Personal lighting conditions in relation to occupational health

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Background
Numerous studies investigated the effect of office lighting on occupational health. Based on a literature study [1], a theoretical framework was proposed demonstrating the indicated correlations between an office lighting parameter and a health indicator used to assess occupational health (see Figure 1).

Since it is known that light effects our non-image-forming system (e.g. alertness) when light is being captured by the ipRGcs on the retina, it is essential to know how much and what type of light enters the eyes.

Researchers investigating the health effects of office lighting often use average lighting conditions inside an office environment for the effect analyses. However, the employees’ health is individual and we expect that we can support their health better if we measure lighting conditions individually. There are multiple methods to measure personal lighting conditions, for example via:

1. person-bound portable measurement devices (Lightlogs [2], see Figure 2),
2. location-bound measurements (according to the non-obtrusive practical method described in [3]), and
3. simulations and location-tracking.

Methodology
In May 2017, the first and second method were applied in order to compare these different measurement methodologies. The person-bound wearables were worn by 69 office workers whereas the location-bound measurements were performed for two weeks with a sample period of 10 seconds in the first week and 1 minute in the second week. The location-bound measurements were performed at five reference locations throughout the office building.

In addition to these lighting measurements, questionnaires regarding health and satisfaction were distributed four times a day. The questionnaires consisted of the general health questionnaire SF-36, the sleepiness questionnaire KSS, the office lighting survey OLS, and questions to gather additional information concerning occupational health.

Further steps
The two methodologies to measure light (i.e. vertical illuminances at eye height behind a desk) will be compared by calculating the deviations between those methods. Potential explicatory variables will be included in the analysis in order to explain the magnitude (and direction) of the deviations.

The subjective data (1519 questionnaires) combined with personal lighting conditions may give new insight in the link between office lighting and occupational health.

References