Challenges and Ethical Concerns of Using Stress Data in Data Physicalization

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Stress is a prevalent concern in today's society. Numerous technological aids are available to support users in managing their stress levels and understanding stress triggers. Data physicalization has the potential to assist users in achieving this, including users within a professional work environment. While these designs can help individuals understand their bodies, displaying sensitive data in a potentially public space raises ethical concerns that must be handled with care. In this position paper, we explore the potential benefits and risks of using data physicalization to visualize personal stress data. We propose careful consideration of context, other people, and privacy concerns when designing these tools to avoid negative consequences.

CCS Concepts: • **Security and privacy → Human and societal aspects of security and privacy**; • **Human-centered computing → Visualization**.

Additional Key Words and Phrases: data physicalization, stress

ACM Reference Format:
Henrike Weingärtner. 2023. Challenges and Ethical Concerns of Using Stress Data in Data Physicalization. In *CHI 2023 Workshop: Physicalization from Theory to Practice* . ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

1 INTRODUCTION

Stress is a pervasive problem affecting individuals across various domains of life. Whether it be from work, school, relationships, or other sources, stress can take a significant toll on one's physical, mental, and emotional well-being. The constant pressure to perform, meet deadlines, and manage daily tasks can lead to burnout, anxiety, and depression [16].

Despite the negative effects of stress often being the focus of public and media discussions, researchers have been preoccupied with developing methods for sensing stress levels [1, 5, 7, 9, 13]. To cope with increasing levels of stress, people have turned to various technological aids such as stress management apps [8, 12, 14] or wearable devices [3, 11]. Another promising approach is data physicalization, which is aiming to make data more accessible and engaging for users, by enabling them to interact with and understand complex information in new ways [4]. This could help draw attention to stressors and promote self-reflection. However, using sensitive data in this process raises ethical concerns that must be carefully addressed.

2 CHALLENGES AND ETHICAL CONCERNS

The use of sensitive and personal data can raise ethical concerns and can potentially have far-reaching consequences if mishandled. This concern is amplified by the rapid advancement of technology employed for stress management. In particular, when dealing with sensitive personal data such as stress levels, like displaying your workload level at your place of work, it is crucial to consider the potential ethical issues that may arise when utilizing such data for stress management purposes.

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Manuscript submitted to ACM

With data physicalization, stress data is made semi-publicly available, leading to significant concerns regarding user privacy. Personal and sensitive information may be accessed without consent, and users may have limited to no control over who views their data. Involuntary sharing of this type of data can be a significant problem, especially in a non-private setting such as the workplace. These privacy concerns lead to ethical concerns that need to be addressed.

Depending on the specific data being visualized, the information could be easily misinterpreted. For example, if the workload is used as a stress indicator, someone who is taking on more work voluntarily may be viewed as overwhelmed, when in fact they are handling the additional workload well [10]. Publicly displaying stress data could lead to individuals feeling ashamed or stigmatized by their data [10]. It could also lead to other unintended consequences such as competition between colleagues. Depending on the particular workplace, it is possible that heightened levels of stress may be perceived as indicative of incompetence, or lower levels of stress may be viewed as a lack of effort. This may result in emotional distress and loss of reputation, both of which can have a significant impact on an individual's well-being and overall quality of life. As such, it is important to carefully consider the types of data being displayed, how it may be perceived by others, and to implement appropriate safeguards to protect the privacy and dignity of individuals. The possibility of employers misusing such data, either intentionally or unintentionally, is a significant risk that must be addressed. For example, if employers have access to such data, it could be used as a performance indicator. Since higher levels of stress are associated with reduced job performance [6], this could lead to concerns about potential negative consequences for employees that are under high stress.

This raises questions about whether the focus should be on employee well-being or productivity. Striking a balance between these two goals is critical, as neglecting one in favor of the other could have negative consequences for individuals and organizations alike. To achieve this, we think it is essential to ensure that either the data or the design of the physicalization itself is appropriately anonymized, as this would prevent the disclosure of user-specific information to employers, and ensure both privacy and data security.

3 VISION AND CONCLUSION

We believe that data physicalization can allow for a more intuitive understanding of one's body and enable individuals to make more informed decisions about their health and well-being. However, it is worth noting that relying solely on technological tools for stress management may not always be the best approach. Using these tools as a substitute for self-awareness and reflection could ultimately be counterproductive [10]. Instead, we think these tools should be viewed as temporary aids that can help individuals train themselves to be more aware of their own bodies and stress levels. Otherwise, it could potentially lead to a dependence on the system, thereby impeding one's capacity for autonomous self-reflection.

Therefore, we suggest that data physicalization should be used as part of a larger approach to stress management, rather than relying on them exclusively. Displaying these types of sensitive data in a private or public environment raises ethical concerns and should be handled appropriately and with care. While there are many concerns regarding the public display of personal stress data, research has shown that the visualization of stressors in groups can also positively influence the interaction behavior and workplace atmosphere [2, 15]. We believe that when designing such systems, we should focus not only on the user themselves but also the other people, as these systems also influence the way they behave towards the user.

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