Towards the Healing Car: Investigating the Potential of Psychotherapeutic In-vehicle Interventions

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Kevin Koch, Shu Liu, Thomas Berger, Felix Wortmann
University of St. Gallen, ETH Zurich, University of Bern, University of St. Gallen

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Mental Health: The Daily Commute as an Opportunity

> Mental illnesses are on the rise: e.g. 320 million people worldwide suffer from depression and 264 million from anxiety disorders[1]

> Prevention and treatment of mental disorders still lacks scalable & low-cost treatment measures [2][3]

> Commuting is a life reality for people: e.g. 68% of the German population commute daily by car[4]

> Latest research has recognized the potential of scalable and low cost in-vehicle interventions[5][6]

Research Question: To what extend can the affective state of car drivers be improved by in-vehicle interventions based on well-established psychotherapeutic treatment concepts?
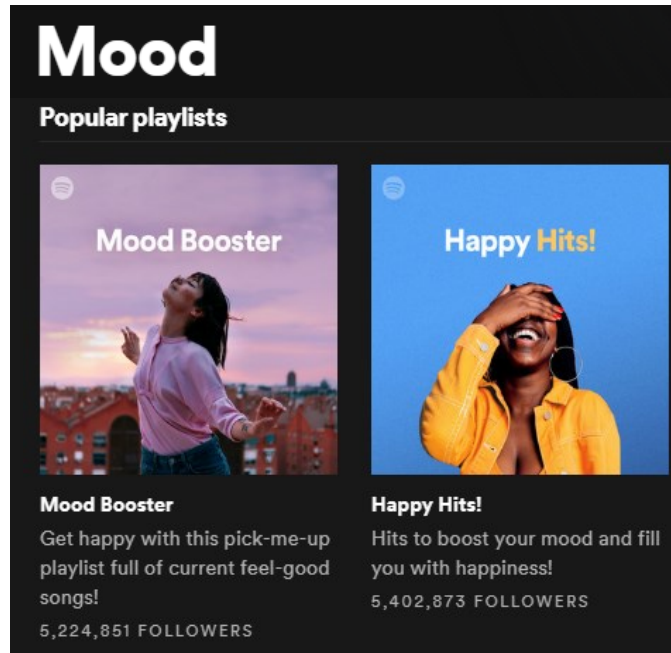
1 World Health Organization (2017) 4 Destatis (2016)
2 Agarwal et al. (2010) 5 Paredes et al. (2018)
3 Berger et al. (2019) 6 Zepf et al. (2019)

In-Vehicle Interventions as a Remedy

Mindfulness[1,2]	Music[3,4]

- Proven mental health/well-being interventions from the field of psychotherapy adapted for the car

- Randomized choice of one intervention per trip and each driver completed each intervention (randomized controlled trial)

- 2-month field study on public roads with 10 participants that repeatedly conducted the interventions

1 Kabat-Zinn (1982)
2 Gu et al. (2015)
3 Van Goethem and Sloboda (2011)
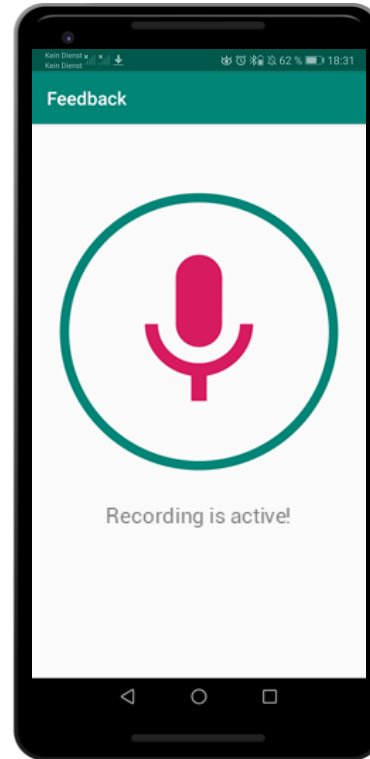4 Leubner and Hinterberger (2017)

The Affective State as Indicator for Mental Health

Pre- and post-driving state

Affective Slider[1]:

- Simple selection of arousal and valence for modern UIs

- Overall measurement of affective state

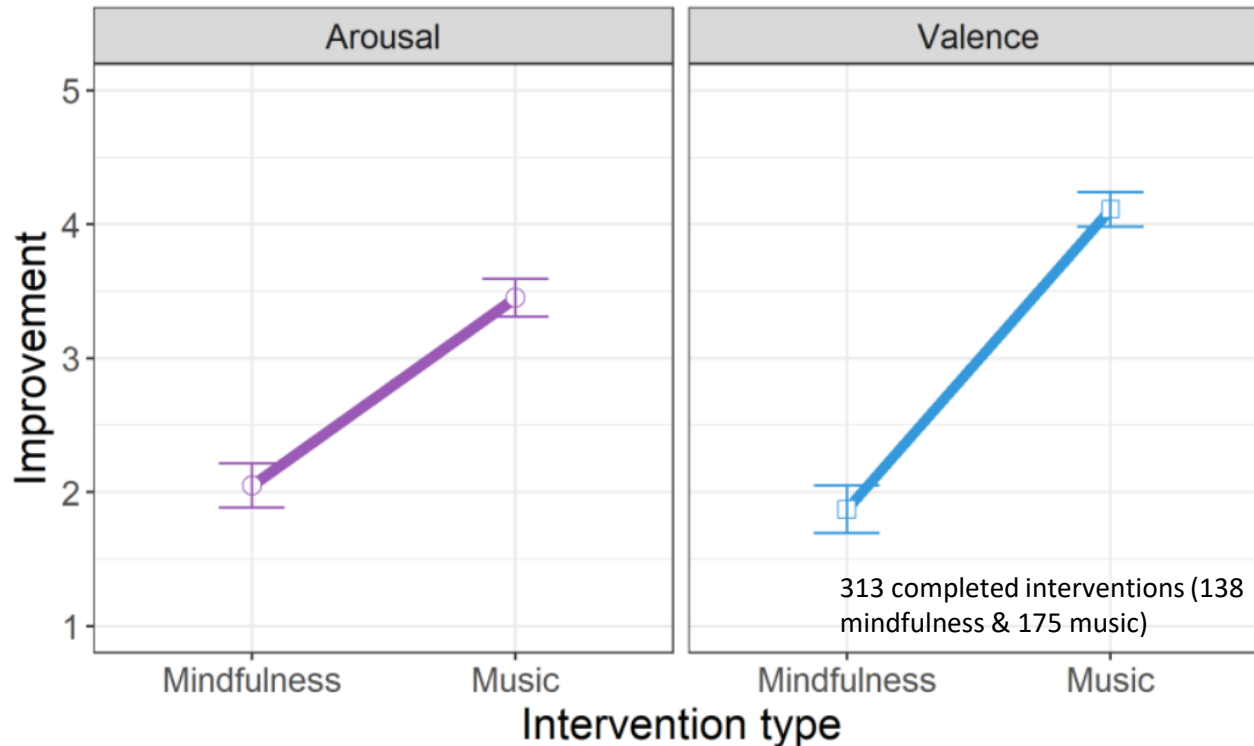- "Modern" version of Self-Assessment Manikin

Short-term voice feedback

Two major voice-based questions after the completion of an intervention (while driving):

- On a scale from 1-5 (1: no improvement at all, 5: very high improvement)[2]

- After the intervention, do you feel...

  ... a) more aroused and...

  ... b) happier?

1 Betella and Verschure (2016)
2 based on the Client Oriented Scale of Improvement (COSI) Dillon et al. (1997)

The Music Intervention has Higher Short-term Effects

313 completed interventions (138 mindfulness & 175 music)

Mindfulness intervention
Improvement for arousal (mean 2.05) and valence (mean 1.87)

Music intervention
Strong improvement of arousal (mean 3.45) and valence (mean 4.11)

Discussion
- The emotional experience of the music intervention seems to be an important factor: Guided the personalization and by recalling positive memories lead to constant improvements
- Rational approach of a mindfulness exercise seems to be less appealing and has maybe other potential problems (e.g. cognitive load)

Conclusion

Promising Short-term Affective State Improvements

Source: Volkswagen Game Day 2013 Commercial: Get in. Get happy.

Next Steps
- Quantitative analysis: Longitudinal and longer lasting effects of interventions
- Qualitative analysis: Interviews with participants about perception of interventions

Conclusion
- Study design in-depth explained for future open road in-vehicle intervention studies
- First indication that the affective state of car drivers can be improved by in-vehicle interventions based on well-established psychotherapeutic treatment concepts

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