

# Making the invisible visible

## Discussing perceived and measured air pollution and noise exposure with cyclists and pedestrians for supporting healthy mobility

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### Objective

The **measured** exposure to air and noise pollution does not always match with the **perceived** exposure of these stressors whilst cycling or walking through the city (Marquart et al. 2022; Ueberham et al. 2019). This discrepancy calls for a need to inform commuters about healthy and pleasant mobility. Therefore, this research investigates:

- How far can raised awareness regarding air pollution and noise en route motivate people to protect themselves?
- How can information on these stressors be designed?
- Is information provision a worthwhile strategy to support healthy and pleasant mobility in cities?

### Background and Concept

- Commuters are exposed to air pollution and noise whilst on-the-move in the city, having severe impacts on health and wellbeing
- Individual exposure of moving people can be captured objectively by wearable sensors (Becker et al. 2021) or the subjectively perceived exposure can be explored (Marquart et al. 2021, 2022)
- This poster is part of greater study which showed that personal exposure, health and wellbeing on-the-move is influenced not only by measurable exposure, but also by the situational context and subjective perceptions (Marquart et al. 2021, 2022) (fig. 1)

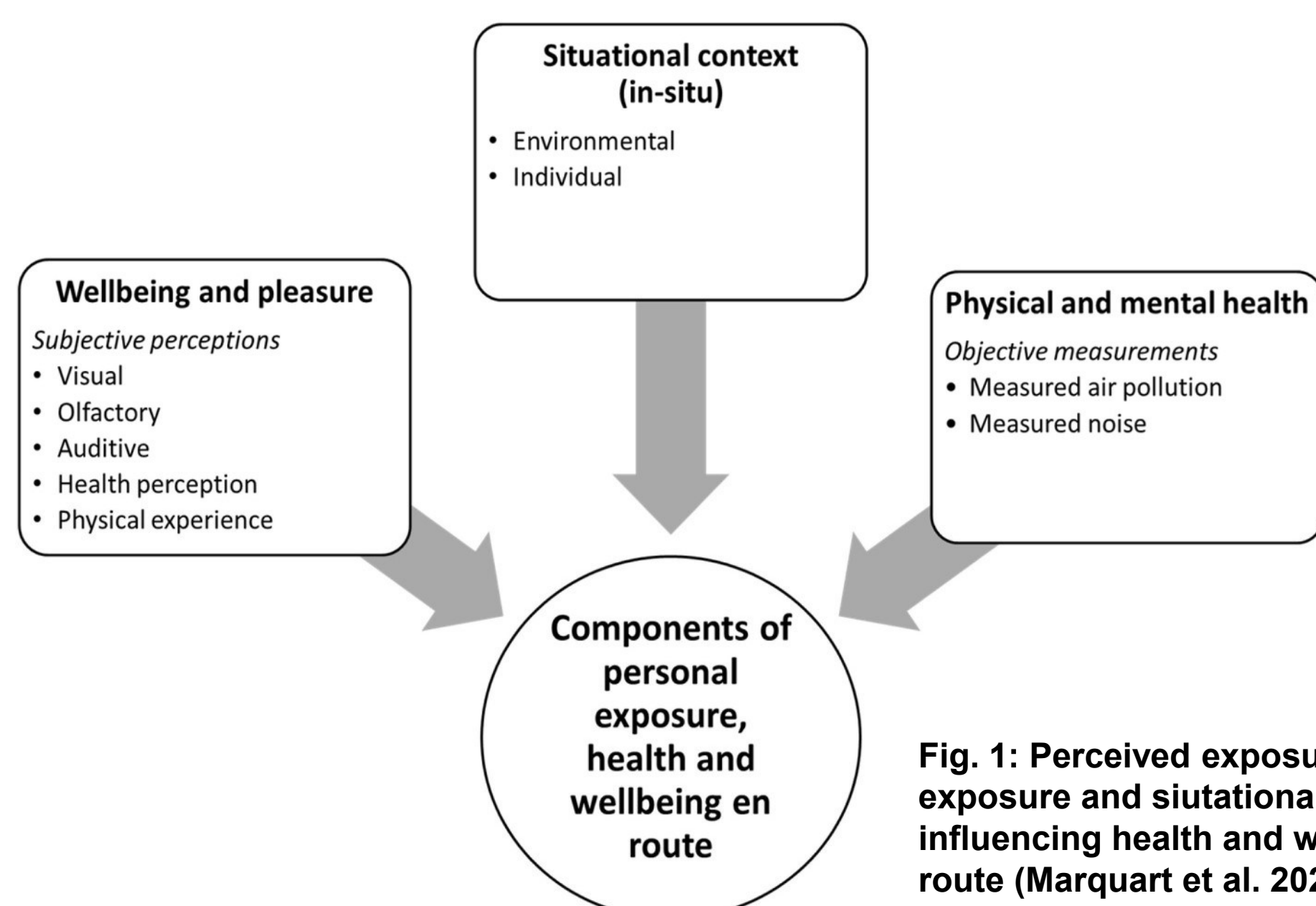


Fig. 1: Perceived exposure, measure exposure and situational context influencing health and wellbeing en route (Marquart et al. 2022)

### Methodological approach

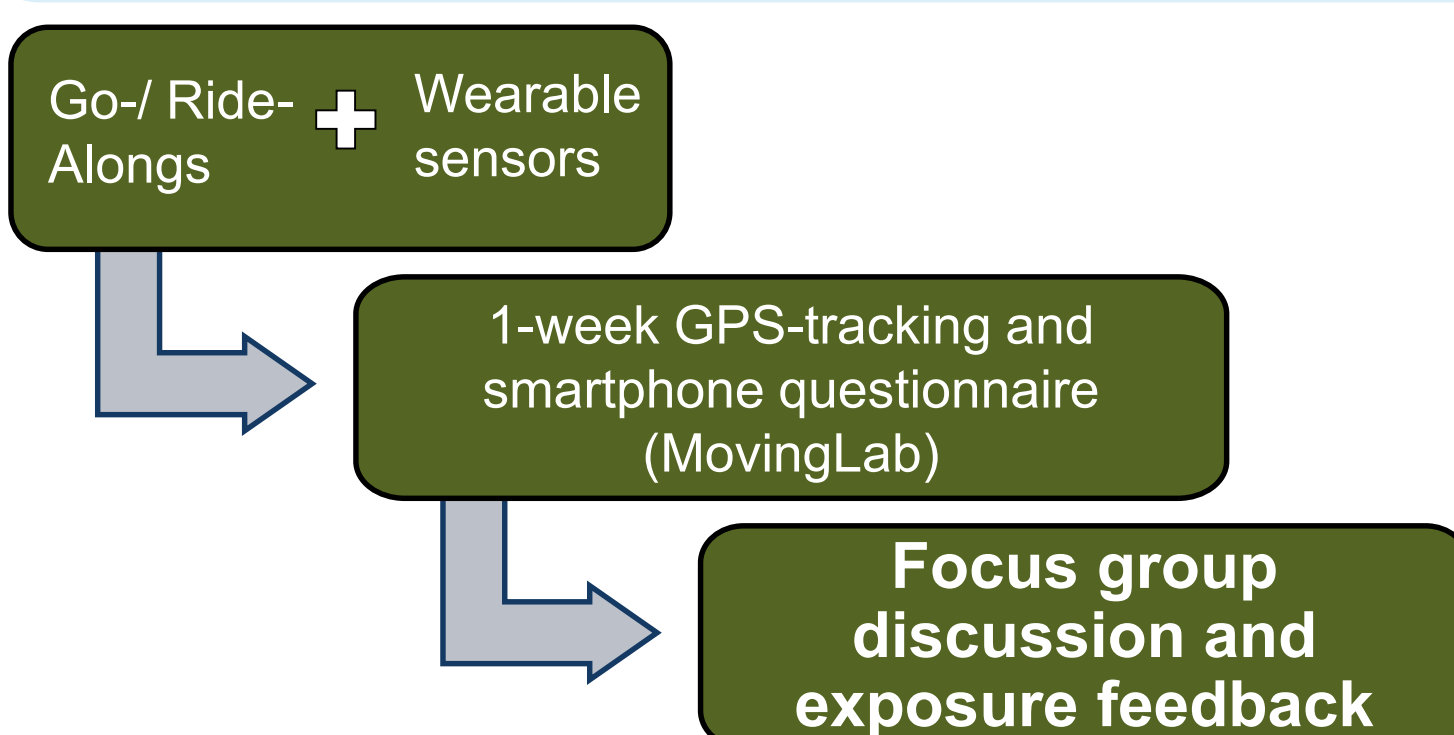


Fig. 2: Methodological approach

A sample of 28 people living and working in Berlin, Germany were recruited for a mixed-method study comprising three phases (fig. 2):

- (1) The participants took part in Go-/ride-along interviews and their exposure was recorded with wearable sensors on-the-move
- (2) They recorded and evaluated their routes regarding perceived and measured exposure for 1 week
- (3) They were invited to **focus groups** to discuss the results and how they want to be informed regarding exposure en route (for more details see Marquart (2022) or Marquart et al. (2021, 20212))

### Results of the focus groups

In total 20 participants took part in the focus groups (held between December 2019 and November 2020). During the focus groups the participants received feedback regarding their **measured exposure**, discussed their **risk perception** and **motivation to protect themselves** as well as how they **want to be informed** regarding their exposure. The discussion resulted in several protective actions, but also showed that being made aware of the ubiquity of the risk can lead to a feeling of helplessness:

Tab. 1: Results from the focus groups retrieved through thematic coding of interview transcripts

Codes defined through thematic coding	Examples (as discussed by the participants)
Protective actions	<ul style="list-style-type: none"> <li>▪ Increased distance to emitter</li> <li>▪ Cover nose/cover ear/hold breath</li> </ul>
Alternative routes	<ul style="list-style-type: none"> <li>▪ (Perceived) less polluted routes searched</li> </ul>
Alternative modes	<ul style="list-style-type: none"> <li>▪ Change towards less exposed modes</li> </ul>
Emotion focused coping	<ul style="list-style-type: none"> <li>▪ Exposure is suppressed to protect oneself</li> </ul>
Feeling powerless	<ul style="list-style-type: none"> <li>▪ Changing mobility practices is difficult</li> <li>▪ Changing routes does not have desired effect</li> </ul>
Resignation / Prioritizing	<ul style="list-style-type: none"> <li>▪ Protective actions contradict with more important factors (e.g. safety, aesthetics, time)</li> </ul>
Perceived health and wellbeing improve	<ul style="list-style-type: none"> <li>▪ Using headphones suppresses exposure</li> <li>▪ Covering nose leads to a healthier feeling</li> <li>▪ Changing mode is good for "body and soul"</li> </ul>
Refuse (and feeling to be useless) to change route	<ul style="list-style-type: none"> <li>▪ Routes are already optimized</li> <li>▪ Route changes not possible (built environment)</li> <li>▪ Changed routes equally high exposure levels</li> </ul>
Importance of other factors	<ul style="list-style-type: none"> <li>▪ Changed route negatively impacts other factors (time, safety, aesthetics)</li> </ul>
Lack of political trustworthiness	<ul style="list-style-type: none"> <li>▪ Political actions demanded to improve health/wellbeing en route, instead of individuals having to find response to stressors</li> </ul>

Exposure information should support people to successfully choose a healthier and more pleasant route in order to **avoid information denial**:

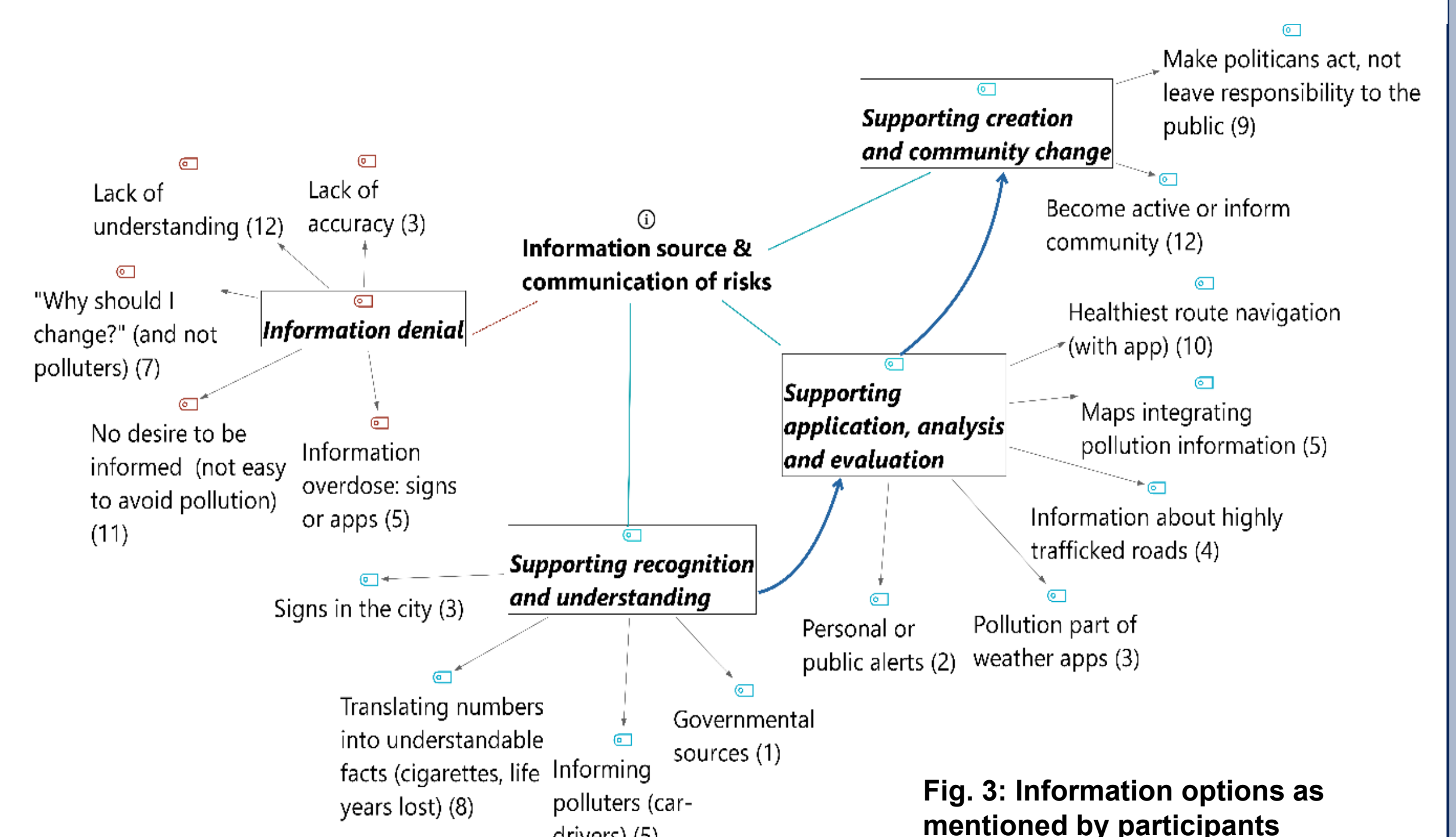


Fig. 3: Information options as mentioned by participants

### Conclusion

- To avoid information refusal, exposure information should center around **peoples' needs, coping abilities and knowledge**
- Urban air pollution/noise is perceived as **ubiquitous and uncertain** and commuting routes are often **inevitable**. Exposure information should be enriched with **pleasant and healthy route aspects consulting participatory mapping** to avoid a feeling **helpless and resignation**
- **Political actions** for healthy mobility are desired by participants

#### References

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