease of interaction and, in turn, subjective well-being.

Results A negative relationship was found between the number of coworkers sharing an office and employees' job satisfaction. This association was serially mediated by ease of interaction with coworkers and subjective well-being, with employees working in small and medium-sized open-plan offices reporting lower levels of both these aspects than employees who work in either cellular or shared-room offices.

Conclusions Open-plan offices may have short-term financial benefits, but these benefits may be lower than the costs associated with decreased job satisfaction and well-being. Therefore, decision-makers should consider the impact of office type on employees rather than focusing solely on cost-effective office layout, flexibility, and productivity.

Key terms cellular office; open office; open-plan office; productivity; shared-room office; subjective well-being.

Numerous private and public organizations have already adopted the concept of open-plan offices and many other companies are currently considering a switch from traditional cellular offices to such open layouts (1–3). In the United States, for instance, approximately 70% of all offices are now open-plan (4), characterized by the absence of interior walls and private workspaces (5). Common arguments for investing in such open spaces are their claimed cost efficiency and flexible layout, assumed ability to facilitate interaction among employees, and, ultimately, presumed potential to improve work performance and productivity (6–8). The problem with these arguments is that most empirical findings do not support them. Extensive research shows that open-plan (versus cellular) offices are linked to decreased ease of interaction among coworkers, lower levels of job satisfaction, and reduced job performance and productivity (9–14). In addition, compared to cellular offices, such open-plan workspaces are linked to decreased well-being and other negative health-related outcomes, such as increased sickness absence, and higher levels of stress, distraction, and disturbance (15–20).

The office plays a major role in many people's lives, and a recent Gallup investigation estimated that distracted and disengaged employees cost companies approximately US$500 billion in lost productivity per

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year in the United States alone (21). Therefore, it is important to understand the effects of different office types on individuals' well-being and job satisfaction. Hence, the present study examined whether office type is associated with employees' ease of interaction with coworkers, as well as with their subjective well-being and job satisfaction.

Our main hypothesis was that there would be a negative relationship between the number of coworkers sharing an office and employees' job satisfaction, defined as the level of satisfaction experienced with one's job (5). We based this prediction on the fact that a large body of literature, including longitudinal studies and experimental research, has shown a negative relationship between open (versus cellular) offices and employees' job satisfaction (9–10, 12, 14–15). Indeed, a systematic review (12) of the effects that various office concepts have on workers' health and performance concluded that "there is *strong evidence* that working in open workplaces reduces job satisfaction" (p128).

Multiple studies, some comprising samples larger than 40 000 occupants, have also documented a negative association between open (versus cellular) offices and employees' ease of interaction with coworkers (5, 9–13), operationalized as the extent to which it is easy to communicate and collaborate at work (13, 15). Moreover, previous research has found a negative relationship between open (versus cellular) offices and various well-being-related outcomes, such as internal motivation to perform effectively at work and feelings of engagement, calmness, and harmony, with ease of interaction at work being conceptualized as an antecedent of such well-being-linked variables (5, 15, 17). Given these research findings, we further expected that the hypothesized association between the number of coworkers sharing an office and employees' job satisfaction would be serially mediated by a decreased ease of interaction with coworkers and, in turn, by lower levels of subjective well-being.

Method

A cross-sectional survey was sent out electronically to 1500 individuals working as real-estate agents throughout Sweden, distributed across three different real-estate agencies and 30 different offices during May 2017. In total, 305 agents replied to the survey, yielding a response rate of 20%, which is similar to the response rates obtained in other studies utilizing web-based surveys (22). Thirty-four surveys had missing values on the crucial item of how many other people (if any) the respondent shared an office with, resulting in a final sample of 271 participants [61% female; mean age 39.70, standard deviation (SD) 11.80 years].

Participants were informed that all responses were anonymous and that the data would be analyzed at an aggregate level, ensuring that it would impossible to identify individual responses or companies. They then replied to a set of items related to office type, subjective well-being, job satisfaction, and other study-specific variables. Participants were initially asked to indicate whether they shared an office with someone, and if so, how many people. We created groups based on the number of coworkers with whom the participants shared their office using a pre-defined categorization from Danielsson & Bodin (11, 15). Participants who worked alone in a room (N=76) were classified as belonging to a cellular office, while those who worked in a room with 1–2 colleagues (N=45) were classified as belonging to a shared-room office. Participants working in a room with 3–9 coworkers (N=113) were categorized as belonging to a small open-plan office, while the remaining participants, who worked in rooms with 10–20 coworkers (N=37), were categorized as belonging to a medium-sized open-plan office. Next, participants completed eight items from the Satisfaction with Travel Scale (STS) (23), which measures subjective well-being (for items, see supplementary material, www.sjweh.fi/show_abstract.php?abstract_id=3707). Items were rated on 9-point semantic differential scales (range -4–4), and were averaged to form a composite well-being index (α=0.90). Using the same 9-point response format, participants continued by replying to two items about ease of interaction at work: "I perceive the communication at my office as: very bad/very good;" and "The collaboration with my coworkers is: bad/good." Items were averaged to form a composite ease of interaction index (α=0.80). Lastly, participants indicated their job satisfaction on a single-item scale ("How satisfied are you with your job?") using the same response format (-4=very dissatisfied; 4=very satisfied). Single-item scales are reliable if, as in the present case, they represent clear and unambiguous constructs (24–25).

Results

We screened the data for outliers and excluded nine cases prior to analysis, using a cut-off of 3 SD from the mean on our key constructs. We then performed a serial multiple mediation analysis (PROCESS Model 6; 26) in which missing values were replaced by group means (27). Office type (cellular office, shared office, small open office, medium-sized open office) was the predictor, ease of interaction at work was the first mediator, subjective well-being was the second mediator, and job satisfaction was the outcome variable. We found that the total effect of office type on job satisfaction was

statistically significant (β=-0.15, T=-2.02, P=0.04), with employees experiencing lower job satisfaction as the office type become relatively more open (table 1). Office type also had significant negative effects on both ease of interaction at work (β=-0.27, T=-3.26, P=0.001) and subjective well-being (β=-0.19, T=-2.53, P=0.01). Furthermore, ease of interaction at work had a positive effect on subjective well-being (β=0.68, T=12.11, P<0.001), with the former variable also being positively associated with job satisfaction (β=0.27, T=4.60, P<0.001), just as subjective well-being was (β=0.24, T=4.52, P<0.001). Central to the current investigation, when job satisfaction was regressed on office type, ease of interaction at work, and subjective well-being, the effect of office type was clearly reduced and was no longer significant (β=0.01, T=0.19, P=0.85). Finally, this mediation effect was assessed using a bootstrap procedure with 5000 bootstrap samples. The results of a 95% confidence interval (CI) revealed that the indirect effect of office type through ease of interaction at work and, in turn, subjective well-being, was significantly different from zero (95% CI -0.09– -0.02, figure 1).

Table 1. Interaction at work, subjective wellbeing, and job satisfaction across office types. [SD=standard deviation.]

	Cellular	Shared	Small open	Medium-sized open
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Ease of interaction	2.62 (1.13)	2.53 (1.17)	2.12 (1.66)	1.80 (1.25)
Subjective well-being	1.99 (1.41)	1.83 (1.21)	1.36 (1.76)	0.78 (1.64)
Job satisfaction	3.15 (1.00)	3.16 (1.21)	2.82 (1.50)	2.78 (0.89)

Discussion

Several studies have demonstrated negative associations between open (versus cellular) offices and ease of interaction with coworkers, well-being-related outcomes, and job satisfaction (5, 9–15, 17). However, as far as we can ascertain, this is the first study to unite all these concepts in one testable model. Our results revealed that employees working in small or medium-sized open-plan offices consistently reported lower levels of job satisfaction, subjective well-being, and ease of interaction with coworkers than employees working in cellular or shared-room offices, with the association between office type and job satisfaction being serially mediated by ease of interaction and, in turn, subjective well-being. Companies may wish to consider these findings before switching to such open office layouts, since their purported financial savings may be substantially lower than the costs associated with decreased job satisfaction and well-being, as well as impaired job performance, increased sickness absence, and higher degrees of stress and distraction (9–20).

However, it should be the noted that the mean values for all constructs in the present study were consistently above the scale midpoint, regardless of office type, which means that employees generally gave positive ratings on job satisfaction as well as ease of interaction with colleagues and subjective well-being. Hence, the question may not be which office type produces satisfied and dissatisfied employees, but rather which office type produces more or less satisfied employees.

Limitations and future research

Because this is a cross-sectional study, it is not possible to infer causality. While we assume that office type has influenced ease of interaction, subjective well-being, and job satisfaction, we cannot rule out the possibility that these assumed consequences or other associated vari-

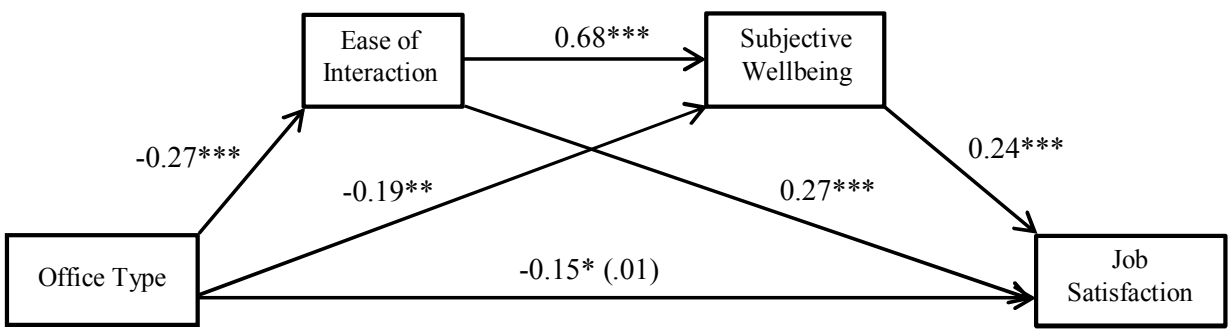

Figure 1. Serial multiple mediation model. ***P≤0.001; **P≤0.01; *P<0.05

ables may have contributed to the pre-selection of individuals into different office types. It is also possible that job satisfaction is a cause, rather than a consequence, of subjective well-being and ease of interaction. However, in light of existing theorizing and the fact that each of our hypothesized relationships has been shown in previous research (albeit not together in a single coherent study), we believe that the use of a multiple mediation model is reasonable.

The low response rate is another limitation of our study. However, because we are testing the model per se rather than trying to infer population values from sample data, we believe it is unlikely that the low response rate should invalidate our findings. Nevertheless, our results – based exclusively on self-report data and with a relatively low response rate – should be taken with caution, and we call for replications with improved research designs, such as cohort studies and studies utilizing cluster-randomized designs, to ascertain whether the direction of causation is as hypothesized.

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