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Unlocking Self-Esteem: A Conceptual Exploration of Technological Proficiency and its Effects

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Abstract

This study examines the impact of Technological Proficiency on the self-esteem of older adults, utilizing a quantitative, cross-sectional research design. The research investigates how varying levels of technological proficiency influence psychological well-being, with a particular focus on self-efficacy, social participation, and independence. Drawing on the Technology Acceptance Model (TAM) and related theories, the study hypothesizes that higher Technological Proficiency positively affects self-esteem by enhancing these psychological factors. Conversely, a lack of familiarity with technology may exacerbate feelings of inadequacy and social isolation, leading to reduced self-esteem. Data are collected from a stratified random sample of adults aged 60 and above, using validated measures of Technological Proficiency and the Rosenberg Self-Esteem Scale (RSES). Statistical analyses, including structural equation modeling (SEM), are conducted to examine the relationships between variables. The findings contribute to the fields of management, psychology, and gerontology by offering insights into how technological proficiency supports the psychological well-being of older adults. Practical implications include the development of targeted technology training and community education programs to enhance the digital skills and self-esteem of this demographic. However, the study acknowledges limitations such as its cross-sectional design and reliance on self-reported data, suggesting the need for future longitudinal research to further explore these relationships.

Keywords: Technological Proficiency, Self-Esteem, Technology Acceptance Model (TAM), Structural Equation Modeling (SEM)

Introduction

The rapid aging of populations across the globe presents significant social, economic, and healthcare challenges. According to the World Health Organization (2020), the global population aged 60 years and over is expected to double by 2050, reaching 2.1 billion. This demographic shift necessitates a stronger focus on strategies that enhance the well-being and

quality of life of older adults. One of the emerging concerns in this context is the increasing technological divide that exists between generations. While technology provides numerous benefits, such as improved access to information, enhanced communication, and greater convenience in managing daily tasks, many older adults struggle with digital tools and services, including smartphones, online banking, and social media (Iancu & Iancu, 2020). This disparity not only affects their ability to engage in modern society but also contributes to psychosocial challenges such as social exclusion, loss of independence, and lower self-esteem (Guner & Acarturk, 2020). As societies become more reliant on technology, the inability of older adults to keep pace with these advancements risks deepening existing inequalities, making it imperative to explore solutions that bridge this gap. This study examines one key factor in this equation: Technological Proficiency, which may play a vital role in supporting older adults' psychological well-being by reducing the adverse effects of the digital divide.

The concept of Technological Proficiency—defined as the extent to which an individual is comfortable and skilled in using digital tools, such as smartphones, online services, and basic troubleshooting—has emerged as a key determinant of how well older adults adapt to modern life (Klimova & Poulova, 2018). While technological proficiency is often viewed through the lens of digital literacy, its broader implications for psychological well-being remain underexplored. Recent studies indicate that technological proficiency in older adults is associated with improved self-esteem, increased social inclusion, and greater independence (Casanova et al., 2021). However, the mechanisms underlying this relationship remain insufficiently understood. Does technological proficiency enhance self-esteem directly, or does it mitigate other risk factors such as loneliness and social isolation? Understanding this relationship is crucial for developing targeted interventions that address the unique challenges faced by aging populations. Given that technology continues to permeate every aspect of daily life, there is an urgent need to investigate how older individuals can be empowered to develop technological skills, thereby safeguarding their psychological resilience and well-being.

Q1: What is the influence of Technological Proficiency on Self-esteem among older adults.?
O1: There is a significance of Technological Proficiency on Self-esteem among older adults.

The significance of this study is twofold. Academically, it contributes to the growing body of literature on aging, technology use, and psychological well-being by addressing the understudied link between technological proficiency and self-esteem among older adults. While previous research has explored digital literacy and its practical benefits, limited attention has been given to its psychological implications, particularly in relation to self-esteem, social inclusion, and perceived independence. By examining these interactions, this study advances understanding in gerontology and technology adoption, offering insights that can guide future research on digital interventions for aging populations.

Practically, the findings of this study can inform the design of targeted technology literacy programs tailored for older adults. For example, community-based workshops on smartphone use, online security, and troubleshooting could help mitigate the negative psychological effects associated with low technological proficiency. Additionally, the study's insights can aid policymakers, social workers, and healthcare providers in developing inclusive digital policies that promote active aging and social participation, ultimately enhancing the overall well-being of aging populations..

Literature Review

Definition of Self-Esteem

Self-esteem is a fundamental construct in psychology, widely recognized as an essential component of psychological well-being. It has been defined in various ways, including as a global evaluation of self-worth and through domain-specific judgments (Branden, N. 2021). Rosenberg (1965) defined self-esteem as a favorable or unfavorable attitude toward the self, encompassing feelings of self-respect and self-worth. Recent studies, such as Cingel et al. (2022), have expanded on this by exploring how self-esteem manifests in different populations, including older adults. This evaluation is persistent and significantly influences an individual's thoughts, behaviors, and overall psychological well-being. Rosenberg's seminal work posits that self-esteem is best understood as a global measure, capturing a person's overall sense of worthiness rather than domain-specific evaluations (Jordan, 2020). The Rosenberg Self-Esteem Scale (RSES), a widely used instrument, operationalizes this concept through statements that individuals rate in terms of agreement, providing a balanced view that integrates both high self-regard and the absence of self-deprecating thoughts. The RSES is noted for its reliability and validity across various populations, including older adults, where it has been adapted to capture age-specific experiences such as physical decline or retirement.

Furthermore, self-esteem is often conceptualized as comprising two key dimensions: self-worth and self-competence (Orth & Robins, 2022). In older adults, self-competence may play a critical role in their ability to navigate technological environments, which in turn reinforces or diminishes their sense of self-worth. Self-worth refers to the inherent value an individual places on themselves, independent of external achievements or societal validation, while self-competence relates to the belief in one's ability to perform tasks effectively and achieve goals. These dimensions are deeply interrelated, as a strong sense of self-competence often reinforces self-worth, particularly in contexts emphasizing achievement and productivity (Salice, 2020).

The dynamic nature of self-esteem is evidenced by its evolution over the lifespan, typically following a curvilinear trajectory: relatively high in childhood, decreasing during adolescence, peaking in midlife, and declining in old age (Orth et al., 2018). This trajectory reflects developmental changes, such as identity formation in adolescence, the achievement of life goals in midlife, and challenges like health decline or role loss in old age, which collectively influence self-esteem. During childhood, self-esteem is shaped by the social environment, particularly parental and peer feedback (Minev et al., 2018), while in adolescence, it fluctuates due to challenges related to identity formation and social comparison (Krauss et al., 2020). In adulthood, self-esteem stabilizes and peaks, driven by the attainment of life goals (Bleidorn et al., 2023). However, in late adulthood, self-esteem often declines due to challenges such as retirement, health deterioration, and loss of social roles (Zhang et al., 2019). While factors such as retirement and health deterioration can diminish self-esteem, the ability to engage with technology may offer new opportunities for social participation and independence, thereby moderating the decline.

This decline can be exacerbated by societal attitudes that prioritize youth, leading to feelings of obsolescence and decreased self-worth (Šare et al., 2021). Societal emphasis on technological competence may further contribute to older adults' feelings of obsolescence,

particularly as younger generations navigate the digital world with ease. Nevertheless, factors such as health, social support, and financial stability can moderate the impact of aging on self-esteem, with stronger social networks and greater resources contributing to higher self-esteem in later life (von Soest et al., 2018). In addition to health and social support, technological proficiency may serve as a crucial moderating factor, as the ability to engage with digital tools can enhance older adults' sense of competence and social inclusion.

Understanding self-esteem as a dynamic construct that changes across the lifespan underscores the importance of age-specific factors when studying the relationship between Technological Proficiency and self-esteem in older adults. Despite extensive research on self-esteem and aging, few studies have examined how technological proficiency specifically impacts self-esteem in older adults, a gap this study aims to fill. As technology becomes pervasive in everyday life, the ability of older adults to adapt to and engage with new technologies may significantly influence their self-esteem during this stage of life.

Definition of Technological Proficiency

Technological Proficiency is a critical concept in the context of aging and digital engagement, referring to the degree to which an individual is comfortable with and proficient in using modern technologies. This construct encompasses several components, including usage frequency, skill level, and adaptability to new technological advancements. These components are particularly relevant to older adults, as lower usage frequency, reduced skill levels, and difficulty in adapting to new technologies can widen the digital divide, impacting their ability to engage with essential services and maintain social connections.

Usage frequency refers to how often an individual interacts with technology, which can vary significantly depending on personal and environmental factors (Saubern et al., 2020). For older adults, usage frequency can be influenced by factors such as physical limitations, including reduced mobility or vision; access to devices; and the availability of social or familial support that encourages technology use. Skill level, on the other hand, involves the technical abilities required to operate digital devices such as smartphones and computers, which are increasingly necessary for accessing services, information, and social networks (Roque & Boot, 2018). For older adults, lower skill levels can impede access to essential services such as healthcare portals, financial management tools, and social networks, which are increasingly digitized.

Additionally, adaptability the capacity to learn and integrate new technologies into daily life—is especially important in an era of rapid technological change (Morgan et al., 2022). For older adults, adaptability can be hindered by cognitive decline, lack of training opportunities, or unfamiliarity with newer technologies, making it a key area of focus for interventions aimed at reducing the digital divide. Measuring Technological Proficiency typically involves a combination of self-reported assessments and objective measures. For older adults, self-reported assessments may be prone to over- or under-estimation due to unfamiliarity with the technology or memory issues, while performance-based tasks may need to be adapted for physical or cognitive limitations. Self-reported assessments may include questionnaires that ask individuals to rate their confidence and competence in using various technologies, as well as the frequency of their use (Sailer et al., 2021). In contrast, objective measures might

involve performance-based tasks where individuals complete specific activities using technology, allowing researchers to directly observe skill levels (Kim & Park, 2020).

The relationship between Technological Proficiency and psychological health, particularly among older adults, is well-documented. Studies show that increasing technological proficiency in older adults is associated with reduced depression and anxiety, as it enables them to maintain social connections and access mental health resources online (Kim et al., 2021). Frequent use of digital communication tools is associated with reduced feelings of loneliness and increased social connectedness (Anderberg et al., 2019). Moreover, higher levels of technological competence are linked to greater self-efficacy and autonomy, both of which are crucial for maintaining self-esteem in later life (Kim et al., 2021). However, the benefits of Technological Proficiency are not uniformly distributed, as the digital divide often exacerbates existing inequalities, leading to increased feelings of isolation and helplessness among those less skilled (Chen & Gao, 2023). Factors such as gender, socioeconomic status, and educational background further widen the digital divide in older adults, with women, those from lower-income backgrounds, and those with less education being disproportionately affected.

Therefore, fostering technological competence in the aging population is essential for promoting mental health and social inclusion, particularly as society becomes increasingly digitized. Effective strategies for fostering technological competence in older adults include community-based technology training programs, intergenerational learning models, and the development of simplified interfaces tailored to older users' needs.

The Relationship between Technological Proficiency and Self-Esteem

The relationship between Technological Proficiency and self-esteem in older adults remains a critical yet underexplored area of research, despite its potential importance in addressing the well-being of aging populations. Although existing research has increasingly examined the general effects of technology on older adults' well-being (Czaja et al., 2018; Barbosa Neves et al., 2019), few studies have directly addressed the specific relationship between Technological Proficiency and self-esteem. Most existing research has concentrated on broader outcomes such as digital inclusion, social connectedness, and the mitigation of loneliness among older populations. For example, Barbosa Neves et al. examined the role of technology in reducing social isolation, while Czaja et al. explored digital engagement's impact on cognitive functioning and social interaction.

Although these studies show the broader benefits of technology, they fail to specifically address self-esteem, which is a critical factor in the psychological resilience and autonomy of older adults. While increased cognitive functioning and social interaction can indirectly contribute to self-esteem by enhancing self-efficacy and autonomy (Poscia et al., 2018), there remains a lack of studies that empirically connect these effects to self-esteem in older adults. Poscia et al. touched on the psychological benefits of technological engagement, such as increased self-efficacy and autonomy, which are closely related to self-esteem. However, these studies often stop short of explicitly linking these benefits to self-esteem, instead focusing on general well-being or life satisfaction (Fang et al., 2018).

Although Pan (2020) noted that technological proficiency can enhance self-efficacy, which is a critical component of self-esteem, direct empirical evidence linking Technological Proficiency to self-esteem in older adults remains sparse, suggesting an opportunity for more targeted research. Furthermore, while the potential positive impacts of technology use on social participation and independence are well-documented (Zander et al., 2020), the specific pathway through which these factors might influence self-esteem is still largely theoretical (Parsakia, 2023). While increased social participation and independence can theoretically bolster self-esteem by reinforcing feelings of competence and autonomy, the mechanisms connecting these constructs remain underexplored.

Empirical studies by Holgersson and Söderström (2019) suggest that older adults who struggle with technological adoption may experience heightened feelings of frustration and lowered self-worth, pointing to a complex interplay between technology use and psychological outcomes. The frustration and lowered self-worth experienced by older adults who struggle with technology can be linked to broader psychological challenges such as anxiety, learned helplessness, and social withdrawal, indicating a complex relationship between technological proficiency and self-esteem.

In summary, while existing research lays the groundwork for understanding the broader effects of technology on older adults, the lack of focused studies on technological proficiency's direct impact on self-esteem underscores the need for empirical research. This could pave the way for interventions aimed at enhancing self-esteem through targeted technology education and support, contributing to the overall psychological well-being of aging populations.

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSES), developed by Morris Rosenberg in 1965, is one of the most widely used instruments for measuring self-esteem across various age groups and cultural contexts due to its robust psychometric properties (Jordan, 2020). Its widespread use can be attributed to its concise structure and ability to capture global self-esteem, making it suitable for diverse populations. Comprising ten items rated on a four-point Likert scale, the RSES assesses global self-worth by balancing five positively worded items with five negatively worded items, thereby controlling for response biases such as acquiescence (Gnambs et al., 2018). The balance of positive and negative items helps mitigate response biases like acquiescence, where individuals might agree with statements regardless of content.

The scale has demonstrated high reliability, with internal consistency typically ranging from 0.77 to 0.88, and strong test-retest reliability, with correlations often exceeding 0.80 over periods from weeks to years (Monteiro et al., 2022). These reliability metrics indicate that the RSES consistently measures self-esteem with accuracy across time and contexts. Validity is supported by the RSES's strong correlations with related constructs like self-worth and psychological well-being, as well as its predictive power regarding various behavioral and emotional outcomes (Lima & Souza, 2019). For Lima and Souza instance, studies have shown that higher RSES scores are predictive of reduced depressive symptoms and greater life satisfaction.

In this study, the RSES is particularly suitable for assessing self-esteem in older adults due to its simplicity and clarity, which are critical when working with populations that may have varying levels of cognitive function or literacy (Mayordomo et al., 2020). Older adults may have varying cognitive abilities, and the straightforward language of the RSES makes it accessible even for those with reduced literacy or cognitive decline. However, it is important to note that the RSES may not capture age-specific aspects of self-esteem related to health, independence, or social roles. Moreover, the scale's balanced structure captures both positive self-regard and the absence of self-criticism, essential dimensions of self-esteem in later life (Ogihara & Kusumi, 2020). In later life, maintaining positive self-regard and minimizing self-criticism are crucial for psychological resilience, especially as older adults face challenges such as health decline and social role changes.

Given its established reliability and validity, the RSES provides a solid foundation for exploring the relationship between Technological Proficiency and self-esteem in older adults. Its ease of administration and interpretation also makes it ideal for large-scale studies, ensuring consistency and efficiency in data collection. While the RSES is straightforward and efficient for large-scale studies, its reliance on self-report may introduce social desirability bias, especially in older adults who may be hesitant to disclose low self-esteem.

Technology Acceptance Model

The Technology Acceptance Model (TAM), originally proposed by Davis in 1989 (Granić & Marangunić, 2019), serves as a foundational framework for understanding how individuals accept and use technology. As illustrated in Figure 1, TAM emphasizes two key variables perceived usefulness (PU) and perceived ease of use (PEOU) which significantly influence an individual's attitude toward using technology, ultimately affecting their behavioral intention and actual usage. Positive experiences with technology, particularly when it is perceived as useful and easy to use, foster favorable attitudes, thereby increasing the likelihood of usage.

In the context of older adults, Technological Proficiency can be framed within the TAM, where perceptions of usefulness and ease of use play crucial roles in determining their engagement with technology (Guner & Acarturk, 2020). For older adults, factors such as cognitive decline, reduced motor skills, and lack of previous experience can make the perceived ease of use particularly challenging. As older adults become more familiar with technology, they often develop greater self-efficacy—a belief in their ability to effectively use technology—which directly enhances their self-esteem (Chen & Gao, 2023). As older adults build technological skills, their confidence in navigating digital platforms increases, leading to a sense of accomplishment and control, which are key components of self-esteem.

Additionally, the social impact of technology use, such as improved connectivity and reduced feelings of isolation, further contributes to this positive effect on self-esteem. Technologies such as video calling platforms like Video Chat, as well as social media, have been shown to reduce feelings of isolation, thereby improving self-esteem (Kaye, L. K., & Quinn, S. 2020). Expanding on TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) incorporates additional factors like social influence and facilitating conditions, which help explain the psychological benefits that come with Technological Proficiency (Dwivedi et al., 2019). Social influence refers to the extent to which individuals perceive that important

others believe they should use technology, while facilitating conditions involve the availability of resources and support to enable technology use.

Moreover, the use of technology can enhance perceived autonomy and independence among older adults, which are critical for maintaining self-esteem, particularly as they navigate the challenges of aging (Cebreros-Valenzuela et al., 2020). For example, health apps that track medication or wearable devices that monitor vital signs enable older adults to manage their health independently, thus boosting their sense of autonomy and self-worth. Therefore, TAM and related models provide a robust theoretical framework for understanding how Technological Proficiency influences self-esteem in older adults by elucidating the complex pathways through which technology use can enhance psychological well-being. As digitalization continues to transform everyday life, understanding how technological proficiency can influence self-esteem in older adults becomes increasingly important for promoting psychological well-being and social inclusion in this rapidly growing demographic.

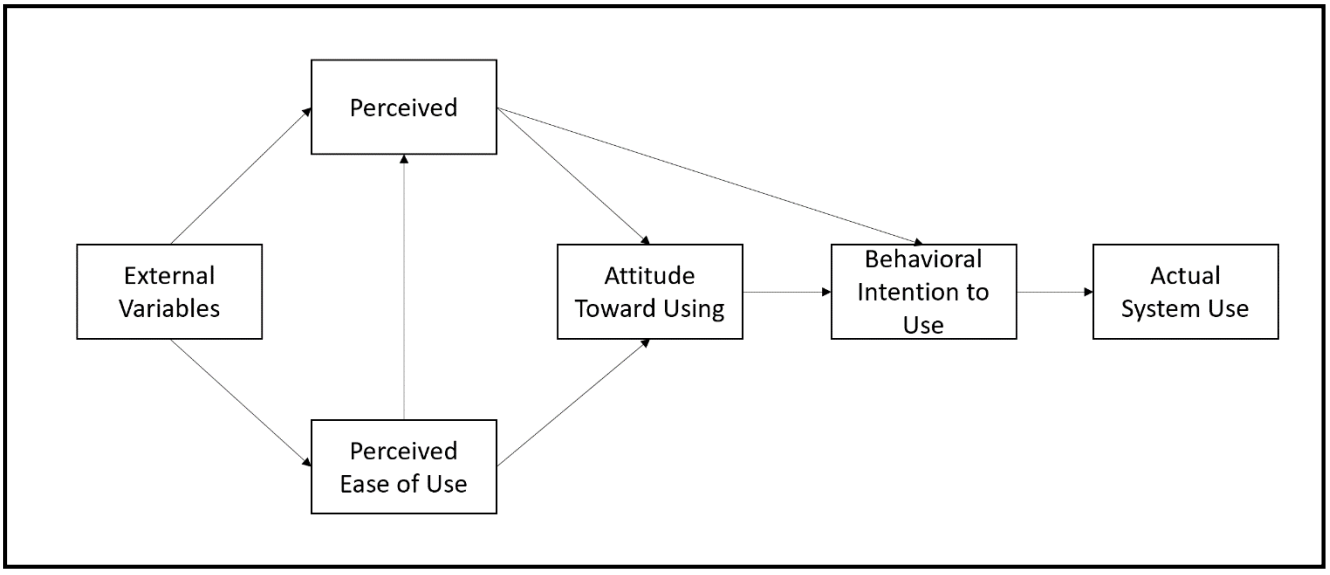

Figure 1, Technology Acceptance Model
Source: Marangunić & Granić, 2015

Frameworks of the study

Given the increasing role of technology in daily life, it is crucial to understand how older adults adapt to these changes and how this adaptation impacts their psychological well-being, particularly self-esteem. However, few studies have systematically explored the link between technology acceptance and self-esteem in this population, leaving a significant research gap. In this study, we employ a comprehensive theoretical framework to explore how technology acceptance influences the self-esteem of older adults. As illustrated in Figure 2, at the core of our framework is self-esteem as the dependent variable, measured using the Rosenberg Self-Esteem Scale (RSES) to capture older adults' global sense of self-worth. This model highlights the pathways through which technology acceptance, influenced by various psychological and social factors, impacts self-esteem..

In our adapted framework, technology acceptance serves as the independent variable, originating from the Technology Acceptance Model (TAM), where perceived ease of use and

perceived usefulness are central components. In addition to these core variables, factors such as anxiety about using technology and concerns about its relevance may also influence technology acceptance in older adults. Perceived ease of use refers to the degree to which an individual believes that using a particular technology will be free of effort, while perceived usefulness relates to the extent to which a person believes that the technology will enhance their life or performance.

For older adults, technology acceptance encompasses not only their willingness to use new technology but also their experiences and feedback during actual use. For older adults, technology acceptance can also be influenced by factors such as social support from family members or caregivers, the accessibility of devices like touchscreens, and prior experience with technology. Therefore, we broadly define technology acceptance to include a wider range of factors influencing older adults' engagement with and use of technology, such as their attitudes toward technology, frequency of use, and skill levels.

We hypothesize that higher levels of technology acceptance can positively influence the self-esteem of older adults by enhancing their self-efficacy, social participation, and independence. Older adults often face challenges related to declining physical and cognitive abilities, which can undermine their sense of independence and self-worth. By improving self-efficacy and fostering social participation, technology use can help maintain or even enhance their self-esteem. As older adults gain confidence in their ability to use technology, they may feel more competent in handling daily tasks, which in turn strengthens their self-image and overall sense of worth.

Through this comprehensive framework, our study aims to provide a detailed understanding of how differences in technology acceptance can lead to varying psychological outcomes in terms of self-esteem among older adults. This framework aims to shed light on how varying levels of technology acceptance can lead to different psychological outcomes, such as improved self-esteem, greater life satisfaction, or enhanced emotional well-being, particularly among aging populations.

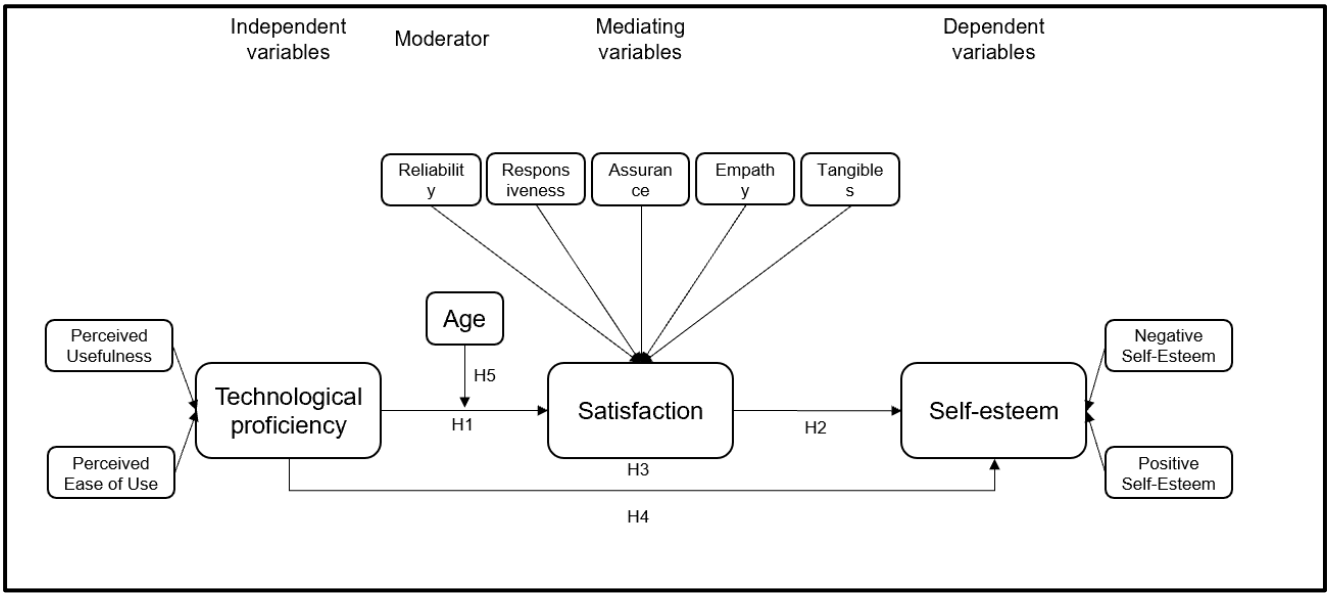

Figure 2, Framework Model

Methodology

This study employs a quantitative research approach, utilizing a cross-sectional design to explore the relationship between Technological Proficiency and self-esteem among older adults. While the cross-sectional design allows for the efficient collection of data at one point in time, it inherently limits the ability to infer causal relationships between Technological Proficiency and self-esteem. The target population consists of individuals aged 60 and above, a group particularly relevant for studying the digital divide. To ensure representativeness, a stratified random sampling method will be used to capture diverse subgroups, including gender, socioeconomic status, and geographic location (urban/rural). A power analysis using G*Power will be conducted to determine the appropriate sample size based on anticipated effect sizes and the study's design, aiming for a minimum of 283 participants.

Data will be collected via a structured questionnaire, which includes validated measures of Technological Proficiency and self-esteem, such as the Rosenberg Self-Esteem Scale (RSES). The Technology Acceptance Model (TAM), validated by Davis (1989), assesses frequency of use, skill level, and adaptability to new technologies, ensuring its relevance to older adults. The inclusion of validated scales enhances the reliability and validity of the findings.

The analysis will be conducted using SPSS 29, beginning with descriptive statistics and normality tests to assess data distribution. If the data are normally distributed, structural equation modeling (SEM) using AMOS will be applied due to its ability to test complex relationships and latent variables. If normality is not met, partial least squares (PLS) path modeling will be used for its robustness in handling non-normal distributions and smaller sample sizes. Preliminary significance testing using t-tests or ANOVA will assess group differences, while SEM/PLS will model the complex relationships between variables.

Ethical considerations include obtaining informed consent, ensuring confidentiality, and securing IRB approval. Limitations such as the cross-sectional design's inability to infer causality, potential response biases due to self-reported data, and challenges in generalizing findings beyond the sample will be acknowledged. Despite these limitations, the study's design and methods are robust, providing valuable insights into the impact of Technological Proficiency on the self-esteem of older adults.

Conclusion and Expected Finding

In summary, this study anticipates that Technological Proficiency will have multifaceted impacts on the self-esteem of older adults, with both positive and negative effects depending on the individual's level of proficiency. On one hand, greater proficiency with technology is expected to significantly enhance self-esteem by boosting self-efficacy, increasing social participation, and promoting independence. Previous research by Jokisch et al., (2020) has shown that increased technological proficiency in older adults is linked to improved self-efficacy and greater social participation, which are critical components of psychological well-being. These factors collectively provide older adults with a sense of accomplishment, autonomy, and confidence in their ability to manage daily tasks and stay connected with others. For instance, the ability to effectively use digital communication tools, such as social media platforms and video conferencing, can enable older adults to maintain and even expand their social networks, thereby reducing feelings of isolation and enhancing their overall sense of belonging. Moreover, proficiency in using online services, such as telehealth

or online banking, can empower older adults to take greater control of their personal health and finances, reinforcing their sense of independence and reducing reliance on others.

On the other hand, the study also recognizes that lower levels of Technological Proficiency may have detrimental effects on self-esteem, potentially leading to feelings of inadequacy, frustration, and social exclusion. For those with low technological proficiency, frustration and exclusion may trigger feelings of learned helplessness and technological anxiety, further contributing to declines in self-worth (Kim et al., 2023). Older adults who struggle with learning new technologies or adapting to the rapid pace of technological change may experience a decline in their perceived self-worth, as they may feel left behind or incapable of keeping up with societal demands. This digital divide can exacerbate existing vulnerabilities among older populations, particularly those who are already marginalized or have limited access to technological resources. As a result, these individuals may face increased psychological distress, further diminishing their self-esteem.

The theoretical contributions of this research are significant, offering new insights into the intersection of management, psychology, and gerontology. This study builds on the Technology Acceptance Model by incorporating psychological factors such as self-efficacy, providing a more comprehensive understanding of how technology use influences self-esteem in older adults. By elucidating the ways in which Technological Proficiency influences self-esteem particularly through psychological constructs like self-efficacy, social connectedness, and autonomy this study provides a nuanced understanding of how older adults adapt to technological changes. These insights are invaluable for organizations and institutions that aim to support older adults in the digital age. By tailoring interventions and support systems that address the unique challenges faced by older adults, such organizations can play a crucial role in promoting the overall well-being and quality of life of this demographic.

Practically, the findings of this study underscore the importance of developing community education programs and targeted technology training initiatives designed specifically for older adults. Research has shown that factors influencing seniors' acceptance of technology, particularly in the context of aging in place, include targeted training programs that address specific needs, ultimately enhancing both technological skills and psychological well-being (Tsertsidis et al., 2019). These programs should focus not only on enhancing technical skills but also on building the confidence and motivation needed to engage with new technologies. Furthermore, the design of technology products and services should consider the cognitive and physical limitations of older users, ensuring that these tools are accessible, intuitive, and user-friendly. By fostering an inclusive digital environment, society can help mitigate the negative effects of technological exclusion and empower older adults to fully participate in the digital world.

However, this study also acknowledges several limitations. The cross-sectional design limits the ability to draw causal inferences, meaning that while associations between Technological Proficiency and self-esteem can be identified, it is difficult to determine the directionality of these relationships. Future research should employ longitudinal designs to better capture the dynamic nature of technological proficiency, as older adults' engagement with technology may change over time. Additionally, the reliance on self-reported data may

introduce biases, such as social desirability bias or recall bias, which could affect the accuracy of the findings. Future studies should explore how intersecting factors such as ethnicity, income level, and geographic location influence both technological proficiency and its impact on self-esteem. Furthermore, the rapidly evolving nature of technology presents a challenge, as the relevance of the findings may diminish over time as new technologies emerge and older ones become obsolete.

To address these limitations, future research should consider employing longitudinal designs, which would allow for a more comprehensive analysis of how Technological Proficiency and self-esteem evolve over time. Additionally, expanding the sample to include a more diverse population in terms of ethnicity, socioeconomic status, and geographical location would enhance the generalizability of the findings. By addressing these areas, future studies can provide a more robust understanding of the psychological impact of Technological Proficiency on older adults, ultimately contributing to more effective strategies for supporting this population in the digital age.

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