Evaluation of Smartphone Digital Wellbeing Features Using A Motivation, Engagement and Thriving in User Experience (METUX) Model

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Introduction

Smartphones have substantially transformed how we interact with others and live our lives. They come with benefits such as enabling people to stay connected with loved ones, providing convenience and access to services on the go (e.g., information search, listening to music, digital payment), and are even being used in clinical applications to improve patient outcomes [1]. Smartphones can also lead to negative impacts on a person's wellbeing, such as distraction in educational settings [2], addiction [3], and other mental health problems [4].

To address some of these negative impacts, major smartphone companies have embedded software features into their smartphones to help users become aware of and manage their smartphone usage to ultimately promote a healthier relationship with their smartphone known as "digital wellbeing". In addition, numerous apps are available for download [5] aimed to help people gain a sense of self-control of their smartphone. The availability of these apps presumes that people have issues with their smartphone usage being intentional and need help with having their smartphone not hinder other desired goals.

With smartphone ownership increasing worldwide [6][7], it is crucial to research how smartphone usage impacts wellbeing and find ways to mitigate or prevent the adverse effects of smartphone usage on a person's wellbeing.

Self-Determination Theory (SDT), developed by Ryan and Deci, is a mature, cross-cultural, and empirically-validated theory that asserts that three basic psychological needs are the basis for psychological wellbeing: autonomy, competence, and relatedness [8][9]. This study used the Motivation, Engagement and Thriving in User Experience (METUX) Model developed by Peters et al. [10] based on SDT to measure and evaluate the three basic psychological needs across six spheres of impact linked to technology design and wellbeing.

The purpose of this study was to investigate psychological wellbeing with respect to smartphone usage and evaluate the effectiveness of smartphone features aimed at supporting wellbeing. This research aimed to quantify the impact of digital wellbeing features on psychological wellbeing using the METUX model.

Research Questions

1. To what extent does smartphone usage impact perceived psychological wellbeing?
2. How aware of and widely used are smartphone features aimed to support wellbeing?
3. To what extent does wellbeing feature usage impact perceived psychological wellbeing?
4. What are the motivations behind the adoption of smartphone wellbeing features?

Methodology

The study used an online survey and one-hour virtual interviews of subjects 18 years old or older to obtain quantitative and qualitative data. The survey accepted responses from December 2022 to March 2023. Virtual interviews were conducted asynchronously after a participant took the survey. Survey data were exported to Excel, cleaned, transformed, and analyzed using pandas, scipy, and seaborn Python libraries.

Results

Over the course of the study, there were 353 respondents to the online survey and 13 interviews conducted. While some noteworthy findings are presented, there are additional findings that have not been presented.

RQ1: Figure 1 describes the perceived autonomy satisfaction distribution by age, where the lower the autonomy score, the higher the satisfaction. The figure shows autonomy score medians decreasing as age increases. This means perceived autonomy satisfaction increases as age increases. A Kruskal-Wallis H-test resulted in a statistically significant difference between the autonomy score means of the age groups ($H = 29.82$, $p = <.001$). This result shows that age plays a role in smartphone usage affecting the autonomy satisfaction individuals experience.

RQ2: Figure 2 describes the awareness feature count distribution by learner and phone type. The question was whether active learners of features on their smartphones learn more smartphone features than passive learners. A Mann-Whitney U test between passive and active learners for Android users and passive and active learners for iPhone users was performed. This resulted in the mean of active learners being greater than the mean of passive learner for Android and iPhone users *(iPhone $U = 3783.5$, $p = .002$; Android $U = 838.5$, $p = .028$)*. This result shows active learners learn more features than passive learners.

RQ3: Figure 3 describes the effect that wellbeing feature has on perceived relatedness satisfaction, where the higher the relatedness score, the higher the satisfaction. The figure shows that the median of those who use wellbeing features is higher than those who do not. A Welch's T-test resulted in the relatedness mean of those who do not use wellbeing features is lower than those who use wellbeing features ($T = -2.00$, $p = .023$). The result shows that those who use wellbeing features have higher relatedness satisfaction.

RQ4: Figure 4 describes the relative autonomy index (RAI) of those who use wellbeing features. The RAI is a measurement of motivation behind adoption ranging from feeling controlled by something or someone else (-4) to autonomous (+4). The figure shows that the median RAI for wellbeing feature adoption is 1.5 and a left-skewed distribution. The results show that the motivation behind adopting wellbeing features is more autonomous than controlled.

Figure 1: Perceived Autonomy Satisfaction Average Score by Age

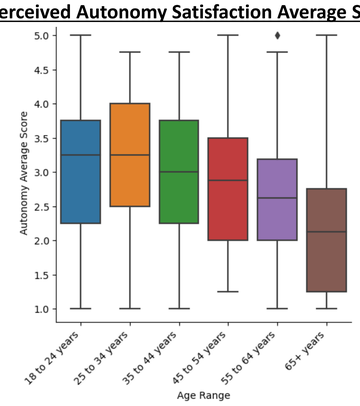


Figure 2: Awareness Feature Count by Learner Type & Phone Type

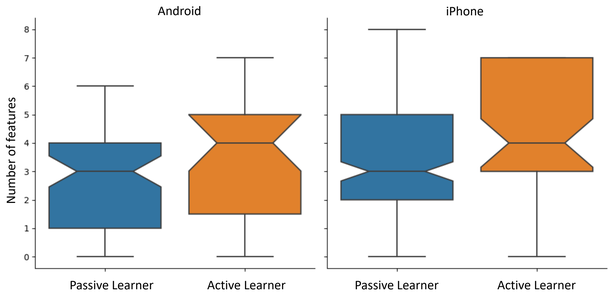


Figure 3: Wellbeing Feature Usage Effect on Perceived Relatedness Satisfaction

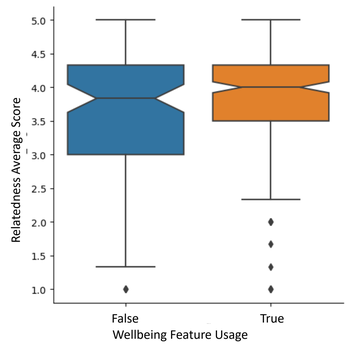
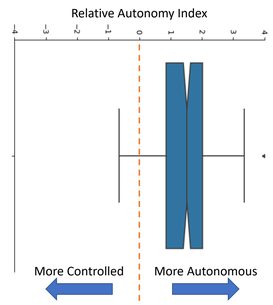


Figure 4: Relative Autonomy Index for Wellbeing Feature Adoption



Conclusion

This research showcased the METUX model quantifying wellbeing with respect to smartphone usage based on Self-Determination Theory and provided a way to evaluate the effectiveness of wellbeing features. People are motivated to use wellbeing features autonomously because they perceive usage will be worthwhile and spend their time on other things they value. Those who use digital wellbeing features have greater relatedness and, therefore, better overall wellbeing [10]. Awareness and usage of wellbeing features are related, and active learners of smartphone features are aware of more wellbeing features and are more likely to be aware than passive learners. Age plays a role in smartphone usage, affecting perceived autonomy. People mainly learn about smartphone features through others or organic smartphone usage. As digital wellbeing research evolves and digital wellbeing features and their design are enhanced, smartphones can be powerful tools to help us communicate, connect, and learn while minimizing harmful side effects to personal wellbeing.

Future Work

Future work would involve a longitudinal study of wellbeing feature usage using the same survey questions to understand if there is a change in wellbeing because of wellbeing feature usage. Since results showed that wellbeing feature awareness and usage are related, an investigation into how strong a relationship between awareness and usage could lead to potential intervention strategies for awareness. In addition, since results showed that those who use wellbeing features have greater relatedness, more research into relatedness and smartphone feature design should be done on digital wellbeing features to improve perceived relatedness satisfaction while not frustrating autonomy and competence. Finally, usability testing of smartphone wellbeing features would also be conducted to evaluate the usability of wellbeing features to improve the user experience and usability of such features.

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