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Indoor air problems and experiences of injustice in the workplace: a quantitative and a
qualitative study

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Abstract

This paper explores subjective injustice experiences of individuals suffering from suspected or observed indoor air problems in their workplaces in two studies. We focus on injustice experiences because they influence how individuals cope with and recover from health problems. The first study reports associations between the perceived harmfulness of the indoor environment (i.e., mould/inadequate ventilation) and subjective injustice experiences in workplaces in a representative sample of Finnish working-aged people (N = 4633). All together 37% of the respondents perceived their workplaces' indoor environments to be harmful. Multivariate logistic regression analyses revealed that the risks of reporting subjective injustice experiences (e.g., information, attitudes and remuneration) were significantly higher for those reporting harmful indoor environments compared to those who reported no such problems (OR 1.28–1.95 for different situations). The second study explored injustice experiences more closely by qualitatively analysing the content of 23 essays. These essays were written by people who suffered from suspected or observed indoor air problems in their workplaces. The respondents reported multidimensional experiences of injustice, which related to conflicts, and moral exclusions. Awareness of these psychosocial effects is important for the prevention of unnecessary escalation of psychosocial problems in workplaces with observed and suspected indoor air problems.

Keywords: indoor air quality; injustice; logistic regression; lived experience; occupational health; qualitative methods

Practical implications: The perception that a workplace's indoor air is harmful associates with injustice-experiences. Such injustice experiences are often multidimensional. Decision-making

and communication related to solving indoor air problems should be developed. More attention should be paid to people's social experience and meaning-making in such contexts.

Introduction

Indoor mould, dampness and chemicals pose serious risks to individuals' health and well-being in workplaces.^{1,2} For example, mould was the most important factor in suspected and diagnosed occupational asthma cases in Finland in 2013.³ Besides asthma, poor indoor air quality is associated with other respiratory and allergic effects, such as respiratory infections, bronchitis and allergic rhinitis.⁴

Despite this growing evidence, the effect of poor indoor air quality on health remains contested, especially with respect to non-specific symptoms (e.g., headaches, fatigue, skin and eye irritation);⁵ which are known to be associated not just with the indoor environment but with psychological and social factors, such as low social support and low control over work.⁶ This paper posits that the contested nature of these health effects may lead employees attributing such health problems to the built environment in an insecure position. This can make them prone to evaluating decisions, practices and treatment from the perspective of (in)justice.⁷ At the same time, these employees may also have a pronounced risk of being treated unfairly as previous research on medically unexplained symptoms has demonstrated.⁸ In other words, suspected or observed indoor air problems could be a risk factor for experience of injustice in the workplace.

This exploratory study focuses on employees' subjective injustice experiences in such contexts. Studying injustice experiences is important because experienced injustice can deeply influence individuals' well-being and behaviour. For example, previous research has shown that experienced injustice strengthens the association between pain severity and depressive symptoms

and increases the risk of non-return to work.⁹ Furthermore, such experiences influence employees' abilities to cope with and recover from various symptoms and injuries.¹⁰

The concept of 'injustice' is defined here as an individual experience that one is not treated fairly. The experience arises from the perception that specific justice rules have been violated (see Supplementary Material 3 for definitions).¹¹ Organizational justice research has found that people evaluate and experience four different types of (in)justice: distributive, procedural, interpersonal and informational (in)justice.¹² *Distributive (in)justice* refers to the perceived (un)fairness of outcome distribution (e.g., rewards and work duties).¹³ For example, people may perceive work distribution to be unfair if they perceive that the duties they receive are not in accordance with their performance. *Procedural (in)justice* refers to the perceived fairness of the decision-making process that leads to outcome distribution.¹⁴ Procedures are perceived to be fair when the decision-making process offers people control over decisions that concern them (e.g., the process allows one to voice their opinion) and leads to a legitimate decision (e.g., decision-making is based on accurate and exact information). *Interpersonal (in)justice* refers to the quality of interpersonal treatment (e.g., a person is treated with respect),¹² and *informational (in)justice* focuses on the adequacy of explanations and the truthfulness of information offered during the decision-making process (e.g., justifications for the decision are offered).¹²

We examine two studies that explore subjective experiences of injustice in the context of suspected and observed indoor air problems in Finland. The first study quantitatively investigates the association between the perceived harmfulness of the indoor environment and the subjective experiences of injustice in the workplace. The second study explores more closely the quality of injustice experiences and the meanings people (who attribute their health problems to their workplace's indoor environment) attach to their injustice experiences. In the occupational

medicine literature, qualitative methods have been highly recommended when a researcher is seeking to capture the meanings that people assign to their and others' actions and how they interpret and make sense of these meanings.^{15,16}

Given the prevalence of suspected and observed indoor air problems in workplaces,¹ this topic is highly important for various stakeholders, such as occupational health care professionals and other authorities, in order to prevent the accumulation of psychosocial problems in such contexts.¹⁷

Study 1

Materials and methods

Data and participants

The data was obtained from the Quality of Work Life Survey that Statistics Finland has conducted since 1977.^{18,19} The survey aims to provide information about the work lives of citizens for political decision-making purposes. This study uses the latest survey data collected in year 2013. The representative sample size was 7000 wage and salary earners. From this sample, 4876 individuals were interviewed face-to-face with a response rate of 69%.¹⁹ Respondents who reported that they were not currently working or had an unknown status (N=238) were excluded from the final analysis. Furthermore, five respondents who had missing values in all the outcome variables were deleted. The final data consisted of 4633 respondents.

Measures

Outcome variables

The respondents' *subjective injustice experiences* were measured by nine questions that asked whether the respondents had been subjected to unequal treatment or discrimination at their present workplaces within the last five years. This discrimination could have happened, for example, at the time of hiring or appointment, during remuneration or in gaining appreciation (see Table 1).¹⁹ The response scale is as follows: 0 = no and 1 = yes.

Predictor

Two questions measured the degree to which the respondents perceived their workplaces' indoor environments to be harmful (i.e., *IE-harm*). The first question asked whether there were adverse factors in the work environment. In order to keep the design simple enough, this study focuses only on two specific adverse factors: a) inadequate ventilation and b) mould in the work environment. The second question asked about the degree to which these adverse factors were strains which affected the respondent at work. The original scale in the questionnaire varied between 1 (very much) and 5 (not at all). The value 0 indicated that there was no such factor in the work environment. The items were recoded so that a value of 0 meant that there was neither inadequate ventilation nor mould in the work environment or neither of them was considered to be a strain (values 0 and 5 in the original scales). A value of 1 meant that only inadequate ventilation was perceived as a strain to some degree (values from 1 to 4 in the original scale). Respectively, a value of 2 meant that mould or both mould and inadequate ventilation were perceived to be a strain.

Background variables

The background variables included *gender* (0 = male, 1 = female), *age*, *ethnic background* (0 = one or both parents born in Finland, 1 = both parents born outside of Finland), *socioeconomic group* (0 = upper white-collar employee, 1 = lower white-collar employee, 2 = blue-collar worker) and *perceived health* (0 = good, 1 = fairly good, 2 = moderate to poor).

Furthermore, we controlled for the respondents' *satisfaction with the job's content*, which was measured by one item ('If you think about various aspects of your work, how satisfied are you with the following: Contents of your job tasks'; 1 = very satisfied to 5 = very dissatisfied). We also controlled for the respondents' *perceived control* over their job tasks using six items (e.g., 'Are you able to influence... a) the contents of tasks or b) the order in which you do your tasks?; 1 = a lot to 4 = not at all; see Sutela and Lehto, 2014.¹⁹ We calculated a mean rating for these six items. If the respondent answered less than four items, the score was not calculated. The Cronbach alpha was 0.81.

We also controlled for the type of *employment relationship* (0 = valid until further notice, 1 = fixed term), perceived *financial position of the workplace* (1 = completely stable and secure to 4 = very insecure) and the *number of organisational change in the workplace*. The latter was measured by five items that asked whether there had been or were going to be any major changes in the workplace (e.g., in upper management or ownership).¹⁸ The items were recoded so that a value of 0 indicated no change and a value of 1 indicated change. The recoded items were then summed and higher values were determined to indicate more change in the workplace. Finally, we controlled for the *size of the workplace* (0 = 1–9 employees, 1 = 10–49 employees, 2 = 50–249 employees and 3 = 250 or more employees).

Statistical analyses

First, we used a Chi-squared test to analyse the univariate associations between the predictor and the outcome variables. Then, separate multivariate logistic regression analyses were conducted to test whether perceiving a workplace's indoor environment as harmful was associated with injustice experiences in the nine different situations measured. The background variables and the predictor were included in all the estimated models. First, we tested the association between the IE-harm and subjective injustice experience in each of the nine situations using 'no harm' as a reference category (see Table 3a and Supplementary Material 1). Then, we tested the association between IE-harm and subjective injustice experience in each of the nine situations using 'harm only from ventilation' as a reference category (see Table 3b). In this way, we were able to test the significant differences between all the predictors' categories. We also reported the R squares of each model.²⁰ The analyses were conducted using Mplus statistical software 7.0 and the maximum likelihood estimation was used as an estimation method. The missing values varied between 0% and 1.3%.

Results

Table 1 presents the descriptive statistics of the variables. In total, 25 % of respondents reported that inadequate ventilation was a strain that affected their work. A further 11% of respondents reported that mould or both mould and inadequate ventilation had such an effect. The most common injustice was access to information and the least common injustice was during the time of hiring or appointment and in gaining fringe benefits. Table 2 presents a cross-tabulation of IE-harm and the subjective injustice experiences. All the associations were significant ($p < 0.001$).

Table 1. Descriptive statistics of the data (N = 4572–4633).

	N	% or mean (SD)
Outcome variables		
Subjective injustice experience		
Hiring or appointment (yes)	221	5
Remuneration (yes)	499	11
Gaining appreciation (yes)	646	14
Career advancement opportunities (yes)	353	8
Distribution of work or shifts (yes)	448	10
Access to training (yes)	361	8
Receiving information (yes)	774	17
Gaining employment fringe benefits (yes)	246	5
Attitudes of co-workers or superiors (yes)	728	16
Predictor		
IE-harm:		
No harm	2918	63
Harm only from ventilation	1176	25 ^e
Harm from mould	529	11 ^e
Background variables		
Gender (female)	2425	52
Age (years):		
17–24	251	5
25–34	896	19
35–44	1089	24
45–54	1350	29
55–65	1047	23
Ethnic background (both parents born outside Finland)	115	3
Socioeconomic group:		
Upper white-collar employees	1425	31
Lower white-collar employees	1863	41
Blue-collar workers	1316	29
Perceived health:		
Good	2580	56
Fairly good	1505	33
Moderate to poor	546	12
Satisfaction with the job's content ^a	4633	1.9 (0.8)
Perceived control over the job ^b	4627	2.5 (0.6)
Employment relationship (fixed term)	540	12
Perceived financial position of the workplace ^c	4572	2.1 (0.9)
Number of organizational changes in the workplace ^d	4623	1.9 (1.4)
Size of the workplace (employee)		
1–9	1173	25
10–49	1792	39
50–249	1044	23
> 249	606	13

^a Scale: 1 = very satisfied to 5 = very dissatisfied. Min–Max = 1–5.

^b Scale: 1 = a lot to 4 = not at all. Min–Max = 1–4.

^c Scale: 1 = completely stable and secure to 4 = very insecure. Min–Max = 1–4.

^d Min–Max = 0–5.

^e $25.4 + 11.4 = 36.8 \approx 37$, please see Abstract

Table 3A provides the results of the logistic regression analyses adjusted for background variables. The IE-reference category is ‘no harm’. The increased risk of reporting injustice

experiences varied between 53% and 95% for respondents who perceived that mould or both mould and inadequate ventilation were harmful for them. The odds ratios were statistically significant in all the injustice situations but the risk of reporting injustice was the highest in work and shift distribution, in co-workers' or superiors' attitudes and in receiving information. Furthermore, the increased risk of reporting injustice experiences varied between 28% and 50% for respondents who reported harm only from inadequate ventilation. The odds ratios were statistically significant in six injustice situations. We observed the highest increase in the odds ratio in the case of hiring and appointment.

Table 3B presents the results of models where the reference category in IE-harm was '*harm only from ventilation*'. After adjusting for the background variables, the increased risk of reporting injustice experiences varied between 43% and 67% for respondents who reported that mould or both mould and inadequate ventilation were harmful for them. The odds ratios were statistically significant in five of the nine injustice situations. We observed the highest increase of risk in the cases of access to training, gaining employment fringe benefits and in co-workers' and superiors' attitudes.

Study 2

Method and materials

Data and procedure

The research material was collected by a writing event organized by the Finnish Literature Society (SKS) and the first author. The SKS is a research institute and a national memory and cultural organization. It organizes nationwide writing events, where people are asked to write on a specific subject and to send their essays to the SKS. The SKS archives this material for future generations. Given that indoor air problems can be a sensitive issue, we used such a method in order to recruit also those respondents who would not otherwise sign up or did not want to talk about their experiences. This method of data gathering also allowed us to acquire a geographical distribution of respondents that would not otherwise be possible. Qualitative health researchers have previously used written material.^{21,22}

Our writing event was advertised by non-profit public health organizations, magazines and online (e.g., news of Yleisradio; it is a Finnish broadcasting company). People were asked to read an announcement on the SKS's webpage, to write about their experiences relating to indoor air problems and then to send their essays to the SKS. The announcement on the SKS's webpage introduced to respondents questions they could answer in their essay (e.g., How do indoor air problems relate to your life?; When did the problems begin and what were they related to?; see the announcement in Supplementary material 2). The respondents could save their essays on SKS's webpage anonymously or complete a form to include their name, address, gender, and age. Optionally, they could send their essays by post. The writing event ran from January to November 2014, and 62 people participated. Two books were raffled among the respondents. All

respondents were made aware that their essays would be used as research material. An Official of Ethics Committee of the Tampere region has approved this study.

Participants

The analysis is delimited only to those participants whose essays focus on employees' experiences of their workplace's observed or suspected indoor air problems. This sample comprised 23 adults (21 female and 2 male). Participants ranged from thirty to 73 years old, with average age of 53 years, among those who reported their age. Only 11 (48%) respondents reported their age. Based on respondents' reports: 2 respondents received old-age pensions, 2 received workers' compensation pensions, 1 received a disability pension, 4 were unemployed or on job alternation leave and 10 were at work. The status of four respondents was unknown. All respondents attributed their symptoms or illnesses, such as asthma and other respiratory illnesses and symptoms, skin and eye irritation, nausea, rheumatic, chronic fatigue, headaches, multiple chemical sensitivity, or infections to their previous or present workplace. Seven of the respondents reported asthma diagnoses and 3 occupational asthma diagnoses. A total of 16 respondents reported that their symptoms or illnesses were chronic. Five respondents reported that their symptoms or illnesses had disappeared after changing the work environment. Two of these five respondents were, however, afraid of the renewal of health problems if they were to have to change their workplace or residence again. The length of these essays in the data set vary from 179 to 9,440 words. All the essays are in Finnish.

Analytical strategy

We examined injustice-related experiences in two steps. First, we analysed what kinds of direct justice rule violations (i.e., third-party experiences excluded) respondents reported. This allowed us to carefully recognize all the depictions of injustice from the large body of textual material. Summative content analysis is an especially suitable method for this purpose because it explores the use of words and content.^{23,24} The method starts by carefully searching for the occurrence of certain words or contents manually or by computer, after which the identified units are counted. By carefully following the theoretical definitions of justice rules (for a review Scott et al., 2009¹¹; see Supplementary material 3, Table J), both authors manually and independently coded all the direct justice rule violations depicted in the textual material and then copied the chosen accounts to Excel. The analytical unit was a clause, a sentence, or a few sentences depending on the length of the description. The same sentence could contain more than one direct justice rule violation. We compared the coding results of the two authors, and resolved disagreements by discussing and consulting existing literature. The analysis yielded 140 accounts in total.

In the second step, we used thematic analyses to study how our respondents experienced these justice rule violations and what kinds of meaning they related to these experiences. Thematic analysis is used to analyse and to interpret patterned meanings – themes.²⁵ Thematic analysis has five phases: familiarizing oneself with and coding the data, searching for themes, reviewing themes and defining and naming themes.²⁵ Our thematic analysis was an organic process, which started by analysing our coded accounts in their wider textual context and by searching for candidate themes. In the beginning of the analysis our candidate themes were detailed descriptions of the content but when the analysis progressed more integrative themes

emerged. After that themes were reviewed and final themes were named. This phase was conducted by both authors working in close co-operation.

Results

We found reported justice rule violations in all four justice dimensions: distributive, procedural, interpersonal, and informational. Justice rules were violated by peers, supervisors, upper management and organizations in general, occupational health personnel and other doctors, insurance companies, public authorities, and people and organizations responsible for the construction and maintenance of buildings with indoor air problems. Reported distributive and procedural justice rule violations related to both material and social issues, such as distribution of work shifts, termination of employment, and withholding of social benefits. The reported interpersonal justice rule violations included disrespectful treatment and lack of appreciation. The informational justice rule violations included difficulties in receiving information. The frequencies of the reported justice rule violations are reported in the Supplementary Material 4, Table K.

The found themes are explained in detail below. We named them as follows: being blamed, being excluded and being objectified. Although we present these themes separately, they are closely interrelated.

Theme 1: Being blamed

Open conflict between the respondents and authorities is a central theme in the accounts. In many cases, the roots of the conflict related to contradictory understandings of whether the respondent's symptoms were caused by external, building-related factors or internal factors, such as stress, mental health problems, or psychosomatic illnesses. This discrepancy between the respondents' illness attributions and those offered by their employers, supervisors, or occupational health personnel framed many of the reported justice rule violations. Firstly, there was disagreement over who should take responsibility for action and how the expenses should be shared: *"Altogether, my illnesses came to cost several hundred, maybe a total of about €1,000 for medicines. Outrageous that the employee was left to pay for everything"*. Secondly, many respondents perceived that those who were responsible for the physical environment of the workplace were remiss in their duties and did not assume this responsibility: *"All those responsible got away scot-free with their management of mould-related matters"*. Finally, they perceived that organizational authorities and co-workers wrongly blamed them for the difficult situations at work: *"I was blamed, I was intimidated and I did not receive compassion"*. If blaming was specified, respondents reported being accused of taking too many absences, which increased the work load of the other employees, of getting ill, and of demanding (unnecessary) inspections of or repairs to the building. Below, one respondent depicts her experiences of injustice in her previous workplace.

At first, I was a favoured and valued employee, but when I was constantly ill the blaming began and I became a burden to the rest of the working community. This was difficult to accept, because I felt totally innocent regarding the situation. I was not given a healthy

working environment, and when I became ill, there was no support available. [...] Everyone shrugged their shoulders and no one took responsibility for the working environment having made me sick. It was a shock to realize how alone I was with this, and that no one was interested.

In the extract above, the respondent depicts the blaming she experienced because of her many sick days. Given that she perceived her employer to be responsible for her illness, she found this criticism undeserved. She found it equally unfair that she did not receive any support from the authorities' side. After working for three months in this office, the respondent changed her job and recovered. However, not all the respondents found this to be an option. Most of them stayed in their workplaces. This usually led to more severe health problems and increasing appraisals of unfair treatment and conflicts. Below one respondent explains an episode in a meeting where her ability to work was evaluated by a supervisor and occupational health personnel. Although she suffered from serious health problems in her workplace, she did not want to leave it. Instead she tried to force the authorities to more carefully inspect and repair the building where she worked. In addition, she requested more flexible work arrangements.

This discussion about my ability to work was not a pleasant occasion for me; I did not feel as though I had been heard, but it was clear that everyone thought I was responsible for the situation at the library.

Also this respondent perceived that others considered her to be responsible for the situation in the workplace. She reports elsewhere that she was blamed not only for her ill health and her absences but also for her continuous insistence for the building to be more carefully inspected. From the employer's perspective, the causes of respondent's symptoms were not evident and the

essential inspections were already done. From the respondent's perspective, her claims were legitimate, because she attributed her symptoms to the building and felt that the inspections were insufficient and carried out negligently. Thus, she perceived her treatment as unfair: "*I did not feel as though I had been heard*".

Nevertheless, it is important to underline that although accounts of confrontation between the respondents and the authorities were common, the picture was often more complex. Many respondents shared an experience that their external illness attributions (i.e., that their symptoms were building-related) were validated by some authorities and invalidated by others.

The occupational health doctor has written a report that finds that I fell ill at the workplace. Five lung specialists agree. The [name of insurance company] denies everything. So, I am left without justice.

This respondent reports that she had asthma, which she attributed to her workplace. Several doctors legitimized this interpretation, but the state insurance institution did not consider her asthma an occupational disease. From her perspective, these inconsistent decisions created a feeling of distributive injustice and, like many other respondents, made her question the fairness of the whole decision-making process.

Theme 2: Being excluded

Experiences of moral exclusion were common. These experiences varied from accounts of disrespectful and dismissive treatment by authorities to broader forms of derogation and downplaying where their moral worth as an individual and as a worker was questioned. Many

respondents reported that supervisors or occupational health care personnel became either aggressive or indifferent when the respondents reported their bodily symptoms or observations related to the building “... *the doctor got angry when I said that I am not the only one who is vomiting*” or “*Indeed, I did not receive support. Instead the supervisor got mad and said that he/she does not want to discuss the matter*”. Below, one respondent with an occupational asthma diagnosis depicts how she experienced such justice rule violations.

My knowledge and experience were constantly nullified. Mentally, I found all the opposition really hard. I often cried at home. When I was tired in the evening, I was easily reminded of what I had again heard. I realized that my actual illness was not taken seriously, but in the workplace they tried to make me mentally ill.

It seems that not being taken seriously and treated with respect and instead being stigmatized and left outside the moral sphere of help and care came as a shock to many respondents. This was considered humiliating and insulting. Furthermore, some respondents reported how their access to information concerning microbial findings or the reparation process was denied, colleagues were not allowed to speak to them, or they even lost their work as reported below. It is noteworthy that such experiences were common among respondents regardless of whether the causes of their symptoms or illness were confirmed by external authorities such as occupational health care personnel.

The workplace manager could not tolerate an employee infected by their microbes. [S]He¹ immediately began to do away with my job. As a strong person, [s]he knew that [s]he would get what [s]he wanted.

That's how it came about that I no longer had a job. I was sick a lot.

My colleagues were ordered not to contact me.

¹ As the Finnish language has gender-neutral pronouns, the manager could have been either a man or a woman.

The unfair treatment did not only question the respondent's moral worthiness as an individual (e.g., ability to accurately evaluate own sensations and health) but also her worthiness as a good employee. Below another respondent reports how she was treated after working for thirty years with the same employer. She perceived that she had been a good employee: "*I had gained appreciation from both senior management and all my colleagues*". Later, as she reports, she received a diagnosis of occupational asthma. Just before retirement, she received a phone call, the content of which she explains below.

That is why it grated somewhat when I completed thirty years at work in [year] and would have been entitled to a medal, but then [name of company] a wages clerk called me. This person claimed I had not earned the medal in question, because I had been sick so much in the last year and a half.

The respondent felt that she had been a good employee and deserved recognition. According to the respondent, the wages clerk perceived the situation differently, and so the respondents did not receive her prize. From her perspective this was unfair because she had become ill because of her workplace. It seems that respondents experienced the discrepancy between their perception of themselves as a good employee who got ill due to their work environment, and the disrespect they were treated with by the employer after this happened, as particularly unfair.

The hardest part was to accept the serious underestimation of the matter, contempt and nullification I received from my supervisor and senior management because I knew and felt that I have been a hard-working, conscientious and motivated worker, as I have also been told before.

Theme 3: Being objectified

The third theme relates to the experience of being objectified, in this case, being treated in a dehumanizing way. One form of objectification reported by respondents relates to the experience that the respondent's body was perceived by others as the source of the problems and - instead of the building - it was carefully examined: "*I have been examined enough. Would it finally be time to investigate the sick library building?*" Indeed, it seems that some respondents felt that the indoor air problems culminated in their malfunctioning bodies. They appeared as problematic spaces in which indoor air-related difficulties were investigated, solved, or denied.

The experience of being treated as a problematic object, whose dignity and well-being as a human no one really cared about, becomes apparent also in some accounts of medical diagnostic processes and accommodation practices. In these accounts an inconsistency between the goal and the end result of practices emerges. For example, a respondent reports how "*during my sick leaves all things and office chairs, among others, from my room were moved to another place, but none of it was cleaned*". Thus although the

respondent received a new room, all her contaminated furniture and equipment were moved with her. The same experience was shared by some other respondents too.

Although the aim of these medical examinations and accommodation practices was to help and protect the respondents and to ensure their legal rights, respondents sometimes even felt that they were harmful and made them sicker. For example, a teacher who suffered from asthma and could not work in her school was asked to work in another school that also appeared to have serious indoor air problems: *“I stayed in the school one hour. When I went out the coughing eased but I still felt vaguely bad. Next morning I woke up sick”*. Below, another respondent, a nurse, depicts her experience. She had worked in a hospital ward with dampness and she had serious asthma there.

In December, a senior nurse called and asked me to attend a test of my ability to work. I said I had been told that [...] there were no clean wards in the hospital. The senior nurse assured me that no one had symptoms in this ward, and that there was no mould there [...]. When I reported in the morning, one talkative nurse laughed out loud: “Oh, it's nice to have you here. Now we have a living indicator. If you become ill, we'll know there is mould here too.” “The living indicator” proved the presence of mould, by visiting the area and getting sick.

The respondent worked for five days in this hospital ward and then she had to take sick leave once again. Instead of being protected and treated with respect, she felt that she was given wrong information and treated as an object; her bodily reactions informed others whether the building should be inspected and repaired. The fact that she was working in a potentially harmful environment and this might be harmful to her was not an issue for others.

Discussion

Our exploratory study analysed subjective injustice experiences at workplaces with observed or suspected indoor air problems. In the quantitative study, we found that experiencing the workplace's indoor environment as harmful was associated with subjective injustice experiences in various situations in the workplace. Furthermore, we found that this risk was higher among respondents who reported harm from mould compared to those who reported harm only from ventilation. The difference was significant in five of the nine injustice-related situations. Attitudes of colleagues and the fair distribution of work or shifts were perceived to be the most problematic among respondents who reported harm from mould. Respectively, fair hiring or appointment and gaining appreciation were perceived to be the most problematic among respondents who reported harm only from ventilation.

Many of the situations measured in the quantitative study also appeared in the essays that were analysed in the qualitative study, such as gaining appreciation, negative attitudes of colleagues, problems with receiving information and unfair distribution of shifts. Furthermore, respondents also reported injustice experiences that were not covered by the quantitative study, such as access to social benefits. This shows that a workplace's observed or suspected indoor air problems may affect various areas of life outside of the workplace. Indeed, the major factor behind injustice experiences in the accounts was the discrepancy between illness attributions, which, in turn, was closely related to the question of responsibility. Disagreements over responsibility easily turn into anger and blaming,²⁶ which was also evident in the accounts. In conflicts, individuals are at a risk of being morally excluded and objectified, which further legitimises rule violations.²⁷ Accounts of moral exclusion, such as disrespectful and dismissive treatment, were common among our respondents.

Our study proposes two important tasks for future research. The *first* is to examine whether respondents' injustice experiences reflect the actual discriminative and unfair treatment in their workplaces or their increased sensitivity to perceive such treatment. It is likely that these experiences reflect both factors. As our qualitative analysis showed, the respondents reported various reasons to feel insecure. An insecure position make individuals prone to evaluate decisions, practices and treatment from the perspective of (in)justice.⁷ At the same time, these employees seem to have a pronounced risk of being treated unfairly. The fact that the body and the building were inextricably linked in the lived experiences of our respondents made their situations special and potentially difficult to understand by others. This might expose them to unfair treatment. Their illness-experiences and their requirements to heal also seem to differ from many other forms of suffering. For example, many of our respondents actively demanded that the building be 'diagnosed'. However, these demands are likely to cause conflicts if others perceive that this is unnecessary. These demands also force others (especially authorities) to take sides in the problem, which may threaten workplace harmony and lead also to unfair treatment. The *second* related task for future research is to investigate why, in the quantitative study, the respondents, who reported mould in their workplaces, were more vulnerable to injustice experiences than those who reported problems only with inadequate ventilation. One possible explanation is the contested nature of the health effects associated with indoor moulds,²⁸ as well as the fear and trouble that such problems might induce.

From a practical point of view, experiences of injustice may produce a vicious cycle that traumatises individuals, prevents sufferers from seeking help and aggravates health problems due to the stress and psychological strain these experiences may evoke. This can lead to more serious health effects and an increase in the risk of labour market exclusion.^{9,10} Breaking this vicious cycle is a challenge for those who are tasked with solving suspected

or observed indoor air problems. Our data suggests that interpersonal conflicts should be prevented, as explained above, and inconsistencies in decisions and procedures should be avoided. As our analysis in Study 2 showed, many respondents experienced their situation as confusing due to inconsistent procedures and the decisions they had to face. For example, respondents reported that their illness attributions were validated by some health authorities and invalidated by others. Careful planning of conduct and decision-making processes, which take into account that people who feel threatened are especially prone to injustice experiences, is essential. A respectful, honest and open communication plays a central role during the inspection and building remediation process. In Study 1 the risk of experiencing injustice in receiving information was especially heightened among the respondents who reported harm from mould. Such experiences were also reported in Study 2. Training authorities in empathy when dealing with indoor air problems is also essential, as empathy is the key to overcoming dehumanisation.²⁹ Such training should also be targeted at authorities who are responsible for construction and maintenance of buildings.

This research has some limitations. The results of the quantitative study can be generalised to the Finnish working-aged population, but because the data was cross-sectional, we are unable to make statements about causality. Using also qualitative methods, we managed to go deeper into the injustice experiences than would have been possible with just a quantitative study. Given that suffering from building-related illness is a sensitive issue, our data collection method in the qualitative study can be considered appropriate. However, textual material has its limitations because our respondents were aware that their essays would be archived for future generations, which might have affected their content. Another limitation is that these respondents were mostly women in Study 2. The gender distribution may reflect the finding that women are more sensitive

to environmental exposures than men.³⁰ . For example Caress and Steinemann³¹ report that women are more prone to suffer from multiple chemical sensitivity than men (72 % for women and 28 % for men). Thus, further research is needed with other kinds of samples and both qualitative and quantitative methods should be used. Qualitative methods are needed because they allow to better understand people's social experience and meaning-making related to indoor air problems than quantitative methods do.

To conclude, our study offers original insights into the kinds of injustice that are experienced by employees who perceive their indoor work environments to be harmful. It also points to the importance of establishing practices that are transparent and experienced as legitimate, as well as the avoidance of conflicts between parties when trying to solve suspected or observed indoor air problems at work.

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Table 2

Table 2. Cross tabulation of subjective injustice experiences with IE-harm. All the association are significant at $p < 0.001$ (χ^2).

	Hiring or appointment		Remuneration		Gaining appreciation		Career advancement opportunities		Distribution of work or shifts		Access to training		Receiving information		Gaining employment fringe benefits		Attitudes of co-workers or superiors		Total (%)
	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	
No harm	2808 (96)	109 (4)	2631 (91)	265 (9)	2578 (89)	331 (11)	2723 (94)	185 (6)	2701 (93)	215 (7)	2720 (93)	196 (7)	2518 (86)	395 (14)	2779 (95)	133 (5)	2546 (87)	366 (13)	(100)
Harm only from ventilation	1101 (94)	74 (6)	1013 (87)	153 (13)	967 (82)	207 (18)	1065 (91)	107 (9)	1033 (88)	143 (12)	1078 (92)	95 (8)	936 (80)	240 (20)	1113 (95)	63 (5)	949 (81)	224 (19)	(100)
Harm from mould	493 (93)	36 (7)	448 (85)	80 (15)	422 (80)	105 (20)	468 (89)	59 (11)	442 (84)	87 (16)	461 (87)	68 (13)	393 (74)	136 (26)	479 (91)	49 (9)	393 (74)	136 (26)	(100)

Table 3

Table 3. Associations between subjective injustice experiences and IE-harm after background variables are inserted into the models (N = 4472 – 4499).

	Hiring or appointment	Remuneration	Gaining appreciation	Career advancement opportunities	Distribution of work or shifts	Access to training	Receiving information	Gaining employment fringe benefits	Attitudes of co-workers or superiors
Table 3A: Models 1a-9a ^{b c}	OR(CI 95%) ^a	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)	OR(CI 95%)
No harm	1	1	1	1	1	1	1	1	1
Harm only from ventilation	1.47 (1.07–2.01)*	1.28 (1.03–1.60)*	1.32 (1.09–1.62)**	1.26 (0.97–1.63)	1.35 (1.07–1.71)*	0.95 (0.73–1.24)	1.33 (1.11–1.61)**	1.03 (0.75–1.41)	1.28 (1.06–1.56)*
Harm from mould	1.62 (1.08–2.42)*	1.53 (1.15–2.03)**	1.53 (1.18–1.98)**	1.55 (1.11–2.16)**	1.93 (1.45–2.57)***	1.59 (1.16–2.17)**	1.77 (1.40–2.24)***	1.65 (1.15–2.37)**	1.95 (1.53–2.47)***
Table 3B: Models 1b-9b ^{b d}									
No harm	0.68 (0.50–0.93)*	0.78 (0.63–0.97)*	0.76 (0.62–0.92)**	0.80 (0.61–1.03)	0.74 (0.59–0.94)*	1.05 (0.80–1.38)	0.75 (0.62–0.90)**	0.98 (0.71–1.34)	0.78 (0.64–0.95)*
Harm only from ventilation	1	1	1	1	1	1	1	1	1
Harm from mould	1.10 (0.72–1.68)	1.19 (0.88–1.62)	1.15 (0.88–1.52)	1.24 (0.87–1.76)	1.43 (1.05–1.94)*	1.67 (1.18–2.36)**	1.33 (1.03–1.71)*	1.61 (1.08–2.41)*	1.52 (1.17–1.97)**
R ² ^e	0.14	0.10	0.13	0.13	0.16	0.16	0.11	0.12	0.13

* $p < 0.05$, ** $p < 0.01$, ***, $p < 0.001$.

^a Odds ratio (confidence interval 95%)

^b Results from logistic regression analysis adjusted for: age, gender, ethnic background, SES, perceived health, satisfaction with the job's content, perceived control over the job, employment relationship, perceived financial position of the workplace, number of organizational changes and size of the workplace. **The full Models 1a–9a are presented in Supplementary Material 1 and Tables A–I.**

^c Reference category: 'No harm'

^d Reference category: 'Harm only from ventilation'

^e R² is the same for both models (e.g., 1a and 1b).