

Faculty of Behavioural, Management, and Social Sciences
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Master Thesis

Unravelling Digital Well-being: Exploring the
Transformative Powers of Growth and Fixed
Mindsets with Moderation Analysis

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Abstract

Purpose – In our rapidly evolving digital age, understanding what impacts our well-being in the digital realm has become paramount. This research embarked on a journey to unravel the almost unexplored facets of digital well-being, guided by a simple yet profound question: How do our inherent beliefs and digital information skills shape our digital well-being?

Aim – This study has a two-fold aim. First, it aims to clarify the concept of digital well-being and how growth and fixed mindset influence it. Next, it also wants to explore the concept of digital information skills and its moderating role in the relationship. It thus seeks to unravel the concept of digital well-being and the factors that possibly impact it.

Method – To add to the concept of digital well-being and clarify it, a new measurement instrument was developed to evaluate digital well-being and its considered dimensions. These dimensions were determined to be digital risks and safety, digital disconnection, and digital dependence. Via the developed exploratory questionnaire, 403 participants, mainly from Germany and the Netherlands, took part and offered their insights into these topics.

Results – It was discovered that our mindset and digital information skills play a pivotal role in shaping our digital well-being. Contrary to expectations, it was revealed that mindset does not play a role in an individual's awareness of digital risks and safety; however, intriguing moderating effects of digital information skills on the relationship between mindset and digital well-being dimensions were identified.

Implications – The findings challenge the assumptions about the role of mindset in digital safety and disconnection, suggesting that mindset alone may not guarantee higher levels of these factors. Instead, they underscore the importance of digital information skills, particularly for individuals with a growth mindset, to enhance digital safety. Furthermore, the findings emphasize the significance of mindset in shaping digital dependence, with growth mindset individuals showing a stronger inclination towards digital reliance. Lastly, the study underscores the importance of digital information skills. Regardless of mindset orientation, improving and investing in digital skills can enhance digital well-being.

Keywords: digital well-being; growth mindset; fixed mindset; digital information skills; PROCESS macro

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1. Introduction

On top of the usual stressors related to daily work, school, and social life, digital technologies have been recognized as increasingly impacting mental health and well-being (Santos et al., 2023). Especially over the past years, highlighted by the COVID-19 pandemic, all age groups' struggles with digital technologies were heightened and brought to the general public's attention. However, even before, it has become evident that society, especially youth and young adults, is facing a mental health crisis (Rosenthal, 2023). The World Health Organization (WHO) also states that stress-related mental health disorders, such as anxiety or depression, are significant causes of disability worldwide, with approximately 300 million people suffering from depression alone (WHO, 2017). As digital technologies become more integrated into daily life and daily activities, ranging from schoolwork to the office to simple tasks in the household, it becomes clear that it is essential to understand how these technologies affect people's mental health and well-being. It has already been shown that despite its importance and significance in everyday life, the excessive use of digital technology can often lead to negative consequences such as increased stress, fatigue, burnout, and decreased productivity (Agafonov et al., 2021; Tarafdar, 2007). A way to cope and work with such feelings is through adjusting one's mindset. Through exploring the profound impact mindsets can have on individuals' well-being in the digital age, valuable insight can be gained into how individuals can maneuver these challenges and harness the benefits of technology to lead more balanced and fulfilling lives (van Tongeren et al., 2018). Mindsets, thus, matter since the beliefs people hold can impact their lives, influencing critical factors like psychological well-being.

Mindset is a crucial component when determining not only someone's behavior but also the degree of happiness, satisfaction, and success they achieve in life (Dweck, 2006; Kern et al., 2015). Dweck's work on the implicit theory of intelligence is an established approach to understanding the complexity of mindset. This theory states that all individuals hold two types of beliefs about the nature of their skills and intelligence within them, distinguishing them as a fixed mindset (entity theory) and a growth mindset (incremental theory) (Dweck, 2012; Dweck & Leggett, 1988). According to this approach, individuals with more of a growth mindset view challenges and failures as opportunities to learn and develop. In contrast, fixed mindset individuals view them as risky situations that could negatively expose them (Dweck, 2012). This becomes crucial when dealing with the digital realm, as it can make or break someone's ability to adjust to new developments and subsequently influence someone's well-being profoundly.

Previous research has already established the above (Keech et al., 2020; Leibowitz & Vittersø, 2020), stating that how individuals perceive challenges can positively or negatively impact their perceived mental health and well-being positively or negatively. However, the relationship between

mindset and the more novel concept of *digital well-being* remains unexplored. Digital well-being emerged due to individuals and society being increasingly influenced by digital technologies and being connected and available around the clock. According to Vanden Abeele (2021) and Gui et al. (2017), it can generally be defined as an individual's subjective perception of their well-being concerning their use of digital technology, thus finding a balance between the advantages and disadvantages of mobile connectivity. Achieving digital well-being means getting the most out of their mobile devices while still feeling in control and not letting it interfere too much with their daily life.

As the exploration of the relationship between mindset and digital well-being unfolds, it becomes apparent that more than understanding these two concepts is needed to present a complete view of the individual's experience. The inclusion of the concept of digital information skills in this research is not only pertinent but also indispensable. In today's era of information abundance and digital connectivity, accessing, evaluating, and effectively utilizing digital information is a pivotal skill set. Digital information skills, which encompass digital literacy, information literacy, and critical thinking, function as the tools enabling individuals to navigate the digital terrain, make informed decisions, and mitigate potential adverse consequences associated with excessive digital technology use (Saikkonen & Kaarakainen, 2021). Evidence suggests that having a particular attitude toward learning, specifically online learning, influences an individual's intrinsic motivation to know and learn (Ferrer et al., 2020). Furthermore, first-time online learners with more of a growth mindset have been shown to adapt to online learning situations more quickly and accept the utilization of new technology (Tseng & Kuo, 2017). However, there has only been some limited in the relevance of attitude or mindset in relation to online learning and knowing (i.e., Digital information skills). The relationship between digital well-being and digital information skills shown in Dweck's mindset theory has yet to be established or studied as an integrated framework.

Digital well-being is a complex and multifaceted concept, encompassing various factors, such as the impact of technology on mental and physical health, productivity, and work-life balance (Vanden Abeele, 2021). Since the concept of digital well-being has only been explored to a limited amount, this study will contribute to an attempt at a measurement scale and further exploration of the concept. Exploring and understanding the influence of growth and fixed mindsets on digital well-being with the moderating role of digital information skills can help better understand the complex relationship between mindset, digital technology, and digital well-being. It may lead to developing targeted interventions and strategies to promote digital health. Hence, the following research questions have been developed to target those areas.

RQ1: *What effect do people's growth and fixed mindset have on their digital well-being?*

RQ2: To what extent do digital information skills moderate the relationship between mindset and digital well-being?

This research will contribute to the existing body of literature by exploring the relationship between growth and fixed mindset and digital well-being, which has yet to receive much attention in the literature so far. The aim is to add to the information spectrum regarding the general concept of digital well-being and contribute to the discourse on digital well-being and mindset by exploring the nuanced connections between these variables and shedding light on the potential avenues for personal growth and resilience in an increasingly digitized world. Additionally, the study will shed light on the moderating role of digital information skills and provide insights into how healthier technology use can be promoted and integrated into daily life.

The following offers a thorough description and exploration of the concept of digital well-being. This is followed by a critical description and evaluation of the concept of growth and fixed mindset, concluded with stating the hypotheses. After that, the research methodology is described. It explains how the applied questionnaire was designed, as well as the measures taken to ensure the reliability and validity of the study. The questionnaire results will be presented hereafter, and the study will conclude with a critical analysis of these, a reflection of the process, and a look ahead.

2. Theoretical Framework

This research aims to find out and better understand whether growth and fixed mindset influence individuals' digital well-being. This chapter will explain the terms of digital well-being and growth and fixed mindset and their assumed connection with each other. First, the term digital well-being is discussed and conceptualized. This is followed by examining Dweck's mindset theory and the subsequent connection both factors might share. Additionally, the relevance of the concept of digital information skills is explained.

2.1. Digital Well-being

The term *well-being* has become a buzzword over the past years. However, it is not only an often-misused word but a crucial and central aspect of human health (Dodge et al., 2012). Society has become increasingly aware of its importance in personal and professional environments, as well-being is an individual's overall sense of physical, emotional, and social health. According to Statham and Chase (2010), well-being can be considered as the general quality of people's lives. They further elaborate and state that well-being is a holistic concept that reaches beyond the absence of illness and disease and encompasses a range of elements that can contribute to an individual's general sense of health. The World Health Organization also agrees as they define well-being in their constitution as: "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO, 2023, para. 1). Hence, well-being is a state that can be enhanced or diminished by fulfilling or neglecting an individual's personal or social goals (Statham & Chase, 2010). The WHO (2023) further claims that achieving a state of well-being can be considered a fundamental human right, and it is necessary to live a fulfilled and satisfied life. Thus, it is evident that to understand the general concept of well-being, factors such as mental, physical, and social aspects of life need to be considered.

The relationship between technology and well-being has been intensely researched over the past decades. While some studies have found that digital technology can enhance well-being by providing social support and facilitating communication (Baumeister & Leary, 1995), others have found harmful effects on mental health, including increased depression, anxiety, and stress (Twenge & Campbell, 2019). Kross et al. (2013) also pointed out that constant comparison to others' supposedly perfect lives on social media leads to negative feelings about oneself. In the context of digital technology, this would mean that individuals may compare themselves to others on social media, leading to negative self-evaluation and reduced well-being (Vogel et al., 2015). Thus, over the years, the general concept of well-being developed and was heavily influenced by the rise of digital

technologies. Hence, a newer concept of well-being had to be developed to justify and meet this digital age's current standards and challenges. Technologies have fundamentally altered how people communicate, work, and entertain themselves. Consequently, the importance of understanding well-being within a digital environment is due to the continuous integration of digital technologies into all parts of modern life (Gui et al., 2017). Still, even though technologies can provide numerous benefits, such as enhanced productivity, communication, and entertainment, concerns have been rising, and their effect on well-being should, thus, be examined. Being digitally connected around the clock can negatively and positively affect a person's well-being through insufficient sleep, mind wandering, decreased life satisfaction, and more (Lissak, 2018).

Due to digitalization, the fusion of *digital technologies* and *well-being* emerged, which is still a relatively new and not much-explored concept. So far, only a few researchers have attempted to address the term, conduct research, and tried to define the concept of *digital well-being* (Gui et al., 2017). Beetham (2015), for instance, mentions several points she deems disruptive to the students' and teachers' digital well-being, like illegal online behavior and stress due to digital work environments. Moreover, Gui et al. (2017, p. 166) describe digital well-being as "a state where subjective well-being is maintained in an environment characterized by digital communication overabundance." Similarly, Burr, Taddeo, and Floridi (2020) refer to digital well-being as the impact digital technologies have on what society perceives as living a life that is essentially good for human beings. Hence, it essentially refers to the balance between the benefits and drawbacks people experience from being connected and online all around the clock (Vanden Abeele, 2021). It is not linear and depends on the individual's personality and the amount of technology used. While the relationship between digital technology and well-being, thus, examines the broader effects of technology on individuals' lives, digital well-being can be seen as more of a specific and focused construct with a proactive approach to understanding and enhancing well-being in the digital age.

One's digital well-being thus depends on the type, frequency, and duration of digital technology use (Orben & Przybylski, 2019). For instance, moderate social media use has been found to be positively associated with digital well-being, while excessive use can subsequently have adverse effects (Lin et al., 2016). Lately, however, a growing body of literature has been advocating to look beyond the benefits of such digital tools and instead focus on the mental challenges users face when exposed to them. According to Beetham (2015), one such challenge is the pressure to adapt to a fast-paced and constantly changing digital environment. Additionally, online harassment, cyberbullying, discriminatory hostility, or algorithms should be considered when exploring the concept of well-being within a digital environment (Kaakinen et al., 2018). Against this background, Beetham (2015) argues that individuals must be asked how they perceive and adapt to such extreme matters within

digitalization. The concept of digital well-being, thus, intends to address problems such as coping with digital stressors, how people feel about technologies shaping their daily lives, and how they define themselves within such environments while placing themselves and their participation in this digital world at the core of digital technologies (Beetham, 2015; Gui et al., 2017). Having an introspective and reflective view of one's technology use is, thus, vital in order to ensure digital well-being. Similarly, awareness of one's mindset and how specific environments and stressors are perceived can even out the way to a healthy digital well-being. Exploring the factors that make up the concept of digital well-being is, thus, vital and the first step in understanding the concept in its entirety.

2.1.1. Dimensions of Digital Well-being

When looking at the literature and previous attempts at conceptualizing the concept of digital well-being, it becomes apparent that researchers lack uniformity regarding its definition. However, despite the fluctuation across literature, what can be found are various factors and dimensions that can seemingly be attributed to digital well-being. When considering possible dimensions of digital well-being, the works of Büchi (2021) should be considered. According to his digital well-being framework, digital practices influence well-being and are moderated by social connectedness. He hypothesizes that the amount of certain digital practices used could lead to experiencing social connectedness, thus enhancing one's digital well-being. Büchi (2021) concludes that the impact of digital practices on well-being is neither inherently good nor bad but depends on the context. Furthermore, social connectedness and digital practices are essential, as it is acknowledged that the balance between concrete harms and benefits constantly affects one's overall well-being. Nevertheless, while social connectedness and digital practices are essential factors to consider when defining digital well-being, other influences, such as the skills and knowledge to safely navigate digital technologies, are not considered.

This presumably important factor of digital well-being is mentioned within the ethical aspects and considerations of Burr et al. (2020). According to Burr et al. (2020), four issues can be identified: education, healthcare, governance, social development, and media and entertainment. According to them, digital technologies are changing education and employment dynamics, such as the possible quantification of well-being. One requirement to combat that is to focus on and encourage digital literacy and lifelong learning, like acquiring the skills to navigate such technologies. Furthermore, healthcare relates to a broad spectrum of factors, from privacy and autonomy to accountability and accessibility. Ensuring clarity for individuals is thus essential regarding their data and technology. The concern of social development relates to privacy risks and data security and the fact that they need to be balanced with the benefits socioeconomic data gathering could bring. Lastly, they believe that the

social feedback received on social media can affect individuals' self-esteem and emotional development. Even though digital technologies offer opportunities for self-understanding, social relatedness, and empowerment, Burr et al. (2020) clearly state that ethical concerns, such as the impact of social media on digital well-being, privacy, and manipulation of user emotions, need to be monitored and considered.

On a different note, but adding to the previously mentioned, Steinert and Dennis (2022) argue that it is crucial to focus and pay attention to the impact social media technologies have on the emotional lives of users. They state that an individual's digital well-being is especially vulnerable if these experiences are exploited. Understanding and reflecting on how social media technologies are linked to and affecting an individual's emotional life and digital well-being is, thus, crucial.

Yu et al. (2022) have researched the concept of digital well-being within Pakistan's teachers' scope. They reported that their perceived skills and resilience significantly influence digital well-being. It was also observed that having digital access was a crucial issue, as the loss of digital access and the lack of proper training on digital literacy negatively affected their digital well-being.

Based on the constructs mentioned above and frameworks, as well as further literature (e.g., Peart et al., 2020; Beldad & Hegner, 2018; Rapp & Salovich, 2018), the following four concepts were created that aim to summarize the potential dimensions of digital well-being and how they influence individuals within today's digital environment, as shown in Table 1. A few concepts and definitions of digital well-being exist already; however, it can be believed that many lack the different facets and influences that potentially affect digital well-being. Only focusing on the emotional lives of users or their perception of their own representation within digital technologies does not encompass the different components that need to be considered when measuring digital well-being. Therefore, the following highlights the importance of understanding the different aspects of individuals' interactions with digital technologies and the factors that can possibly influence their digital well-being.

Table 1

Dimensions of Digital Well-being and their characteristics

Concept	Example	References
Digital Risks and Safety	Protection of personal data and privacy, awareness of personal information online; perceived control over personal data; taking measures to safeguard digital information from unauthorized access, use or disclosure.	Gross & Acquisti, 2017; Beldad & Hegner, 2018; Isaak & Hanna (2018); Beetham (2015); Burr et al. (2020)

Digital Connectivity	Social interactions; substitutions to in-person interactions; developing and working on relationships; social competition	Cotten et al., 2013; Hampton et al., 2015; Twenge & Campbell, 2019; LeFebvre et al. (2019); Shah (2019); Sabatini & Sarracino (2017); Büchi (2021)
Digital Access	Information overload; censorship; unavailable technology and its impact on the self; availability of digital technology	Gui, Fasoli & Carradore (2017); Campbell (2019); Rapp & Salovich (2018); Dhir, Yossatorn, Kaur & Chen (2018); Peart et al. (2020); Yu et al. (2022)
Digital Mindfulness	exercise control over the use and impact of digital technologies on one's life; awareness and conscious use of digital technologies; purpose and intention; being aware of its impact on mental and emotional health; balance with other aspects of life such as work, leisure and social interactions.	Sheldon et al., 2020; Woods & Scott, 2016; Peart et al. (2020); Burr et al. (2020); Steinert & Dennis (2022)

By including these dimensions in the concept of digital well-being, the various factors that contribute to an individual's overall satisfaction, safety, and positive health and experiences in the digital world can be comprehensively assessed and understood.

One concept that is quickly overlooked when it comes to well-being concerns safety, data, and privacy protection. Including digital safety in the dimensions of digital well-being is essential as feeling safe and secure online contributes significantly to a positive experience with technology, reduces anxiety, and helps maintain a safe and secure online presence. Measuring concepts related to digital safety, thus, provides insights into the potential risks individuals face and their general ability to protect themselves from harm while engaging with digital technologies. Gross and Acquisti (2017) highlighted the importance of such issues, suggesting that online users must be mindful of the risks associated with digital technology and thus take appropriate measures to protect themselves (Pelet & Taieb, 2017). Beyond just setting solid passwords, digital safety involves a holistic understanding. It also concerns digital literacy, accentuating the importance of having the skills to safeguard digital information from unauthorized access, use, or disclosure (Beldad & Hegner, 2018). They also emphasized the role of organizations, which must promote the cause of digital safety and educate their employees on digital literacy.

Something more apparent in their importance to digital well-being are interactions and connections online. Considering digital connectivity as a concept when defining digital well-being

recognizes online relationships, communities, and circles' significant impact on an individual's overall well-being, social support, and sense of belonging (Büchi, 2021). Measuring concepts related to social support, online social interactions, online community engagement, and feelings of belongingness can help assess digital technology's influence and impact on an individual's social well-being and satisfaction with their digital connections. One significant factor that influences connectivity is social media. Cotten et al. (2013) found that social media use can bolster social support, an essential component of well-being. This indicates the platform's potential in developing and working on relationships. However, it has also been found that social media can be associated with higher rates of depression and loneliness among adolescents due to their over-reliance on online spaces and their real lives happening more on the sidelines (Campbell, 2019). Social media use has been associated with greater social capital, which refers to the resources and advantages individuals can obtain from their social networks (Hampton et al., 2015). However, Twenge and Campbell (2019) and similarly, LeFebvre et al. (2019) found that constant connectivity through excessive texting could be associated with lower satisfaction among partners. Within the delicate interplay between digital connectivity and digital well-being, the type and intent of said interaction play a pivotal role (Sha, 2019). Passive engagements like mindlessly scrolling news feeds often correlate with negative repercussions. In contrast, active engagements, like posting or commenting, tend to foster a positive disposition. Overall, the relationship between digital connectivity and digital well-being is complex and may depend on various factors, e.g., the type of technology used and the context of use.

Having grown up privileged and in a Western country, the thought of not having access to technology is almost unimaginable for many. However, it should be considered what impact it can have on individuals if they cannot access digital technologies. Access to materialistic devices and information, education, online services, and social connections through digital means can empower individuals and promote inclusivity and equal opportunities (Gui et al., 2017). Similarly, though, it can also foster feelings of isolation and social decline when unable to access such resources (Yu et al., 2022; Gorenko et al., 2021). Campbell (2019) resonated with this, arguing that the availability of digital technology, and by extension, the Internet, is not just a matter of convenience but a prerequisite for social and economic integration. However, the spectrum of digital access is not merely binary - available or unavailable. On one hand, there is information overload, where an overabundance of data can overwhelm individuals. Contrarily, the other extreme displays the challenges of limited access and the repercussions of unavailable technology on the self. Inaccessible technology translates into tangible feelings of isolation and disengagement, thereby negatively impacting psychological well-being (Rapp & Salovich, 2018). On a more positive note, Dhir, Yossatorn, Kaur, and Chen (2018) highlight that unlimited digital access can affect psychological well-being positively. This includes

increased social connections, reduced stress, and greater opportunities for education and employment. Peart et al. (2020) noted that digital access is essential to digital information skills and highlighted the importance of promoting equal access to digital technologies for digital well-being. Hence, measuring digital access is crucial when making conclusions about digital well-being.

Being aware and intentional about one's digital behaviors and practices might be one of the most apparent concepts that need to be included when measuring digital well-being; however, it is also one of the most crucial. By incorporating digital mindfulness into the concept of digital well-being, individuals learn to develop healthier relationships with technology, reduce the negative impacts of excessive screen time and enhance their overall mental and emotional well-being (Sheldon et al., 2020; Lissak, 2018). Measuring to which degree individuals engage in balanced and mindful technology use can help detect the presence of excessive or problematic behaviors and improve the ability to manage and control digital habits effectively. Related to that, Woods and Scott (2016) explored the concept of "digital detox" and its potential benefits for mental health, while Peart et al. (2020) developed a Digital Balance Scale to measure the degree of balance between technology use and other activities. By managing the use of technology, individuals may reduce stress, anxiety, and other harmful effects associated with excessive use of digital devices. Literature, thus, suggests that finding a healthy balance between technology use and other activities is critical for maintaining digital well-being (Steinert & Dennis, 2022). Practicing digital mindfulness, which involves intentional and conscious engagement with digital technologies, could thus positively influence digital well-being.

2.2. Growth and fixed mindset

As mentioned before, it becomes apparent that digital well-being has yet to be researched extensively. In comparison, the fact that our well-being is influenced by digital technologies, the Internet, and social media has been investigated more extensively (Castellacci & Tveito, 2018). It has become evident that different factors can influence the relationship between digital technology use and well-being. To those factors, we can also count personality traits or coping mechanisms. Coping strategies, such as problem-focused or emotion-focused coping, can influence the relationship between digital technology use and well-being. Individuals who use problem-focused coping, which involves actively trying to solve a problem, may experience more positive outcomes from digital technology use than those who use emotion-focused coping, which involves managing emotions (Park & Baek, 2018). One aspect that certainly falls under the domain of personality traits is the mindset, more specifically, growth and fixed mindset.

The term mindset refers to an individual's perspective on their abilities and the nature of their abilities. The earliest research into mindset originated in the early 1990s, with Gollwitzer proposing

the construct of mindset theory, stating that a reflective mindset is marked by more open-minded information processing. Opposite, a more implemental mindset can be characterized by more closed-minded processing. Furthermore, mindset theory was among the first to outline and explain the complex interaction between cognitive and interactional processes (Gollwitzer et al., 1990). Based on this first exploration, Fujita et al. (2007) found that having a reflective mindset can lead to superior recognition memory, suggesting that an increased open-mindedness leads to less selective processing of incidental information. According to Dweck (2006), mindset is the assumptions, methods, or notations held by someone or a group of people. It concerns a set of beliefs and a way of thinking. One's mindset is not stable but changes over time due to new experiences, triggers, and observations (Dweck, 2006). The concept of mindset is vital since it can help a group develop a unique approach to solving an issue and making decisions. It thus creates a common identity that can be systematized and shared with new group members (Bellin & Pham, 2007).

The concept of mindset is relatively comprehensive and complex, so research has adopted two main types of mindsets introduced by Stanford University psychologist Carol Dweck (2006). She developed and based those concepts on attribution theory and its effect on students. A growth mindset relates to the idea that one's basic inherent skills, such as intelligence or talent, are changeable and can be developed and nurtured. She further states that individuals with a growth mindset are more inclined to view challenges as opportunities. They are eager to learn new things, generally take things less personally, and believe their skills and abilities can grow through hard work, input from others, or good strategies. Furthermore, Dweck (2006) states that people with such a mindset are generally more open-minded toward new information and view failure and setbacks as opportunities to grow and learn. People with a fixed mindset tend to be more likely to view setbacks or failure as an indication of the natural limit to their skill or general lack thereof. They are furthermore less open to change and challenges or new information. They often fail to adjust their opinion despite the presence of new data and feel threatened by constructive criticism. It should be emphasized, however, that everyone has a mixture of both mindsets. People with a growth mindset can be provoked into a fixed mindset or vice versa (Dweck, 2006). This change typically happens when a greater sense of awareness of the individual's current mindset is developed, and steps are taken to adopt more of a growth mindset actively. This mindset change is crucial since it can lead to better interactions, relationships, and overall happiness (van Tongeren & Burnette, 2018). The concept of mindset has, thus, important implications for individuals' learning, achievement, and well-being. Research has shown that individuals with a growth mindset have higher achievement, better job satisfaction, and greater well-being than those with a fixed mindset (Dweck, 2006; Kondratowicz & Godlewska-Werner, 2022). Moreover, adopting a growth mindset can lead to positive changes in

individuals' behavior and learning, such as increased motivation, resilience, and willingness to take on challenges (Yeager & Dweck, 2012)

Even though the mindset theory is convincing and encouraging to many, referencing positive affirmations and the "power of yet" or "not yet", many scholars have criticized the theory. It has been revealed that Dweck's research has not been easily replicable. Hendrick (2019) argues that growth mindset theory is "what happens when psychological theories are translated into the reality of the classroom, no matter how well-intentioned" (Hendrick, 2019, p.6), thus concluding that even though Dweck's research might help individuals struggling with a fixed mindset, educators could be set up for failure due to the research's inability to be replicated.

While it is essential to acknowledge the criticism and limitations of the growth and fixed mindset theory, these challenges should not discourage further research. It is also important to acknowledge that a substantial body of research exists that supports the validity and effectiveness of the concepts in different contexts. Many studies have demonstrated positive outcomes concerning growth mindsets, such as increased resilience, motivation, and learning (e.g., Richardson et al., 2021; Wolcott et al., 2021; van Tongeren & Burnette, 2018). It is also noteworthy that criticism can lead to refinement and clarification of concepts. By addressing the criticisms and limitations of the growth mindset theory, contributions can be made to its evolution and improvement. Hence, this study will continue using growth and fixed mindset as the dependent variables in this model.

When it comes to digital technologies, having either a fixed or growth mindset could influence how individuals approach and handle such tools. Technology could be used to promote a growth mindset by providing opportunities for learning, feedback, and collaboration (Dweck, 2010). However, learning the way around new technologies generally takes time and effort, and technological developments at work frequently lead to fundamentally more complicated roles, requiring more cognitive abilities and ongoing retraining. Hence, attitudes about the malleability of ability, particularly an individual's beliefs about their own technological ability, are essential. When confronted with these initiatives, individuals must evaluate their relevant technological skills and belief in their abilities' malleability, which could affect how they react to and participate in the necessary change (Solberg et al., 2020). Hence, having a fixed mindset could limit one's openness to approaching new technologies and lead to a lack of information and inclusion, leading to decreased well-being.

Overall, the concept of mindset is an essential area of research that has implications for individuals' learning, achievement, and well-being. Adopting a growth mindset can promote positive changes in individuals' behavior and learning, and technology use can play a role in shaping individuals' mindsets. Researchers and practitioners can develop strategies and interventions that promote a

growth mindset and enhance individuals' learning and achievement by understanding the different dimensions of mindset.

2.3. Connecting the concepts

The literature still needs to include the connection between growth and fixed mindset and digital well-being. The broader concept of well-being has already been connected to mindset in the past since broadening a mindset has been related to broadening an individual's social, physical, and psychological resources (Frederickson, 2004; Ortiz Alvarado et al., 2019; Blake, 2022). However, it is still to be found whether a significant relationship exists between an individual's mindset (fixed or growth) and their level of digital well-being. Ultimately, institutions, organizations, and individuals could benefit from meaningful answers to that question and utilize the answers to improve and understand their own well-being.

2.3.1. Digital Risks and Safety

Central to the mindset theory is the proposition that a proactive approach to digital safety—safeguarding personal data, fostering awareness of the nuances of online threats, and advocating for responsible online interactions—can pave the way for a robust digital habitat (Dweck, 2006). Within this secure environment, individuals can navigate the digital realm with renewed confidence, capitalizing on opportunities, collaborating, and sharing perspectives without apprehensions about cyber threats or invasions of privacy. Consequently, this increased digital safety fosters a growth mindset, encouraging individuals to embrace technology, take risks, and continually learn and adapt, leading to personal and societal growth. Based on this, it is hypothesized that heightened awareness and perceived control over personal data, intertwined with digital risks and safety, will be positively associated with a growth mindset. Consequently, the first hypothesis is formulated as follows:

H1: *Individuals with a growth mindset are more likely to have higher levels of digital risks and safety than those with a fixed mindset.*

2.3.2. Digital Connectivity

An individual's mindset, whether it leans towards a more growth or fixed mindset, can influence their behaviors and attitudes within the digital environment, particularly regarding online interactions and connections. The interplay between one's mindset and digital connectivity must be addressed, as

evidenced by Smith et al. (2020). They postulated that these domains do not just coexist but intricately intersect with each other, influencing and being influenced in return. As individuals with a growth mindset tend to believe that their abilities and intelligence can be developed through effort, learning, and perseverance, individuals may be more inclined to actively seek out online relationships, communities, and circles as opportunities for personal growth and development when put in the context of digital connectivity. They might view online interactions to acquire new knowledge, skills, and social support, which are essential components of overall well-being (Dweck, 2006). On the other hand, individuals more prone to a fixed mindset may be more hesitant when engaging in online interactions or communities, worrying that they will fail in these digital spaces or not meet certain expectations. Understanding the nexus between our digital connections and inherent beliefs becomes paramount as we navigate this digital age. It is not just about how we connect but how these connections shape and are shaped by our mindsets. With this understanding, we can formulate the hypothesis:

H2: *Individuals with a growth mindset are more likely to have higher levels of digital connectivity than those with a fixed mindset.*

2.3.3. Digital Access

The connection between digital access and the concept of growth and fixed mindset can be framed in the context of understanding how individuals' beliefs about their abilities may influence their access to digital technologies. Individuals with a growth mindset may be more likely to seek out and embrace digital technologies actively. They may view technology as a tool for self-improvement, education, and skill development, aligning with a growth mindset's principles. Consequently, individuals with a growth mindset may be motivated to overcome barriers to digital access and actively engage with digital resources. However, the lack of digital access can also foster feelings of isolation and social decline when unable to access such resources (Yu et al., 2022). Individuals with a fixed mindset may be less inclined to seek digital access or to adapt to new technologies. They may believe that their abilities are fixed and immutable, leading to a lack of motivation to explore digital opportunities or overcome challenges related to digital access. It can be suggested that individuals who believe in their capacity for growth and development may be more inclined to actively seek and utilize digital resources, ultimately leading to higher levels of digital access. It aligns with the idea that mindset beliefs can be essential in shaping individuals' behaviors and attitudes towards technology and digital opportunities. Hence, the hypothesis can be read as follows:

H3: *Individuals with a growth mindset are more likely to have higher levels of digital access than those with a fixed mindset.*

2.3.4. Digital Mindfulness

Digital mindfulness, as previously described, emphasizes the importance of individuals being aware, intentional, and balanced in their use of digital technologies to promote their digital well-being. This concept intersects with the idea of growth and fixed mindsets, particularly within the context of the way individuals approach their own development and learning. Moreover, digital mindfulness can catalyze and foster a growth mindset. It encourages individuals to approach digital technologies with intentionality, critical thinking, and self-reflection, enabling them to harness the potential of digital tools for growth and learning while mitigating potential drawbacks or adverse effects. Thus, it is hypothesized that individuals with a growth mindset are more predisposed to embrace digital mindfulness to enhance their digital well-being in the digital environment. This underscores the potential link between one's mindset and one's ability to develop healthier relationships with technology, ultimately contributing to improved digital well-being. Summarizing the above, the next hypothesis is formulated as follows:

H4: *Individuals with a growth mindset are more likely to have higher levels of digital mindfulness than those with a fixed mindset.*

2.4. The moderating role of digital information skills

In the contemporary digital era, the mastery of digital information skills—comprising knowledge on usage and navigation of technologies—is imperative for proficiently steering through the infinite opportunities of the digital realm.

With abundant information and digital connectivity, the ability to access, evaluate, and effectively utilize digital information is a pivotal skill set. The skills necessary to live and work in the 21st-century world are called 21st-century skills, which consist of communication skills, collaboration skills, technical skills, critical thinking skills, creative skills, problem-solving skills, and information skills (van Laar, van Deursen, van Dijk, & de Haan, 2020). According to van Laar et al. (2020), digital information skills involve the capacity to search for information from digital sources and assess the usefulness, relevance, and dependability of the information retrieved, as well as the ability to manage digital information (i.e., managing documents, files, and emails).

When examining the role of digital information skills in the context of digital well-being, it becomes evident that these skills should take on a moderating role in the relationship between mindset (growth and fixed) and digital well-being. One of the reasons it would be beneficial to include digital information skills over other metrics, like screen time or device usage, is that digital information skills offer a more comprehensive perspective on an individual's interaction with technology. They encompass both quantitative aspects (usage) and qualitative dimensions (information management and assessment), making them a more nuanced and encompassing measure of digital engagement (Van Deursen & Van Dijk, 2008). Not much research has been conducted on the significance of digital information skills in promoting digital well-being. However, it can be assumed that high proficiency in these skills would positively influence an individual's ability to navigate the digital world effectively and, thus, manage their digital lives and deal with online challenges like cyberbullying and digital harassment more successfully.

High proficiency in digital information skills could empower individuals to quickly adapt to technological advancements, access and evaluate information more critically, successfully collaborate online, and leverage digital opportunities for learning and productivity. As individuals develop and improve these skills, they would be more inclined to adopt a growth mindset, believing in their capacity for continuous learning and skill improvement, which can lead to personal and societal growth.

In essence, while digital information skills and mindset individually can influence digital well-being, the dynamic interaction between them—moderated by digital information skills—determines the degree and direction of this influence. Hence, rather than directly constituting digital well-being, digital information skills play a pivotal role in shaping how mindset influences one's digital well-being. As a result, it is crucial to consider digital information skills as a moderating variable, steering the course of the relationship between mindset and digital well-being. Therefore, the following hypotheses are presented for the four concepts of digital well-being: digital risks and safety, digital connectivity, digital access, and digital mindfulness.

H5a: *Digital information skills moderate the relationship between mindset and risks and safety.*

H5b: *Digital information skills moderate the relationship between mindset and digital connectivity.*

H5c: *Digital information skills moderate the relationship between mindset and digital access.*

H5d: *Digital information skills moderate the relationship between mindset and digital mindfulness.*

2.5. Model

A conceptual research model was developed to visualize the hypotheses, shown in Figure 1. This model maps out the intricate relationships and interactions among growth and fixed mindsets, digital information skills, and various facets of digital well-being.

This model shows two relationships. Direct arrows from growth and fixed Mindset connect to all four facets of digital well-being, representing the direct effects posited in Hypotheses H1 through H4. On the other hand, additional arrows bridge Growth and Fixed Mindset and the digital well-being facets via Digital Information Skills. These arrows emphasize digital information skills' moderating role in the relationship between a growth mindset and the four digital well-being dimensions, as articulated in Hypotheses H5a through H5d. This visually reaffirms the proposition that higher digital information skills amplify the positive relationship between a growth mindset and improved digital well-being across its diverse facets.

The conceptual model offers a holistic view of how mindsets, digital information skills, and various aspects of digital well-being interrelate, as posited in the formulated hypotheses.

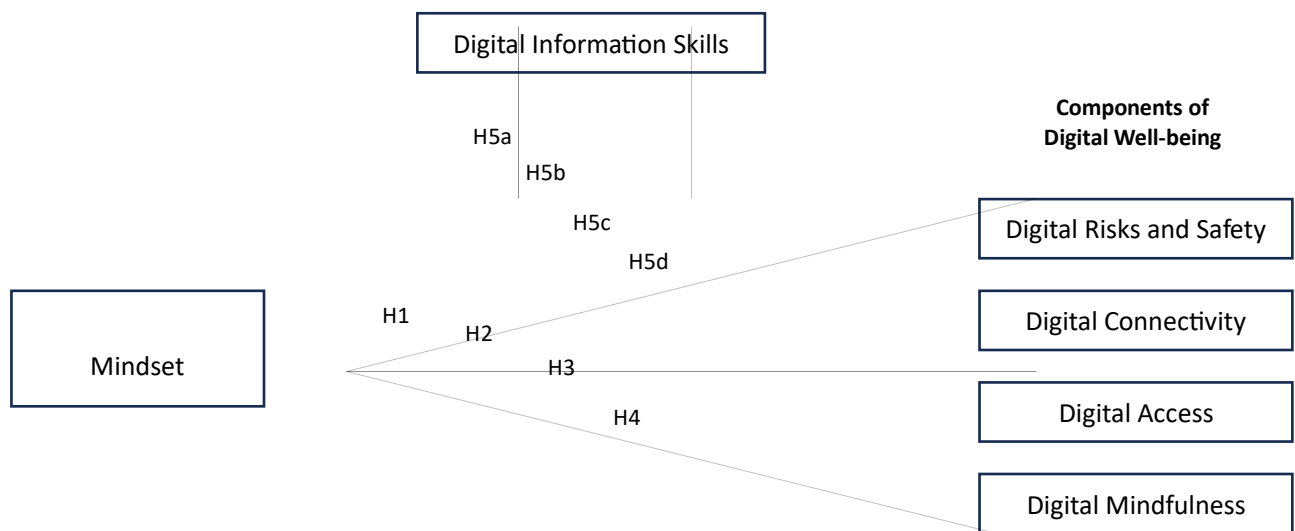


Figure 1: Conceptual Model of the Relationships Between Growth and Fixed Mindset, Digital Information Skills, and Digital Well-being

3. Method

3.1. Research design

This exploratory study follows a quantitative design. A cross-sectional survey was created using the online tool Qualtrics to measure the different concepts. The conceptual framework and measurement items were created in the first phase, with the literature review as a base. As only a little research has been conducted on the antecedents and moderators of digital well-being, a new measurement scale was created by scouting different pre-validated measurement tools. It was decided to focus on four variables to make up the concept of digital well-being (digital risks and safety, digital connectivity, digital access, digital mindfulness) and one moderating variable (digital information skills), as these were found to reappear continuously in the relevant literature. It was essential to ensure that all chosen items measured the same overall concept and that the flow of the questions was consistent with deviated wording. Hence, most items were adjusted in their wording to work together. After creating the questionnaire, a pre-test was conducted among a small sample of 6 individuals. As it was intended to distribute the interview in several languages to heighten the chances of responses, German, Dutch, and English-speaking individuals assessed the questionnaire's applicability and acceptance level. In the second phase, the adjusted survey was shared with different organizations and via social networks, such as WhatsApp, Facebook, LinkedIn, and Instagram. The data was collected over one week, from July 12th to July 18th, 2023.

3.2. Procedure

Prior to the start of the data collection, ethical approval was granted from the Ethics Committee of the University of Twente. After deciding to participate in the questionnaire, participants were invited to follow an anonymous link to the online environment Qualtrics. Here, they were first informed of the aim and background of the study and their rights to withdraw at any moment. Informed consent for participation was collected electronically before participants proceeded to the survey. All information collected was unidentifiable, and all data was stored securely. Participants were presented with the questions after consenting to the terms and conditions. They were first asked to give short information about their demographics and educational level before answering 33 questions to determine their digital well-being, level of digital information skills, and growth and fixed mindset. At the end of the survey, participants were given the option to leave their email addresses to participate in a random lottery to win one out of five 10€ vouchers for amazon.com or Bol.com. They were assured that their email address would only be used for the lottery and deleted right after. Lastly, after moving on to the final page, participants were provided with a brief but detailed description of the purpose and aim of

the study and to what their offered data is contributing. In total, participants needed just under 10 minutes to fill out the survey. The entire questionnaire, including the intro and outro, can be found in Appendix A.

3.3. Participants

The main selection criterion for participating in the study was to be 18 years of age or older. Participants were recruited through sharing an anonymous link over various online networks. Over several days, a brief invitation to fill out the survey, completed with the anonymous link, was posted on Instagram -, WhatsApp -, and Facebook - Stories. Additionally, the snowball system was utilized. Friends and family were contacted directly with the request for support and whether they could share the anonymous link on their Stories and with their friends. The survey was shared within various Facebook Groups designed for students to share their research projects and support one another. Furthermore, the study was published on the SONA System, on online in-house sharing-of and participating-in research environment of the University of Twente. Lastly, an invitation for participation was shared on LinkedIn, where people from the Network also interacted with the article and pushed its visibility. In total, 403 responses were collected. In total, 158 were male, 239 were female, five of those identified as non-binary, and one preferred not to disclose their gender. Of those 403 participants, 126 were Dutch, and 239 were German. The other 38 participants were from fellow European countries, for example, Romania, Bulgaria, or Turkey. These participants were collected under the term European. The youngest participant was 18, and the oldest was 74 ($M = 33.75$, $SD = 13.3$).

As this study concerns the differences between growth and fixed mindsets within individuals, it was evaluated which individual belonged to which spectrum. After looking at the distributions, and since the questionnaire was evaluated with the help of a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree), it was decided to set the cut-off point at 3.0. Therefore, everyone who scored an average of 3.0 or lower on the questions that determined mindset would be assigned a growth mindset, and everyone who scored 3.1 or higher would be assigned the trait fixed mindset.

Therefore, when looking at the distributions of demographics regarding mindset, for both growth and fixed mindset, the age group with the most representation lies within the age range of 26 years. The overall distribution in the growth mindset group is slightly more balanced among the younger and older age groups compared to the fixed mindset group, and no stark age-based difference between those with a fixed or growth mindset could be found.

Regarding nationality, Germans consistently have a higher representation in both mindset categories. Germans dominate with 59.3% in the fixed mindset group, followed by the Dutch with 31.3% and other Europeans with 9.4%. In the growth mindset group, Germans again dominate with 60.2%, but the

percentage of Dutch participants drops slightly to 33.5%, and other Europeans account for 6.3%. A slight variation in the distribution of Dutch and other European nationalities can be found between the two groups.

Across both mindsets, females consistently outnumber males. However, gender does not seem to significantly impact whether someone is more inclined to have a fixed or growth mindset based on this data. For the fixed mindset group, females constitute the majority, with 59.3%, followed by males, with 39.2%. Non-binary and those who prefer not to say are a minor segment with a combined representation of 1.4%. For the growth mindset, the gender distribution is relatively consistent with the fixed mindset group. Females again dominate with 61.1%, while males are at 37.7%. Non-binary participants make up 1.2%.

The highest level of education is consistent across both mindsets, with those having a university education (either applied sciences or general) being predominant. Based on the given data, there is no clear correlation between educational attainment and the type of mindset. For fixed mindset, those from the University of Applied Sciences (28.5%) and University (32.8%) dominate this group, followed by those with pre-university education (13.9%). The least represented are those with primary education. The educational distribution within the growth mindset group is consistent with the fixed mindset group, with the University of Applied Sciences (31.1%) and the University (32.6%) having the most representation. For a more detailed view of the frequencies and percentages of the participants, see Table 2 below.

Table 2
Descriptive Statistics for Participants with Fixed and Growth Mindsets

	Frequency (%)	Frequency (%)
Age (Years)		
18-25	28 (40.6%)	107 (32.0%)
26-35	16 (32.2%)	96 (28.7%)
36-45	5 (7.2%)	28 (8.4%)
46-55	8 (11.6%)	38 (11.4%)
56-65	8 (11.6%)	25 (7.5%)
66+	2 (2.9%)	4 (1.2%)
Nationality	14 (20.3%)	
Dutch	38 (55.1%)	112 (33.5%)
German	17 (24.6%)	201 (60.2%)
Europe	32 (46.4%)	21 (6.3%)

Gender	35 (50.7%)	
Male	1 (1.4%)	126 (37.7%)
Female	1 (1.4%)	204 (61.1%)
Non-binary	0	4 (1.2%)
Prefer not to say	0	0
Education	6 (8.7%)	
Primary School	6 (8.7%)	1 (.3%)
Primary Vocational	10 (14.5%)	18 (5.4%)
Higher General	8 (11.6%)	9 (2.7%)
Pre-University	11 (15.9%)	46 (13.8%)
Intermediate Vocational	23 (33.3%)	39 (11.7%)
University of Applied Sciences	5 (7.2%)	104 (31.1%)
University	28 (40.6%)	109 (32.6%)
Doctorate	16 (32.2%)	8 (2.4%)

3.4. Measures

To measure the different concepts, the questionnaire was based on previously conducted research to support its reliability. All concepts were measured using a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). An overview of all items can be found in Appendix A.

To measure the dependent variables of growth and fixed mindset, a revised and shortened version of the Dweck Mindset Instrument (Dweck, 2007) was utilized to support the research's reliability. The moderator variable, digital information skills, was measured with a previously validated scale by Van Deursen and Van Dijk (2008).

Measuring digital well-being was more complex, as no measurement scale with the desired dimensions has been created so far. Therefore, several existing scales were combined to create the new concepts:

Digital Risks and Safety

Digital safety measures the extent to which individuals are aware of their data and privacy online and how much control they have over it. The scale was based on items that were used by Peart et al. (2020), Pelet and Taieb (2017), and Ng et al. (2009) It contained five items, for example, 'I am careful with the information I share about myself online' (Peart et al., 2020), 'I am aware of the privacy policies used by online networks' (Pelet & Taieb, 2017), and 'I find it important not to open attachments/files if the content of the email/website looks suspicious to me' (Ng et al., 2009).

Digital Connectivity

This construct measures online social interactions, whether they substitute for in-person interaction, and whether individuals experience online social shaming, comparison, or competition. The scale was based on Wajcman et al. (2009), Peart et al. (2020), and Grieve et al. (2013). It contained five items, for example, from Grieve et al. (2013): 'I lose a sense of connectedness with the real world when I am online', 'I feel connected to my friends and family through digital devices' (Peart et al., 2020), and 'I always take my digital devices with me so that I can be reached at all times' (Wajcman et al., 2009).

Digital Access

The fourth construct addresses individuals' materialistic access and whether the absence of available technology could influence their self-esteem. The scale was based on Yildirim and Correia (2015) and Lynn et al. (2022) and counted four items, including 'I am able to access the internet at home and on the go' (Lynn et al., 2022) and 'I feel uncomfortable when I do not have constant access to the internet through my digital devices' (Yildirim & Correia, 2015).

Digital Mindfulness

The last concept relates to the control individuals experience over the use and influence of digital technologies in their lives. This concept relates to the awareness individuals experience about digital tech's impact on mental and physical health and how it can be balanced with other aspects of life. The scale was based on Peart et al. (2020) and Brown and Ryan (2003) and contained four items. Those items included, for example, 'I actively avoid behaviors that harm my health and well-being when online' (Peart et al., 2020) and 'I find myself distracted when listening to someone because I am doing something online at the same time' (Brown & Ryan, 2003).

3.5. Questionnaire testing and development

Before applying the questionnaire to a large sample and before the central part of the data collection, a pre-test was run among a small sample of six individuals familiar to the researcher. This was done to investigate and ensure whether the questionnaire was understandable, to judge whether questions could be misinterpreted, and to assess the approximate time frame participants would need to complete the questionnaire. The general aim was to complete it in under 15 minutes so that participants could focus and not lose interest in the process. After the pre-test, all items were revised per the feedback the pre-test yielded. No items needed to be deleted; however, some were reformulated to clarify their intention to increase the survey's usability, consistency, and

understandability. This included adding words like 'online' to the question to clarify that the question was explicitly about online environments and using descriptions for phrases that were seen as easily misunderstandable for, for example, older generations, like 'unbiased' or 'configure.' Furthermore, the structure of some question blocks was changed to rank them from weakest to strongest or to create a more natural flow to the questions. The refined questionnaire included 30 questions and could be completed in less than 10 minutes, which was deemed appropriate for use in the target population. Furthermore, demographic information such as gender, nationality, age, and level of education was also collected.

3.6. Scale construction

The proposed constructs must be statistically reliable and valid to reflect reality and ensure meaningful results. To ensure that, a factor analysis with a Promax rotation was run to determine or confirm the underlying constructs in the survey items. The calculation of Cronbach's Alpha followed this to measure the internal consistency of the measurement items. The results of these can be found in Table 3.

3.6.1. Factor analysis

In the factor analysis, using SPSS, six factors could be recognized first. The factor analysis was conducted using Principal Component Analysis as the extraction method. Subsequently, a Promax rotation with Kaiser Normalization was applied to the factor solution to improve the interpretability of the latent constructs. The KMO coefficient and Bartlett's test are applied to determine whether the obtained data should be used for an exploratory factor analysis. A KMO coefficient higher than 0.60 and significant results ($p < 0.05$) on Bartlett's test indicate suitable data for the factor analysis (Hair, Black, Babin & Anderson, 2010). In this case, a KMO coefficient of 0.76 and $p = 0.000$ on Bartlett's test revealed that factor analysis could be performed.

However, not all constructs were identified in their intended way. It was decided to cut five items, as their loadings were lower than 0.30, suggesting that they might not be as relevant or did not align with the primary dimensions identified in this sample. After re-examining the data, another three items were deleted, as they did not load significantly onto any factor; thus, eight items were removed from the data, and the 25-item final scale was obtained. As a result, it was determined that the items were gathered under five factors and explained 55.9% of the total variance. The constructs could be recognized as valid since an explained variance above 50% can be considered reasonable (Güney et al., 2021).

At first glance, it was directly notable that some items appeared to have cross-loadings, meaning they loaded on more than one factor. Cross-loadings can complicate the interpretation of factor analysis results because they suggest that an item might be related to multiple underlying constructs. A careful review of the pattern matrix was conducted to address this issue. It was observed that three items exhibited substantial loadings on their intended factors while also showing smaller loadings on other factors (C3, GF2, and GF3). In these cases, the decision was made to retain the items in their primary factors based on theoretical considerations and the strength of the loadings. The retention of these items in their primary factors was deemed appropriate because it better aligned with the intended construct and maintained the theoretical coherence of the measurement instrument.

As mentioned before, the original six factors were combined into five. It was decided to split the construct of *Digital Mindfulness* since the items loaded on two different factors. Here, online behaviours' proactive versus reactive nature is a meaningful distinction in this sample. While proactive behaviors involve taking precautionary measures (M1, M2), reactive behaviors relate more to being distracted or doing things without attention (M3, M4). Hence, M1 and M2 were grouped with *Digital Risks and Safety*. Another concept that was split is the one of *Digital Connectivity*. This was decided because, interestingly, C5, which was intended to measure the loss of connection to the real world, loaded on the third factor, together with the previously mentioned M3 and M4. This implies that feeling disconnected from reality when online might be more related to a lack of mindfulness than the feeling of connection through digital means. They were grouped under the new term *Digital Disconnection*. Furthermore, the remaining items of *Digital Connectivity* and *Digital Access* were grouped together under the new term *Digital Dependence* as they reflect a common theme related to digital connectivity and the dependence on digital devices for communication and information.

3.6.2. Cronbach's alpha

Following that, the calculation of Cronbach's alpha showed that all created constructs were reliable (see Table 3). The highest score was found for Mindset with an alpha of .81 (N of items = 6). The lowest score was for *digital disconnection*, with an alpha of .54 (N of items = 3). The consensus is that for an Alpha to be reliable, it should be around .70 or higher (Tavakol & Dennick, 2011). However, as this is an exploratory factor analysis, it could be argued that an alpha of .54 can be tolerated if the results are interpreted accordingly (Bonett & Wright, 2015).

Table 3*Factor analysis and final construct reliability check*

	Digital Risks and Safety	Digital Dependence	Digital Disconnection	Digital information skills	Growth and Fixed Mindset
	1	2	3	4	5
R1 Careful with personal Information online	.772				
R2 Adjust privacy settings on devices	.767				
R3 Evaluate safety of online platforms	.617				
R6 Avoid opening suspicious attachments/files	.526				
M1 Actively avoid harmful behaviour when online	.489				
M2 Consider consequences before engaging in online activities	.600				
C1 Always carry digital devices to be contacted at all times		.491			
C3 Having more online acquaintances than offline		.613			
A2 Feeling uncomfortable without access to the internet		.832			
A3 Being nervous when not being able to get news updates		.771			
A4 Feeling stressed when not being able to access digital devices		.704			
M3 Distracted when listening to someone due to being online			.698		
M4 Being online without paying attention			.735		
C5 Losing connection to real life when online			.529		
S1 Easily finding information online				.718	
S2 Being able to decide on the best keywords for online searches				.698	
S3 Ending up on certain Websites without knowing how				.573	
S4 Difficulty of finding the right information online				.549	
S5 Evaluating trustworthiness of websites				.664	
GF1 One has a certain amount of skill and not much can be done					.755
GF2 One has a certain amount of talent and not much can be done					.306
GF3 One's talent is something that cannot be changed much					.301
GF4 One's skills are something that cannot be changed much					.803
GF5 One can learn new things but not change basic skills					.697
GF6 One can change basic levels of talent considerably					.814
<i>Reliability scores</i>	.71	.73	.54	.70	.81

R = Digital Risks and Safety; M = Digital Mindfulness; C = Digital Connectivity; A = Digital Access; S = Digital information skills; GF = Growth and Fixed Mindset

3.7. Revised Model

As several adjustments had to be made to the conceptual model, a revised and updated overview of the model and hypothesis is needed. The concept of digital mindfulness has been split in two and grouped with others; thus, hypotheses H4 and H5d do not exist anymore. Even though items from digital mindfulness were added to the concept of *digital risks and safety*, the title will stay the same as the added items do not change the meaning behind the concept. Hence, the hypotheses also remain the same:

H1: *Individuals with a growth mindset are more likely to have higher levels of digital risks and safety than those with a fixed mindset.*

H5a: *Digital information skills moderate the relationship between mindset and risks and safety.*

As variables from the concepts of digital connectivity and digital mindfulness loaded onto the same factor, they were grouped under the updated term *digital disconnection*. The new title emphasizes the content of the items as it concerns the feeling of disconnect from the real world. The updated hypothesis for this concept can be read as follows:

H2: *Individuals with a growth mindset are more likely to have higher levels of digital disconnection than those with a fixed mindset.*

H5b: *Digital information skills moderate the relationship between mindset and digital disconnection.*

As the remaining items of digital connectivity loaded on the concept of digital access, and the intent behind the items could be grouped with the concept, the new title, *digital dependence*, was created. Rather than access to a digital device, this concept focused more on the dependence on being able to access digital technology for individuals' digital well-being. Thus, the last hypotheses are:

H3: *Individuals with a growth mindset are more likely to have higher levels of digital dependence than those with a fixed mindset.*

H5c: *Digital information skills moderate the relationship between mindset and digital dependence.*

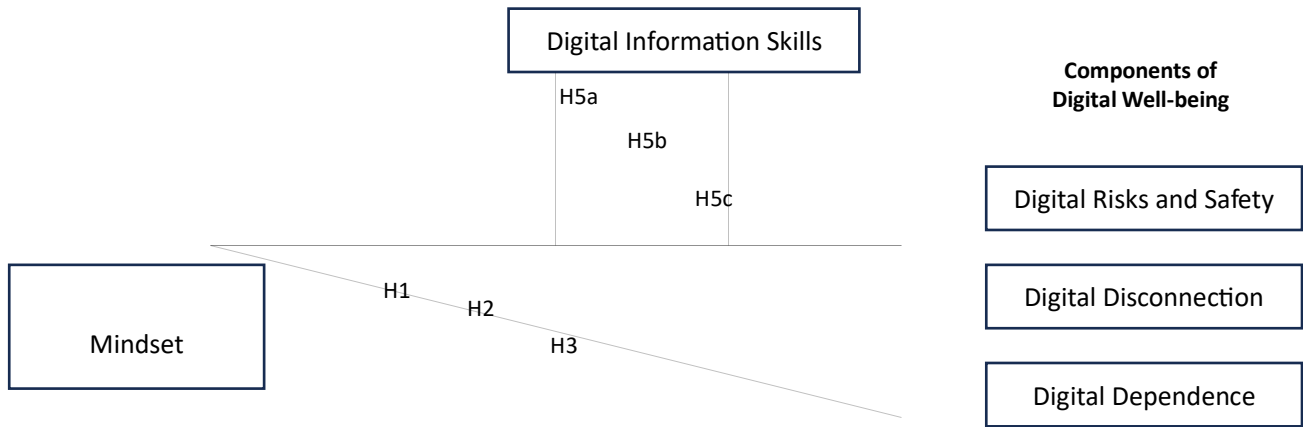


Figure 2: Revised conceptual model of the Relationships Between Growth and Fixed Mindset, Digital information skills, and Digital Well-being

3.8. Analysis

Quantitative data from the survey were analyzed using descriptive statistics, regression analysis, and moderation analysis. After cleaning the data and creating all variables, the first thing done was to check whether the results were normally distributed and if there were any outliers. The Shapiro-Wilk test showed that the data is not normally distributed, as $p < 0.05$ for digital risks and safety, digital dependence, digital disconnection, digital information skills, and mindset. However, as the primary interest lies in exploring relationships and patterns within the data, testing will continue with the given data set. Although assumptions of normality are fundamental in statistical testing, the main goal is to infer relationships, and the chosen methods can still provide valuable insights.

After this, statistical tests were utilized to determine how the variables affect each other. First, independent sample tests were run to compare the means of digital well-being factors between those with a growth vs fixed mindset. Then, regression analysis was run to determine the relationship between growth and fixed mindset, digital information skills, and digital well-being. Lastly, the hypothesized moderation was tested with a conditional process analysis following the PROCESS macro (Hayes, 2017).

4. Results

4.1. Descriptive statistics: Differences between growth and fixed mindset

Independent samples t-tests were run to determine possible differences between the two groups of growth and fixed mindset (see Table 4). The results show statistically significant differences between individuals with growth and fixed mindset for three of the four variables with a significance level of $p > 0.05$. Only the variable Digital Risks and Safety showed not to be statistically significant. This means that individuals with a growth mindset have different attitudes to Digital Access, Digital Disconnection, and Digital information skills than those with a fixed mindset.

Contrary to expectations, no significant difference could be detected between individuals with a growth mindset and those with a fixed mindset concerning their awareness of digital risks and safety. Both groups, on average, reported similar levels of awareness ($t(401) = .533, p = .59$). Furthermore, the effect sizes were small (Cohen's $d = .59$), suggesting that the magnitude of this non-significant difference was minimal. The results showed that individuals with a fixed mindset reported higher levels of digital access than those with a growth mindset ($t(401) = -2.03, p = .043$). This relationship's effect size was moderate (Cohen's $d = .72$), implying that individuals with a fixed mindset might place more value or emphasis on accessing digital resources than those with a growth mindset. Regarding digital connectivity, individuals with a growth mindset showed significantly higher levels of digital connectivity compared to those with a fixed mindset ($t(401) = 2.80, p = .005$). The effect sizes were only moderate (Cohen's $d = .74$), indicating a moderate difference between the two groups. The results for digital information skills offered one of the most compelling findings. A significant difference between the groups was found, with those having a fixed mindset exhibiting higher levels of digital information skills than those with a growth mindset ($t(401) = -5.47, p < .001$). The effect size was large (Cohen's $d = .59735$), highlighting a substantive group divergence.

Table 4

Overview results group statistics, independent samples t-test with assumed equal variances, and effect size

	Growth Mindset		Fixed Mindset		t-test for equality of means		Effect Size Cohen's D
	Mean	SD	Mean	SD	t	Sig.	
Digital Risks and Safety	3.7	.59	3.6	.59	.53	.59	.59
Digital Dependence	3.1	.70	3.3	.83	-2.03	.043	.72
Digital Disconnection	3.4	.72	3.1	.81	2.80	0.05	.74

Digital information skills	2.1	.57	2.5	.69	-5.47	<.001	.59
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4.2. Regression Analysis

Regression analyses were conducted to examine the relationship between the independent variable of growth and fixed mindset, the moderator variable of digital information skills, and the dependent variables of digital well-being – digital risks and safety, digital disconnection, and digital dependence. The results for each of these outcomes are summarized in Table 5. The model proposes that digital information skills moderate the relationship between Growth and Fixed Mindset and the variables of Digital Well-being. To test the above-mentioned hypotheses, conditional process analysis following the PROCESS macro approach was applied (see Figure 3).

Table 5

Regression Analysis for the relationship between Mindset and Digital Well-being, along with the moderating effects of Digital Information Skills

	B	SE	t	P
Digital Risks				
Constant	3.67	.03	121.93	<.001
Mindset	-.06	.04	-1.43	.15
Skills	-.14	.05	-2.81	.005
Mindset*Skills	.19	.06	3.18	.001
Digital Dependence				
Constant	3.21	.03	86.41	<0.001
Mindset	.16	.05	3.06	.002
Skills	-.14	.06	-2.29	.02
Mindset*Skills	-.04	.07	-.59	.55
Digital Disconnect				
Constant	3.41	.03	89.78	<0.001
Mindset	-.05	.05	-.95	.33
Skills	-.15	.06	-2.42	.01
Mindset*Skills	-.11	.07	-1.43	.15

Note: Digital Risks: $R^2 = .46$ $F(3, 399) = 6.49$, $p < .001$
Note: Digital Dependence: $R^2 = .03$. $F(3, 399) = 4.23$, $p = .05$
Note: Digital Disconnection $R^2 = .03$ $F(3, 399) = 4.49$, $p = .004$

4.2.1. Mindset, Digital Risks and Safety, and the moderating effects of Digital Information Skills

A multiple regression model examined the relationship between the predictors (Mindset, Skills, and Interaction) and the outcome variable (Safety). The overall model was statistically significant, $F(3, 399) = 6.49, p < .001, R^2 = .46$, indicating that 46% of the variance in digital risks and safety can be attributed to the predictors in the model.

The regression coefficient for mindset was found to be $b = -.06, t(399) = -1.43, p = .15$, indicating that mindset was not a significant predictor of digital safety. Therefore, Hypothesis H1a is rejected. The interaction term between growth and fixed mindset and the moderator variable digital information skills significantly predicted digital risks and safety ($b = .19, t(399) = 3.18, p = .001$), indicating that digital information skills moderate the relationship between mindset and digital safety. Additionally, when inspecting the conditional effects of the predictor (Growth and Mixed Mindset) at various values of the moderator *Digital Information Skills*, it becomes evident that their relationship changes across different levels of digital information skills. The conditional effects are presented at different levels of digital information skills, ranging from -1.15 (approximately one standard deviation below the mean) to 2.24 (approximately two standard deviations above the mean). At lower levels of digital information skills (e.g., Skills = -1.15), individuals with a growth mindset tend to have significantly lower digital safety scores ($b = -0.29, p < 0.001$). This suggests that a growth mindset might be associated with reduced digital safety when individuals have lower digital information skills. As digital information skills increase, the negative effect of a growth mindset on digital safety diminishes. For instance, at moderate digital information skills (Skills = 0.45), the effect becomes non-significant ($b = .02, p = .62$), indicating that the relationship between mindset and digital safety is weaker. However, as digital information skills continue to rise, the effect becomes positive, meaning that individuals with a growth mindset and high digital information skills tend to have higher digital safety scores. This positive relationship is statistically significant at higher levels of digital information skills (Skills = 2.06 and above). Therefore, Hypothesis H5a is accepted.

As the interaction effect was significant, the slopes for growth and fixed mindset predicting digital risks and safety at each level of the moderator digital information skills were evaluated. For low skills, the slope for mindset ($b = -.18, t(399) = -3.19, p = .001$) was significant and negative. This indicates that at low skill levels, there is a negative relationship between mindset and digital safety. For every 1 unit increase in mindset, there is an associated decrease of .18 units in digital safety. For average skills, the slope for mindset ($b = -.06, t(399) = -1.43, p = .15$) was insignificant, suggesting no relationship between mindset and digital safety at average skill levels. For high skills, the slope for mindset ($b = .61, t(399) = .98, p = .32$) was also insignificant, indicating no relationship between mindset and digital safety at high skill levels.

4.2.2. Mindset, Digital Dependence, and the moderating effects of Digital Information Skills

Multiple regression analysis examined the relationship between the predictors (mindset, skills, and interaction) and the outcome variable (Dependence). The overall model was statistically significant, $F(3, 399) = 4.23, p = .05, R^2 = .03$.

The regression coefficient for mindset in the digital dependence model was significant and positive ($b = .16, t(399) = 3.07, p = .002$), indicating that individuals with a growth mindset are more likely to have higher levels of digital dependence. Therefore, Hypothesis H2 is accepted. The interaction term between mindset and skills in the digital dependence model was not a significant predictor ($b = -.04, t(399) = -.59, p = .55$), indicating that digital information skills do not moderate the relationship between mindset and digital disconnection. Nevertheless, the conditional effects of the predictor were inspected at various values of the moderator variable digital information skills. Here, it becomes evident that their relationship changes across different levels of digital information skills. At a lower level of digital information skills (e.g., Skills = -1.15), the conditional effect of mindset on digital dependence was positive and statistically significant ($b = .22, p = .03$). This suggests that for individuals with low digital information skills, there is a significant positive relationship between mindset and digital dependence. For every 1 unit increase in mindset, there is an associated increase of 0.22 units in digital dependence. This also counts for slightly higher levels of digital information skills (Skills = -0.64), as a positive relationship between mindset and digital dependence can be observed ($b = 0.19, p = 0.007$). This suggests that even for individuals with moderately high digital information skills, there is a significant positive relationship between mindset and digital dependence. However, as soon as the level of digital information skills increases (Skills = -0.47 to 2.24) from moderately high to high levels, the conditional effect of mindset on digital dependence may remain positive; however, the relationship becomes weaker and is no longer statistically significant as skills increase. Therefore, Hypothesis H5b is rejected.

Additionally, the slopes for mindset predicting digital dependence at each level of the moderator digital information skills were evaluated. For low digital information skills, the slope for mindset ($b = .19, t(399) = 2.73, p = .006$) was significant and positive, indicating that there is a positive relationship between mindset and digital dependence at low skill levels. For every 1 unit increase in mindset, there is an associated increase of .19 units in digital dependence. For average skills, the slope for mindset ($b = .16, t(399) = 3.06, p = .02$) was also significant, suggesting a positive relationship between mindset and digital dependence at average skill levels. For high skills, the slope for mindset ($b = .13, t(399) = 1.91, p = .05$) was marginally significant, indicating a positive relationship between mindset and digital dependence at high skill levels.

4.2.3. Mindset, Digital Disconnection, and the moderating effects of Digital Information Skills

The relationship between the predictors (growth and fixed mindset, digital information skills, and their interaction) and the outcome variable (digital disconnection) was analyzed with multiple regression analysis. The overall model was statistically significant $F(3, 399) = 4.49, p = .004, R^2 = .03$, indicating that the predictors can explain only a small percentage of variance in digital disconnection.

The regression coefficient for growth and fixed mindset in the digital disconnection model was not significant ($b = -0.05, t(399) = -0.95, p = 0.33$), indicating that there is no significant association between an individual's mindset (growth or fixed) and their level of digital disconnect. Therefore, Hypothesis H3 is rejected. The interaction term between growth and fixed mindset and skills in the digital disconnection model was not a significant predictor ($b = -0.11, t(399) = -1.43, p = 0.15$), indicating that digital information skills do not moderate the relationship between growth and fixed mindset and digital disconnect. Further analysis examined the conditional effects of the predictor growth and fixed mindset on digital disconnection at various levels of the moderator's digital information skills. The conditional effects are presented at different levels of digital information skills, ranging from -1.15 to 2.24. The conditional effects of mindset on digital disconnection are consistently positive; however, they do not reach the point of statistical significance. These findings suggest that regardless of individuals' digital skill levels, there is no significant relationship between Mindset and Digital Disconnect. Therefore, Hypothesis H5c is rejected.

Lastly, the conditional slopes for the relationship between growth and fixed mindset and digital disconnection at different levels of the moderator digital information skills were examined. It was, however, found that there is no significant relationship between mindset and digital disconnection at any level of digital information skills, including low ($b = .15, t(399) = .21, p = .83$), average ($b = .05, t(399) = -.95, p = .33$), and high ($b = -.12, t(399) = -1.64, p = .10$) skills.

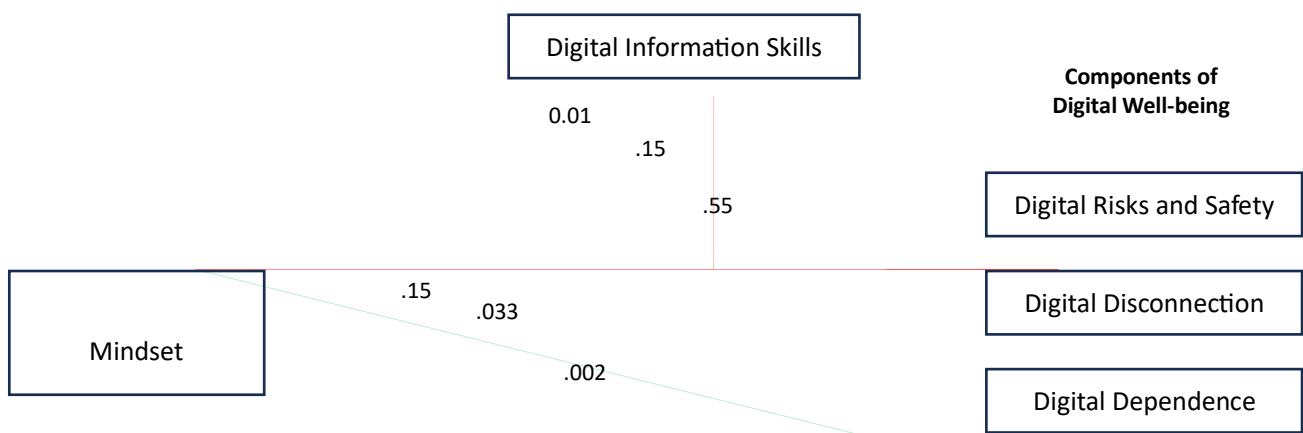


Figure 3: Results of the conceptual research model of the Relationships Between Growth and Fixed Mindset, Digital information skills, and Digital Well-being with significance levels

5. Discussion

The primary goal of this study was to research whether a connection between the two concepts of growth and fixed mindset and digital well-being can be found and whether the variable digital information skills would moderate said relationship. After many adjustments, it was determined that the novel concept of digital well-being would consist of three dimensions: *digital risks and safety*, *digital dependence*, and *digital disconnection*. Additionally, it was sought to understand the possible moderating role of *digital information skills* in these relationships. The results shed some light on important aspects of how the factors of digital well-being can interact with mindset orientation and how external factors, such as digital information skills can moderate them.

It is important to note that the concepts of digital connectivity, digital access, and digital mindfulness have been split and integrated into the concepts mentioned above based on the factor analysis results. While this approach helps rationalize the measurement tool, it is crucial to recognize that some concepts, such as digital disconnection, have lower internal consistency. From a theoretical standpoint, it makes sense to split certain concepts and group them with others, as the underlying theme of the items aligned with each other. For example, splitting the concept of digital mindfulness into proactive and reactive behaviors (*Digital risks and safety* and *digital disconnection*, respectively) is a reasonable decision based on the factor analysis results and the content of the items. This decision reflects the different aspects of mindfulness when engaging with digital technologies. Even though this split allows for a more nuanced understanding of how individuals interact with technologies, it also means some caution is needed when interpreting the results, as further refinement might be necessary. As mentioned, it is essential to note that the reliability scores were relatively low for digital disconnection. This could imply that the items within the concept may not be internally consistent, measure different aspects, or require further refinement. The analysis further confirms this as we later see that the associations between mindset, digital information skills, and digital disconnection lack overall significance.

In terms of moving forward, the final three dimensions provide a valuable framework for studying digital well-being. However, some considerations need to be kept in mind. For example, as highlighted before, the issue of reliability within the concept of digital disconnect is a potential issue. Therefore, revising and reevaluating the items within this construct is needed to improve its measurement accuracy. While the three dimensions of digital well-being provide a solid foundation for research and interventions, continuous improvement refinement and adaptations are essential. Based on the results, the measurement tool should be revised in the way it is now being presented before moving forward.

5.1. Main findings and theoretical implications

Digital Risks and Safety - When it comes to risk and safety, it was expected that enhanced awareness of digital risks and safety would positively impact an individual's growth mindset. However, it seems that a person's mindset (whether growth or fixed) might not play a pivotal role in determining their cognizance of digital risks and safety. Both groups seem to perceive similar levels of risk awareness; thus, in this sample, no difference was found between those with a growth mindset and those with a fixed mindset. Mindset may influence how individuals approach challenges and their beliefs about their abilities and how they could overcome them (Dweck, 2006); however, they do not affect their ability to identify and assess risks. Also, the specific context and situation for the participants might not have been strongly influenced by mindset beliefs. Following that, further results confirmed that having either a growth or a fixed mindset does not significantly affect one's level of digital risks and safety. The relationship only becomes interesting when the concept of digital information skills is added.

Intriguingly, digital information skills show a significant negative relationship with digital risks and safety. This means that individuals with higher digital information skills reported lower levels of perceived digital safety. This counterintuitive result could be explained by the digital divide (Cheshmehzangi et al., 2022), which suggests that as individuals become more proficient with technology, they may become more aware of the associated risks and vulnerabilities. Hence, while they have the skills to navigate the digital landscape, they may also be more cognizant of potential dangers (Gross & Acquisti, 2017). This relationship, thus, emphasizes the importance of digital literacy and safety education, particularly for those with growth mindsets, when trying to enhance digital safety. This also aligns with the literature on digital well-being, emphasizing the role of psychological factors in shaping online experiences (Gerli et al., 2022). Additionally, the different levels of digital information skills concerning mindset showed another critical finding. It was shown that individuals with a growth mindset have lower digital safety when their digital information skills are also low; however, as their skills increase, this negative effect diminishes and turns positive. This aligns with Dweck's (2006) idea that a growth mindset encourages ongoing learning and adaptation, which can lead to improved digital safety practices.

Notably, in the realm of digital safety, the presented findings challenge conventional assumptions about the role of mindset. Contrary to initial expectations, individuals with a growth mindset were not found to have higher digital safety levels. This result suggests that the relationship between mindset and safety in the digital space is more nuanced than previously thought. Further research into theoretical models of digital safety should consider the moderating influence of digital information

skills. Possessing a growth mindset alone may not guarantee higher levels of digital safety; instead, it may depend on an individual's ability to translate that mindset into effective safety practices.

Digital Dependence – It was initially sought to determine the relationship between digital dependence and growth versus fixed mindset, hypothesizing that a growth mindset positively influences enhanced digital dependence. When just looking at the descriptive statistics, it can be seen that individuals with a fixed mindset reported higher levels of digital dependence than those with a growth mindset. This is an intriguing observation, suggesting that individuals with a fixed mindset might place more value or emphasis on accessing and relying on digital resources than those with a growth mindset. Still, the assumption that individuals with a growth mindset would report a higher level of digital dependence was ultimately confirmed in the analysis. This is consistent with the idea that a growth mindset might lead individuals to embrace and rely on digital tools and platforms for personal and professional growth and, thus, potentially increasing dependence (Gui et al., 2017). It also underscores the need to recognize the role of mindset in shaping our digital behaviors. The positive association between a growth mindset and digital dependence suggests that for individuals with a growth mindset, the allure of digital technologies might be stronger, and they develop a reliance on digital technologies more quickly. This highlights the need for balance and mindfulness in using digital devices.

However, while a growth mindset was positively associated with digital dependence, digital information skills did not moderate this relationship. The concept of digital information skills played a significant negative role in this relationship, which implies that individuals with higher digital information skills tend to experience lower levels of digital dependence. This aligns with the literature on digital literacy, highlighting that individuals with greater proficiency in navigating digital spaces tend to have a more balanced and controlled relationship with technology, thus reducing their dependence on it (Hasan & Linger, 2016). The interaction between growth and fixed mindset and digital information skills was insignificant in predicting digital dependence. This means that the impact of mindset on digital dependence remains consistent across different levels of digital information skills.

All in all, the study's findings suggest that mindset and skills play roles when it comes to the concept of digital dependence, but their combined effect and interaction are not significant. A growth mindset, however, is associated with higher digital dependence, particularly among individuals with lower digital information skills. As access and reliance on digital devices are increasingly prominent in literature due to digitalization and the dependence on such tools in daily life, research and theories addressing digital dependence should consider the dual influence of mindset and digital skills.

Enhancing digital skills may not be enough to address issues of digital dependence. Instead, interventions must consider mindset and provide individuals with strategies to manage their digital consumption in a balanced manner.

Digital Disconnection – At first glance, the study's results seemed promising, as they showed that individuals with a growth mindset possess significantly higher levels of digital connectivity than those with a fixed mindset. This could underscore the importance of digital networks and connections in fostering a growth-oriented mindset. A growth mindset might propel individuals to seek diverse online connections, understanding the benefits of varied perspectives and learning opportunities. In contrast, those with a fixed mindset might prefer sticking to familiar territories (Dweck, 2006). However, due to the lack of significance within the model, it can be assumed that factors beyond mindset contribute to the concept of digital disconnection. This stands in line with the assumption and highlights the importance of the fact that digital connections and well-being are of a multifaceted nature (Gupta et al., 2022). The concept of a growth mindset showed a positive influence on digital disconnection. This implies that individuals with a more growth-oriented mindset might experience higher levels of digital disconnection. This result resonates with the notion that individuals with a growth mindset might be more willing to disconnect from digital devices when they perceive them to benefit their well-being (Sheldon et al., 2020). However, due to its non-significance, it can also be assumed that mindset alone may not be a primary driver of digital disconnection, and other factors may be at play. This means that individuals with both a growth and a fixed mindset experience a feeling of digital disconnection.

Digital information skills, on the other hand, were shown to have a negative influence on digital disconnection, indicating that individuals with greater digital information skills tend to experience less digital disconnection. This aligns with the idea that digital information skills can enhance one's ability to manage their online presence effectively, reducing feelings of disconnection (Livingstone & Helsper, 2007). This also aligns with the previously established assumption that emphasis on digital literacy and having the skills to navigate digital interactions effectively can mitigate digital disconnection. However, the interaction between a growth and fixed mindset and digital information skills is not significant, suggesting that the relationship between digital information skills and digital disconnection remains relatively constant regardless of one's mindset. Thus, investing in one's digital information skills development can be a practical strategy to reduce digital disconnection. While mindset lays the foundational attitude towards learning and adaptability in the digital world, digital information skills equip individuals with the necessary tools and competencies to navigate this space efficiently and effectively. Scholars focussing on facets of digital disconnection should emphasize the importance of

digital skills as a critical determinant. Enhancing individuals' digital skills may be more crucial in mitigating digital disconnection than altering their mindsets.

5.2. Practical Implications

Understanding and exploring the relationship between growth and a fixed mindset and digital well-being has profound consequences across various sectors. The findings of this research carry practical implications for individuals, educational institutions, policymakers, and organizations striving to enhance digital well-being in the context of digital safety, digital disconnection, and digital dependence.

As highlighted before, the concept of digital information skills plays a pivotal role in all facets of digital well-being. Hence, it is logical to conclude that organizational and educational institutions should prioritize comprehensive digital literacy programs that teach the technical aspects of digital safety and address the mindset component. Training initiatives that encompass mindset and digital information skills could be implemented to foster safer online working or learning environments. This approach can reduce the risk of cybersecurity incidents and privacy breaches. Encouraging a growth mindset, alongside digital information skills, can empower individuals to take a proactive approach to online safety.

Digital information skills also play an important role in combatting digital disconnection. Individuals should focus on enhancing their digital information skills, as this study suggests that developing such skills could aid in mitigating feelings of disconnection. Online communities and courses can offer resources for individuals to improve their digital competencies. Schools and workplaces can also encourage the adoption of healthy digital habits. This includes designated breaks from screens, encouraging face-to-face interactions, and promoting mindfulness practices to reduce digital disconnection and increase interactions.

Furthermore, becoming more mindful of personal habits is necessary to decrease feelings of digital dependence. Individuals should develop self-awareness of their online behaviors and recognize when they may become overly dependent on digital technology. Mindfulness practices and self-monitoring could help individuals maintain a healthy balance. Organizations, educational institutions, and healthcare providers should promote responsible digital use and incorporate education about digital dependence into their programs. This could include workshops, counselling services, or seminars addressing and preventing digital dependence.

Incorporating these implications into educational curricula, workplace policies, and individual behaviors can contribute to a more digitally healthy society. It is essential to recognize the holistic

nature of digital well-being and take a multifaceted approach that addresses mindset (both growth and fixed) and digital information skills to promote responsible and balanced digital engagement.

5.3. Limitations

The present study aimed to delve into the intricate interplay between growth and fixed mindset and the possible facets of digital well-being. While our findings have contributed valuable insights, certain limitations warrant consideration.

One challenge encountered during the research process was the issue of cross-loadings in our analysis. This could suggest that some items might be pertinent to multiple dimensions of digital well-being. While the complexity of the constructs under study is acknowledged, it is plausible that some elements might resonate with more than one facet of the digital experience, leading to these cross-loadings. Though the factor analysis was interpreted to align with theoretical underpinnings, this interpretation would be strengthened if validated with a new sample in a confirmatory factor analysis. Regrettably, such a step was not feasible within this project's scope. Another significant limitation regarding the initial analysis concerns the reliability of one of the constructs. The low alpha value of digital disconnection could have heavily influenced further analysis and interpretation of the results. Due to the novel aspect of this research and its exploratory nature, research continued; however, its impact put limitations on the results.

Several inherent limitations also deserve mention. The reliance on self-reported data introduces possible biases. Respondents might, consciously or unconsciously, provide answers deemed socially desirable or may not perfectly recall past experiences, thus introducing recall bias. Hence, responses can be skewed as participants might not want to admit to certain behaviors or play them down to feel better. This risk is always prominent when researching such sensitive information through quantitative studies, as participants' responses cannot be checked.

Additionally, the sample might need to encapsulate the broader population's diverse characteristics. For example, if tech-savvy individuals were predominantly represented, it might influence the perceived associations between mindset, digital access, and skills, thereby reducing the generalizability of our conclusions.

Lastly, while various variables are accounted for within the research design, other potential confounders might influence the given results. Variables such as socio-economic status or prior experiences with technology might have underlying effects on both mindset and digital well-being, and the study did not account for these.

While this study provides a foundational understanding of the relationship between mindset and digital well-being, the limitations underscore the need for further, more nuanced research within this domain.

5.4. Future Research

The findings from this study pave the way for deeper exploration into the interplay between mindset and digital well-being. While the current results provide a foundational understanding, future research stands to gain from several refinements and extensions. Firstly, as mentioned before, validating the factor structure identified here would be beneficial through a confirmatory factor analysis. This would bolster confidence in the identified constructs and their relationships.

A noted concern during the research process was the issue of cross-loadings. To tackle this, there is room to craft new items or refine current ones to delineate more clearly between the constructs. This would ensure that each item is singularly representative of its intended construct without uncertainty. Additionally, while this study began to scratch the surface of the moderating role of digital information skills, future inquiries could delve deeper into this and explore other potential moderating and mediating variables, such as age, cultural factors, or digital experience.

One mentioned limitation of the current study is its cross-sectional design, which does not allow for establishing causal relations. A longitudinal design that observes changes over time would be advantageous to better understand these relationships. Additionally, given the complex nature of digital well-being, adopting qualitative methodologies like interviews or focus groups might bring more prosperous, more detailed insights into individual experiences.

To strengthen the generalizability and applicability of the findings, involving a broader and more diverse sample—demographically, geographically, and culturally—could be pivotal. Such an approach could also reveal any cultural or regional nuances in the relationships under study. Future research might also consider experimental designs, where interventions designed to shift mindsets or enhance digital information skills are evaluated for their impact on digital well-being.

Incorporating broader operational definitions and using multiple measures for each construct would ensure that the research captures the entirety of the phenomenon in question. With digital dependence, for example, and since several items needed to be deleted during the factor analysis, more than three items to measure one construct might be needed to report reliable data about the measurement tool. Lastly, it is essential to account for potential confounders in subsequent studies. Variables like socio-economic status or educational background can influence the observed relationships, so controlling for these would provide a more nuanced understanding of the direct interplay between mindset and digital well-being.

5.5. Conclusion

When combining and inspecting the vast insights garnered from this study, it becomes evident that the relationship between mindset and digital well-being is multifaceted and worthy of further exploration. We investigated the relationship between mindset orientation (both growth and fixed), the various dimensions of digital well-being, including digital risks and safety, digital dependence and digital disconnection, and digital information skills. The findings revealed significant differences between individuals with a growth mindset and those with a fixed mindset in their attitudes toward digital dependence, digital disconnection, and digital information skills. Contrary to expectations, no significant differences were detected in regard to their awareness of digital risks and safety. Moreover, intriguing moderating effects of digital information skills concerning the relationship between mindset and digital well-being dimensions were observed, which highlights the nuanced interplay between psychological orientation, digital information skills, and digital well-being outcomes.

As digital environments become more intertwined with our daily experiences, it is essential to recognize how our mental states and capabilities can shape and be shaped by our interactions and confidence within this space. While the present study has taken significant strides in shedding light on these connections, it also underscores the immense potential and significance for future research. The subsequent challenges and opportunities will undoubtedly refine our understanding of growth and fixed mindset and guide educators, policymakers, and organizations in fostering a holistic digital well-being.

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Appendix

Appendix A *Questionnaire*

Informed Consent

Dear participant,

Thank you for taking part in this online questionnaire.

The survey will take about 10 minutes, and your participation will be anonymous.

For you to be able to fill out the survey with an open mind, I will not disclose the purpose behind the questions yet. However, I can tell you that the questions are about general well-being, and at the end of the questionnaire, you will find a short summary of what this study is about. After the project is finished, I will share my data and outcomes with you if you wish so.

At the end of the survey, you can leave your email to participate in a lottery to win 1 out of 5 10€ vouchers for Bol.com or Amazon.com. Your email will only be used for the lottery and will be deleted right after the five winners are drawn. Further, all emails will be handled separately from the primary dataset, so they cannot be attributed to your data.

I strongly believe any information I can collect from you would be beneficial and useful for my research; thus, there are no wrong answers. Please answer honestly since the following questions will ask you to reflect on your feelings and views. Again, your response will be anonymous, and the data file will be anonymized as soon as possible. Further, the anonymized data will only be shared with the University for scientific purposes; hence, no responses can be attributed to you.

Your participation is entirely voluntary; if you feel uncomfortable, you can withdraw anytime. Please check the box below to consent to your participation.

If you have any questions, feel free to contact me at j.a.herale@student.utwente.nl!

Section 1: Demographics

1. How old are you? (For example, 18, 25, 55)
 - a. (Open question in years)
 - b. Prefer not to say.
2. What is your gender?
 - a. Male
 - b. Female
 - c. Non-binary
 - d. Other (please specify)

- e. Prefer not to say.
3. What is your nationality?
- a. Dutch
 - b. German
 - c. Other (specify)
4. What is your highest level of education
- a. Primary School | Basisschool | Grundschule
 - b. Preparatory Vocational Education | VMBO | Realschule
 - c. Higher General Secondary Education | HAVO | Gesamtschule
 - d. Pre-University Education | VWO | Gymnasium (Abitur/Allgemeine Hochschulreife (AHR))
 - e. Intermediate Vocational Education | MBO | Berufsschule
 - f. University of Applied Sciences | HBO | Fachhochschule (FH)
 - g. University | WO | Universität
 - h. Doctorate degree | Doctoraad | Doktor-Grad
 - i. Other (please specify)

Section 2: Digital Well-being

In the following, I will sometimes refer to the term *Digital Devices*. Note that this entails all digital devices, including smartphones, laptops, tablets, e-readers, game consoles, etc.

In the top right/bottom, you can see the progress bar that tells you how far along you are in the questionnaire!

Please indicate your agreement or disagreement with the statements below.

Digital Risks and Safety

- R1 I am careful with the information I share about myself online.
- R2 I adjust the settings on my digital devices to protect my privacy.
- R3 I evaluate whether an online platform is a safe space before using it.
- R4 I am aware of the privacy policies used by online networks.
- R5 I read more than the first three sentences of the privacy policies of the digital devices and networks I frequently use.
- R6 I find it important not to open attachments/files if the content of the email/website looks suspicious to me.

Digital Connectivity

- C1 I always take my digital devices with me so that I can be reached at all times.
- C2 I have more close friends online than offline.
- C3 I feel connected to my friends and family through digital devices.
- C4 I connect with other people online by sharing information and content.
- C5 I lose a sense of connectedness with the real world when I am online.

Digital Access

- A1 I am able to access the internet at home and on the go.
- A2 I feel uncomfortable when I do not have constant access to the internet through my digital devices.
- A3 Being unable to get the news (e.g., happenings, weather, socials, etc.) on my digital devices makes me nervous.
- A4 I feel stressed when I cannot access my digital devices and/or their capabilities whenever I want to do so.

Digital Mindfulness

M1 I actively avoid behaviors that harm my health and well-being when online.

M2 I usually think about the possible consequences before doing something online, like uploading a photo, commenting, signing up for a newsletter, etc.

M3 I find myself distracted when listening to someone because I am doing something online at the same time.

M4 I find myself doing things online without paying attention.

Moderator: Digital information skills

S1 I find it easy to find information online.

S2 I find it hard to decide on the best keywords for online searches, e.g., on Google or Bing.

S3 Sometimes I end up on websites without understanding how I got there.

S4 I find it difficult to find the right information on some websites.

S5 I know how to evaluate whether a website can be trusted.

Section 3: Growth and Fixed Mindset

GF1 I have a certain amount of skill, and I cannot really do much to change it.

GF2 I have a certain amount of talent, and I cannot really do much to change it.

GF3 My talent in an area is something about myself that I cannot change very much.

GF4 My skills are something about myself that I cannot change very much.

GF5 I can learn new things, but I cannot really change my basic skills.

GF6 I can change even my basic level of talent considerably

Thank you so much for filling in my survey! You have helped me a lot!

If you want to participate in the lottery and have the chance to win 1 of 5 10 € vouchers for Bol.com or Amazon.com, please leave your email below.

If you win one of the vouchers, I will contact you and send them to you via email; thus, ensure that the email you enter is valid.

Please note that all emails will be handled confidentially and will only be used for the lottery. They will be stored separately, so they cannot be connected to your data. After the lottery, all entries will be deleted.

Please continue the survey to the next page; otherwise, your response will not be recorded!

Your response has been recorded. Thank you for participating!

If you wish, you can close this browser window now.

As promised, here is a short description of what this survey is about.

For my master's thesis, I am researching the effect of digital well-being on growth and a fixed mindset. So, what is that?

Digital well-being is a rather new concept. It means well-being as we know it; however, it takes into account all the digital influences that surround us so much on a daily basis. It is important to constantly adjust our perception of such concepts since we and the society we live in also constantly evolve. Well-being from 10 years ago can, thus, not be compared to well-being today anymore.

I want to know now if our mindset influences our digital well-being. According to Carol Dweck, we all have two forms of mindset: a fixed and a growth mindset. This can be seen as more of a spectrum and less of a distinction, as everyone carries both within themselves. Depending on the situation and trigger, one of the mindsets can be more prevalent. Note, though, that you mostly have more of a growth mindset or more of a fixed mindset. And having either is totally fine!

If you are interested in the outcomes of my study, you can email me at j.a.herale@student.utwente.nl

Thank you for your time!