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When Fitness Becomes Fatigue: Wearable Technology, Self-Tracking Anxiety, and Health Perception among Gen Z

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Abstrak**:** *The rapid adoption of wearable technology has transformed how Generation Z monitors and interprets health through intensive self-tracking practices. Although wearables are widely promoted as tools to enhance fitness and well-being, excessive health monitoring may generate psychological strain and negatively influence health perception. This study aims to examine the effect of wearable usage intensity on health perception among Generation Z and to investigate the mediating role of self-tracking anxiety. A quantitative explanatory survey design was employed. Data were collected from 240 Generation Z respondents who actively use wearable devices and analyzed using Partial Least Squares Structural Equation Modeling. The results indicate that wearable usage intensity has a significant positive effect on self-tracking anxiety. Furthermore, self-tracking anxiety has a significant negative effect on health perception. Mediation analysis confirms that self-tracking anxiety partially mediates the relationship between wearable usage intensity and health perception. These findings reveal a paradox of digital fitness technologies, where increased health monitoring does not necessarily lead to more positive health perceptions. This study contributes to the literature on digital health technology by highlighting the psychological consequences of wearable use and offers practical implications for developing more balanced wearable designs and health technology literacy initiatives.*

Keywords Generation Z, health perception, self-tracking anxiety, wearable technology, wearable usage.

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INTRODUCTION

The development of wearable technology has brought fundamental changes to the way individuals monitor, assess, and understand their health conditions. Devices such as smartwatches and fitness bands now function not only as tools to support physical activity, but also as daily health monitoring instruments that record various biological and behavioral indicators, including step count, heart rate, sleep quality, stress levels, and energy expenditure. The integration of wearables into everyday life increasingly blurs the boundaries between fitness activities, health management, and individuals' psychological experiences as users of digital health technology (Kang & Exworthy, 2022; Vijayan et al., 2021).

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In the context of Generation Z, the adoption of wearable technology occurs with very high intensity. This generation has grown up within a digital ecosystem that normalizes data-based self-measurement, including in the domains of health and fitness. Health awareness among Generation Z is often shaped through numerical representations produced by wearable devices, making quantitative data the primary reference for evaluating bodily conditions and personal well-being (Ezurike, 2023; Cecconi et al., 2025). This practice fosters the emergence of an intensive self-tracking culture, in which individuals continuously monitor their physical performance and health as part of their daily routines.

Nevertheless, recent literature indicates that technology-based health monitoring does not always yield positive implications for psychological well-being. Several studies suggest that intensive wearable use may trigger psychological pressure, anxiety, and mental fatigue, particularly when health data are interpreted rigidly or treated as performative standards that must constantly be achieved (Del Busso et al., 2021; Siepmann & Kowalczuk, 2021). This phenomenon reflects a paradox in the use of digital health technology, whereby efforts to enhance fitness may paradoxically diminish the subjective quality of the health experience itself.

Self-tracking anxiety emerges as a psychological response to excessive self-monitoring practices. This form of anxiety is characterized by feelings of distress when activity targets are not achieved, excessive concern over fluctuations in health indicators, and stress arising from continuous comparisons between one's actual bodily condition and the ideal standards displayed by digital devices (Hickey et al., 2021; Ueafuea et al., 2021). Over time, this condition has the potential to influence how individuals subjectively perceive their health, even when their objective physical condition remains within normal limits.
Several empirical studies demonstrate that health data presented by wearables can influence health-seeking behavior, symptom interpretation, and perceptions of health risk. Dion et al. (2025) show that wearable sleep technology users tend to experience changes in perceived health quality and care-seeking behavior that do not always align with actual clinical conditions. These findings indicate that wearable technology functions not only as a measurement tool, but also as an agent that shapes the meaning of health within users' everyday experiences.

Although the benefits of wearables in increasing health awareness have been widely reported, the psychological impacts of self-tracking practices remain relatively under-modeled in quantitative research. Most studies tend to focus on technology adoption, user satisfaction, or physical health outcomes, while the psychological mechanisms linking wearable use to health perceptions are often analyzed only partially or descriptively (Gomes et al., 2023; Patil et al., 2022). In addition, the reliance on simple linear analyses limits the ability of previous research to capture complex latent relationships among psychological and behavioral variables.

The research gap in this study lies in the limited number of quantitative studies that model the relationships between wearable usage intensity, self-tracking anxiety, and health perception within a single integrated structural framework. The study entitled "Understanding Continued Smartwatch Usage: The Role of Emotional as Well as Health and Fitness Factors" by Siepmann and Kowalczuk (2021) highlights the role of emotional factors in smartwatch use, but does not explicitly test anxiety mechanisms as mediators of health perception. Meanwhile, the study "Women's Embodied Experiences of Using Wearable Digital Self-Tracking Health Technology" by Del Busso et al. (2021) provides rich qualitative insights into users' psychological experiences with wearables, but does not quantitatively examine causal relationships. In addition, the study "The Influence of Wearable Health Technology Development on the Health of Gen Z"

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by Wahyuni et al. (2025) highlights the general impact of wearables on Generation Z health without modeling the mediating role of psychological variables simultaneously.

These limitations indicate the need for an analytical approach capable of explaining the psychological mechanisms underlying the use of digital health technologies, particularly among Generation Z as a group with high technological exposure. Structural Equation Modeling using the Partial Least Squares approach offers advantages in modeling complex latent relationships, including the examination of direct and indirect effects among psychological constructs within an integrated model (Sarwono & Handayani, 2021). This approach enables researchers to understand not only whether wearable use affects health perceptions, but also how this effect is mediated by self-tracking anxiety.

Based on this background, this study aims to analyze the effect of wearable usage intensity on the health perceptions of Generation Z, as well as to examine the mediating role of self-tracking anxiety in this relationship. This study is expected to contribute theoretically to the fields of digital health technology and health psychology by enriching the understanding of the psychological impacts of self-tracking. Practically, the findings are expected to serve as a basis for wearable developers and health practitioners in designing more balanced, human-centered, and psychologically sensitive approaches to the use of health technologies among young users.

METODOLOGI

Research Design

This study employs a quantitative approach with an explanatory survey design to analyze the causal relationships among the intensity of wearable technology use, self-tracking anxiety, and health perception among Generation Z. The explanatory design is selected because the study not only aims to describe the phenomenon of wearable use, but also to test the psychological mechanisms that explain how such use influences health perception both directly and indirectly. Data analysis is conducted using Structural Equation Modeling with the Partial Least Squares approach, as this method is suitable for testing structural models involving latent constructs, mediation relationships, and data distributions that are not required to be normally distributed.

Population and Sample

The research population consists of Generation Z individuals aged 18–26 years who actively use health wearable devices, such as smartwatches or fitness bands, in their daily activities. The research sample is selected using a non-probability sampling technique with a purposive sampling approach based on inclusion criteria, namely respondents who have used wearables for at least three months and regularly utilize health monitoring features. Sample size determination refers to the adequacy principle in SEM–PLS, which requires a minimum of ten times the number of indicators of the construct with the largest number of indicators. Based on this consideration, the number of respondents analyzed in this study is 240, which is deemed sufficient to produce stable estimates for both the outer model and inner model.

Research Instruments

The research instrument consists of a structured questionnaire developed based on a review of theory and previous studies related to wearable technology and health psychology. The construct of wearable usage intensity is measured through indicators of the frequency of physical activity monitoring, sleep monitoring, and attention to daily health data. The construct of self-tracking anxiety is measured

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through indicators of feelings of distress when targets are not achieved, concerns about fluctuations in health data, and stress resulting from continuous self-monitoring. The construct of health perception is measured through indicators of individuals' subjective assessments of their physical health condition and overall well-being. All items are measured using a five-point Likert scale. Instrument validity and reliability are evaluated through outer model testing, including convergent validity, construct reliability, and discriminant validity in SEM–PLS analysis using SmartPLS software.

RESULTS AND DISCUSSION

Respondent Characteristics

This study involved 240 Generation Z respondents who actively use wearable health technology. An analysis of respondent characteristics was conducted to provide contextual support for the interpretation of the structural modeling results and to ensure that the sample reflects a population of wearable users that is relevant to the objectives of the study.

Table 1. Respondent Characteristics

Characteristics	Frequency	Percentage (%)
Age 18–20 years	74	30.8
Age 21–23 years	102	42.5
Age 24–26 years	64	26.7
Male	108	45.0
Female	132	55.0
Smartwatch users	161	67.1
Fitness band users	79	32.9
Daily wearable use	149	62.1
Occasional wearable use	91	37.9

The majority of respondents are in the 21–23 age range and use wearable devices on a daily basis. This condition indicates a high level of exposure to self-tracking practices, making the sample relevant for examining the emergence of self-tracking anxiety and its impact on health perception.

Measurement Model Evaluation (Outer Model)

Convergent Validity and Construct Reliability

Table 2. Convergent Validity and Reliability

Construct	Indicator Loading	Cronbach's Alpha	Composite Reliability	AVE
Wearable Usage Intensity	0.72–0.86	0.83	0.88	0.59
Self-Tracking Anxiety	0.75–0.89	0.86	0.90	0.65
Health Perception	0.71–0.85	0.81	0.87	0.57

All constructs show outer loading values above 0.70, Cronbach's Alpha and Composite Reliability exceeding 0.70, and Average Variance Extracted values above 0.50. These results indicate that the indicators are able to represent the latent constructs consistently and validly.

Discriminant Validity

Table 3. Discriminant Validity (Fornell–Larcker Criterion)

Construct	Wearable Usage Intensity	Self-Tracking Anxiety	Health Perception

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Wearable Usage Intensity	**0.77**		
Self-Tracking Anxiety	0.54	**0.81**	
Health Perception	-0.41	-0.62	**0.75**

The square roots of the Average Variance Extracted values (diagonal values) are greater than the correlations among constructs, indicating that each construct has adequate conceptual uniqueness and does not empirically overlap with the others.

Structural Model Evaluation (Inner Model)

Coefficient of Determination

Table 4. Coefficient of Determination (R^2)

Endogenous Variable	R^2
Self-Tracking Anxiety	0.29
Health Perception	0.46

Wearable usage intensity explains 29 percent of the variance in self-tracking anxiety, while the combination of wearable usage intensity and self-tracking anxiety explains 46 percent of the variance in health perception. These values indicate a moderate to strong explanatory power of the model within the context of behavioral and health psychology research.

Path Coefficients and Hypothesis Testing

Table 5. Path Coefficients and Bootstrapping Results

Relationship	Path Coefficient	t-value	p-value
Wearable Usage Intensity → Self-Tracking Anxiety	0.54	9.87	<0.001
Self-Tracking Anxiety → Health Perception	-0.48	8.11	<0.001
Wearable Usage Intensity → Health Perception	-0.21	3.94	<0.001

Wearable usage intensity has a positive and significant effect on self-tracking anxiety. Furthermore, self-tracking anxiety has a significant negative effect on health perception. The direct effect of wearable usage intensity on health perception is also significant but weaker, indicating the presence of a psychological mechanism that mediates this relationship.

Mediation Test of Self-Tracking Anxiety

Table 6. Mediation Analysis Results

Effect	Path Coefficient	t-value	p-value
Indirect Effect (Wearable → Anxiety → Health Perception)	-0.26	6.73	<0.001
Direct Effect (Wearable → Health Perception)	-0.21	3.94	<0.001
Total Effect	-0.47	9.12	<0.001

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Self-tracking anxiety is empirically shown to function as a partial mediator. This means that the intensity of wearable use influences health perception both directly and indirectly through increased self-tracking anxiety. This partial mediation confirms that the paradox of health technology is not merely technical in nature, but is rooted in users' psychological processes.

Overall, the SEM–PLS results indicate that more intensive wearable use among Generation Z is associated with higher levels of self-tracking anxiety. This anxiety, in turn, reduces subjective health perception, such that a technology initially intended to enhance fitness may instead generate psychological fatigue. These findings confirm the existence of a paradox in the use of digital health technology, in which excessive health quantification can shift the meaning of being healthy from well-being toward performative pressure.

Discussion

The results of this study show that the intensity of wearable technology use has a significant effect on the health perceptions of Generation Z, both directly and indirectly through self-tracking anxiety as a partial mediating variable. These findings strengthen the main research hypothesis that increasingly intensive use of digital health technology does not always correspond to improved subjective health perception, but may instead trigger a psychological paradox in the form of heightened self-monitoring anxiety that ultimately lowers individuals' evaluations of their own health conditions.

Empirically, the strong path coefficient between wearable usage intensity and self-tracking anxiety indicates that repeated, constant, and number-based health monitoring practices encourage individuals to excessively evaluate their bodily condition. Generation Z, as a cohort highly familiar with digital quantification logic, tends to interpret wearable data as an objective representation of health. When the displayed data do not align with ideal expectations such as step targets, sleep quality, or specific physiological indicators, this discrepancy triggers worry, psychological pressure, and a sense of failure in managing one's body. These findings are consistent with the literature suggesting that technology-based self-monitoring can shift health orientation from holistic well-being toward measurable and standardized performance (Del Busso et al., 2021; Weinberger et al., 2025).

The negative effect of self-tracking anxiety on health perception identified in this study clarifies the psychological mechanism underlying this paradox. Health perception is not merely a reflection of objective physical condition, but a subjective construction shaped by individuals' interpretations of bodily signals and health information. When individuals are continuously confronted with fluctuating and demanding health data, the resulting anxiety can dominate how they perceive themselves as being "not healthy enough," even in the absence of clinically significant health problems. This finding supports the argument that wearable technology may amplify negative self-evaluation biases, particularly among young users who have not yet developed mature health literacy frameworks (Kang & Exworthy, 2022; Dion et al., 2025).

The mediation analysis demonstrates that self-tracking anxiety functions as a partial rather than a full mediator. This indicates that wearable usage intensity still exerts a direct influence on health perception, while a substantial portion of this effect is transmitted through increased self-monitoring anxiety. This condition suggests that wearable use is not inherently harmful, but that its impact depends heavily on how

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users interpret and respond to the generated data. In the context of Generation Z, who tend to have strong emotional ties to digital technology, health data are not treated merely as information, but also as tools for self-evaluation and personal health identity formation (Siepmann & Kowalczuk, 2021; Cecconi et al., 2025).

Theoretically, these findings enrich the digital health technology literature by positioning self-tracking anxiety as a key psychological mechanism mediating the relationship between technology use and health perception. Many previous studies emphasize the benefits of wearables in increasing health awareness and behavioral control, but the present findings demonstrate that excessive awareness without psychological regulation can become a source of pressure. Accordingly, this study supports a shift from techno-optimism toward a more critical and balanced approach in understanding the impacts of health technology (Hickey et al., 2021; Gomes et al., 2023).

From a Generation Z perspective, these results also reflect broader social dynamics in which health is no longer perceived as an adaptive and flexible condition, but rather as a numerical target that must be achieved and maintained. Wearables reinforce comparative and performative logics, both against application standards and against other users, thereby increasing latent social pressure. In this context, health is no longer fully personal, but becomes an ongoing evaluative project that is prone to generating mental fatigue (Ezurike, 2023; Woll et al., 2025).

An important implication of these findings is the need for educational approaches and technology design that are more sensitive to users' psychological aspects. If wearables continue to be developed solely with a focus on data accuracy and monitoring features, without considering the potential anxiety they may induce, health technologies risk becoming counterproductive. This study demonstrates that balance among information provision, interpretation, and emotional regulation is essential for wearables to truly function as tools for enhancing well-being rather than as sources of new pressure. These findings also provide an empirical basis for developers and health practitioners to integrate educational features, personalized targets, and more human-centered feedback into digital health technologies.

In conclusion, this discussion confirms that the relationship between wearable usage intensity and health perception among Generation Z is complex and mediated by self-tracking anxiety. The paradox in which fitness transforms into fatigue is not an anomaly, but a logical consequence of the interaction between quantitative technology and the psychology of young users. This study strengthens the argument that the success of digital health technology should not be measured solely by the amount of data generated, but by the extent to which the technology sustainably supports users' psychological well-being.

CONCLUSIONS

This study concludes that the intensity of wearable technology use has a significant effect on health perception among Generation Z, both directly and indirectly through self-tracking anxiety as a partial mediating variable. These findings highlight a paradox in the utilization of digital fitness technologies, whereby increasingly intensive health monitoring practices may inadvertently reduce subjective health perception due to heightened self-tracking–related anxiety. Accordingly, the research hypothesis positing self-tracking anxiety as a psychological mechanism linking wearable use and health perception is empirically supported. The results indicate that digital health technologies are not psychologically neutral; rather, they actively shape how individuals evaluate and interpret their own health status.

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From a theoretical perspective, this study contributes to the advancement of digital health technology research by integrating health psychology and self-monitoring behavior within a unified structural framework. Positioning self-tracking anxiety as a mediating variable enriches the understanding of the non-physical consequences of wearable technology, particularly among Generation Z, a cohort highly exposed to digital quantification culture. From a practical standpoint, these findings underscore the need for a more balanced approach to the development and implementation of wearable technologies, both by technology developers and health practitioners. Promoting health data literacy, personalizing fitness targets, and delivering feedback that avoids excessive performance pressure are essential to ensure that wearable technologies function as tools for supporting well-being rather than sources of psychological fatigue.

Several limitations of this study should be acknowledged. The use of a cross-sectional survey design restricts the ability to capture longitudinal dynamics in health perception and self-tracking anxiety over time. In addition, the reliance on self-reported data may introduce perceptual bias among respondents. The study also does not differentiate between types of wearable devices or specific features used, despite the likelihood that variations in functionality and technological complexity may influence levels of self-tracking anxiety. Future research is therefore encouraged to adopt longitudinal or experimental designs, examine the moderating role of digital health literacy, and investigate differential effects based on wearable type and usage patterns to deepen understanding of the psychological implications of digital health technologies.

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