# *The Impact of Deep Care Isa on Reducing Musculoskeletal Disorders and Enhancing Productivity Among Office Employees: A Comprehensive Study*

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## Theoretical Background

Long sitting periods are widespread in today's work environment. Office employees spend an average of more than two-thirds of their working hours sitting, often without interruptions [1,2]. This is directly linked to an increased risk of cardiovascular and musculoskeletal disorders (MSD) [3–5]. The World Health Organization (WHO) emphasizes the importance of workplaces as key points for interventions aimed at reducing sitting time [6].

To promote health-conscious routines in offices, the intelligent sitting behavior assistant (Isa) was developed by Deep Care. Isa supports ergonomic and dynamic sitting and encourages regular sitting interruptions and movement exercises. This study examines Isa's effectiveness in influencing health behavior, particularly in terms of reducing musculoskeletal complaints and increasing productivity among office employees.

## Research Question

What impact does the use of Isa and the intended behavioral changes have on reducing musculoskeletal disorders and increasing productivity among office employees?

## Methods

To assess effectiveness, a total of 2,325 office employees from 50 German companies were studied over nearly three years, focusing on their health, movement behavior, and work productivity. Participants used Isa autonomously during 4- to 18-week interventions.

Isa specifically supported ergonomics, movement, and hydration with tailored health interventions, which were integrated into daily work through visual cues based on artificial intelligence and sensor technology.

Data collection took place at three points (pre-, peri-, and post-intervention) using standardized questionnaires and qualitative interviews.

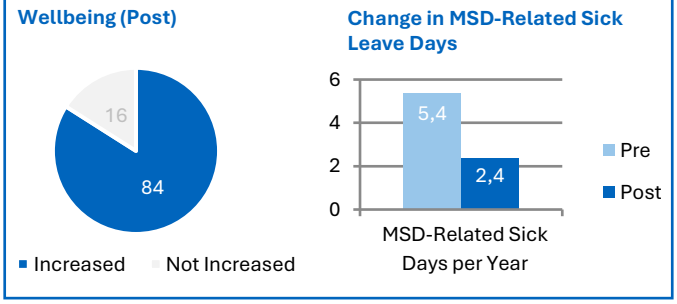
## Results & Discussion

The results show significant improvements among users in all measured variables. Isa not only strengthened office employees' awareness of ergonomic work practices but also reduced sick leave due to musculoskeletal complaints by more than half. Since movement behavior has a significant impact on health [7], a positive effect through Isa's regular movement animations is highly likely.

Beyond reducing sick leave, 4 out of 5 participants reported increased well-being, which also led to higher productivity. The latter increased by more than 50%. This positive trend can be explained by the proven effects of regular physical activity on cognitive performance [8].

A precise dose-response relationship for Isa cannot be derived from the available data, as participants determined their own usage intensity. The results, therefore, indicate clear positive tendencies but require further research to determine an exact dose-response effect.

| Variable | Pre | Post | Change (Pre-Post) |
|---|---|---|---|
| **Ergonomic Awareness** (1-10) | 3,5 | 6,6 | **+88%** |
| **Proportion of Working Hours with Movement Interruptions** | 40% | 79% | **+97%** |
| **MSD-Related Sick Days per Year** | 5,4 | 2,4 | **-56%** |
| **Productivity** (1-100) | 60 | 95 | **+58%** |
| **Hydration Recommendation Met** | 50% | 78% | **+56%** |




## Conclusion

The study results show significantly positive effects of Isa use on movement behavior, the reduction of musculoskeletal complaints, and productivity. Isa contributes to the establishment of a health-promoting work environment through targeted health interventions. Further research is needed to precisely determine the dose-response relationship.

## References

[1] Hadgraft, N.T. et al., 2016: Preventive Medicine Reports, 4, pp. 184–191; [2] Healy, G.N. et al., 2013: Preventive Medicine, 57(1), pp. 43–48; [3] Paterson, C. et al., 2020: Sports Medicine, 50(11), pp. 1929–1942; [4] Pinto, P. et al., 2012: In: PLoS One, 7(2); [5] Stamatakis, E. et al., 2019: Journal of the American College of Cardiology, 73(16), pp. 2062–2072; [6] WHO, 2018: Global Action Plan on Physical Activity 2018-2030; [7] Neumann, N., 2007: Dtsch Med Wochenschr, 132(45), pp. 2387–2391;[8] Dunstan, D.W. et al., 2013: BMC Public Health, 13, p. 1057.