



KEY POINT SUMMARY

OBJECTIVES

To investigate potential building-related risk factors, or building characteristics, that contribute to symptoms of headache or dry eyes among outpatient healthcare workers within healthcare environments.

Building characteristics associated with self-reported dry eyes and headaches of outpatient workers in hospital buildings

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Key Concepts/Context

Previous studies have examined how specific building characteristics contribute to instances of dry eyes and headaches among office workers; however, this has yet to be explored within healthcare environments. The results of this study found that room types, indoor air quality, and visual quality all influenced rates of dry eyes and headaches in healthcare workers. More specifically, an association was found between frequently used room types and the presence of a window facing the corridor.

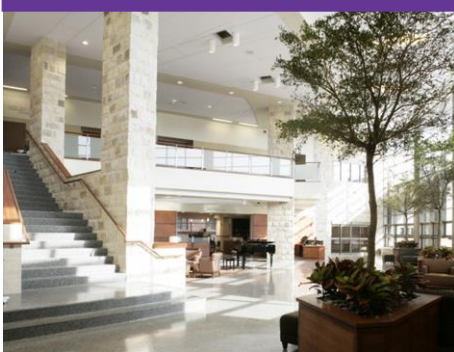
Methods

A survey based on OFFICAIR, which was developed through previous research to learn more about building-related symptoms in European offices, was conducted in six separate hospital buildings. The authors developed new questions tailored towards outpatient healthcare workers within the hospital environment. The questionnaire asked outpatient healthcare worker respondents such questions as:

- In which location do you mostly work?
- In which department do you work?
- What room type is used most frequently in your work/department?
- Is there a window that faces the façade and/or corridor?

Demographic information and psychological aspects related to health, comfort, and building-related symptoms were also gathered.

The authors also developed adapted building and room checklists based on OFFICAIR which allowed them to check for specific features while observing different building sites. Checklist items included: potential outdoor pollution sources, façade characteristics, maintenance and characteristics of HVAC units, room characteristics (e.g., lighting direction, temperature control, finishing material,



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windowsill height), layout characteristics (e.g., size of open areas, dimensions of building wings), and the frequency of cleanings for amenities and surfaces.

The survey was administered digitally to a total of 556 outpatient workers. Within the six hospital buildings, the authors observed both the locations themselves as well as daily operations, inspecting a total of 127 outpatient rooms in the process. Once all data were gathered, multivariate logistic regression and univariate analysis were used to assess the risk of having dry eyes and/or headaches related to building-related features.

Findings

Statistical analysis of survey results found that no building-related aspects were strictly associated with only headaches among outpatient care staff. Building-related aspects associated with dry eyes and headaches included work in offices instead of consultation rooms, as well as the absence of windows facing the corridor and façade. Instances of dry eyes were also associated with how frequently ventilation grilles were cleaned, as well as working in a treatment room versus an office. These findings support the idea that building-related variables are risk factors in perpetuating headache and dry eye symptoms within outpatient areas in hospitals.

Dry eyes were also associated with the presence of rotating heat exchangers, which could be explained by additional exposure to airborne pollutants. Dry eyes and headaches were negatively associated with the presence of a façade window. The authors note that this is likely due to the fact that this window could offer control over the fresh air supply and the removal of potential indoor air contaminants, while also providing access to natural daylighting. By this same logic it follows that the positive association between headaches and dry eyes with windowless rooms likely derives from a lack of natural lighting and an oversaturation of artificial lighting illuminance.

Overall, the results of this study found a strong association between the occurrence of dry eyes and headaches with room types. Additionally, these symptoms were correlated with windows that faced corridors.

Limitations

The authors note that a relatively small number of buildings were included in the study, which may have affected the variance in building-related aspects. The specific rooms on which the participants reported their comfort levels were not identified due to practical and privacy reasons. This may have caused discrepancies between building aspects identified during inspection when compared to the exact locations that healthcare workers may have had in mind. There was an unequal distribution in gender among survey respondents; the authors note that caution is



needed before generalizing these results to account for an entire outpatient care team.

Design Implications

The results from this study suggest that access to natural lighting and fresh air through windows could help offset symptoms of headaches and dry eyes in outpatient healthcare workers; conversely, windows that face interior corridors, as well as specific room types that are illuminated with artificial light, may contribute to increased instances of headaches and dry eyes.

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