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DIGITAL IDENTITY OF DIGITAL NATIVES

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Annotation

The doctoral dissertation “Digital identity of digital natives” investigates the psychological mechanisms of digital identity formation, maintenance, and transformation among users of digital social technologies. The research focuses on the relationship between digital self-representation and the user’s subjective experience of self, aiming to reveal how interaction within digital environments contributes to self-presence, immersion, and the fusion of digital and core identity.

The study explores the configuration of psychological constructs that underlie digital identity development, including the process of use (customization and control), selective self-representation, duration of interaction, social interaction, self-presence, and immersion. The objective of the research is to identify interrelationships among these components and to construct an empirically grounded theoretical model that explains how digital identity becomes integrated into the user’s overall self-concept.

The empirical study involved 227 active users of digital social technologies aged 13 to 65 years ($M = 26.6$, $SD = 8.4$), primarily representing digital natives – individuals for whom digital technologies constitute an essential part of both everyday functioning and psychological identity development. The main data collection method was an author-developed survey combining elements of the Cross-Media Self-Presence Questionnaire (CM-SPQ) and the Extended Game Immersion Questionnaire (E-GIQ), adapted for digital identity contexts. Statistical analysis included descriptive statistics, exploratory and confirmatory factor analysis, correlation and variance analysis, and multivariate statistical methods.

Twelve research hypotheses were formulated based on theoretical analysis, aiming to explore the relationships between digital identity use and key psychological components such as social interaction, immersion, and self-presence.

The results confirmed positive associations between digital identity use and social interaction, self-presence, and immersion. Customization primarily influenced engagement and body-level self-presence, whereas control was decisive for emotional and identity-level self-presence as well as for total immersion. Selective self-representation was shown to affect both emotional resonance and identity relevance, depending on the type of representation (precise, improved, modified, or alternative). Social interaction acted as a psychological amplifier, enhancing all levels of self-presence and increasing immersion. Duration of interaction reinforced these effects, demonstrating that meaningful and repetitive engagement with digital identity supports identity fusion.

Based on these findings, a theoretical configuration model of digital identity development was constructed. It integrates self-presence and immersion as key psychological mediators that transform digital self-representation into a psychologically internalized component of the self. The results extend the understanding of the Proteus effect, showing that sustained interaction with a digital self-representation can lead not only to behavioural but also to identity-level transformation.

The dissertation contributes to the field of cyberpsychology and social psychology by redefining digital identity as a dynamic, psychologically adaptive construct that evolves through the interaction between users and their digital environments. The proposed model provides a theoretical and empirical basis for understanding how digital self-representation participates in identity formation in the digital era.

The structure of the doctoral thesis consists of an introduction, a theoretical section divided into five subchapters, and empirical research presented in a separate chapter with five methodological and analytical subchapters. The thesis also includes a discussion and a final conclusion. The reference list contains 159 sources in English and Latvian. The total length of the dissertation, excluding appendices, is 172 pages. The thesis includes 56 tables and 7 figures. Appendices are presented in a separate volume comprising 18 pages.

Anotācija

Promocijas darbs “Digitālo iezemiešu digitālā identitāte” pēta psiholoģiskos mehānismus, kas saistīti ar digitālās identitātes veidošanos, uzturēšanu un transformāciju digitālo sociālo tehnoloģiju lietotāju vidū. Pētījums koncentrējas uz attiecībām starp digitālo pašreprezentāciju un lietotāja subjektīvo “es” pieredzi, cenšoties atklāt, kā mijiedarbība digitālajā vidē veicina pašklātesamības, iegremdēšanās un digitālās un pamatidentitātes saplūšanas veidošanos.

Pētījumā tiek analizēta to psiholoģisko konstruktu konfigurācija, kas nosaka digitālās identitātes attīstību: lietošanas process (kustomizācija un kontrole), selektīvā pašreprezentācija, mijiedarbības ilgums, sociālā mijiedarbība, pašklātesamība un iegremdēšanās. Pētījuma mērķis ir identificēt šo komponentu savstarpējās attiecības un izveidot empīriski pamatotu teorētisku modeli, kas skaidro, kā digitālā identitāte tiek integrēta lietotāja vispārējā “es” koncepcijā.

Empīriskajā pētījumā piedalījās 227 aktīvi digitālo sociālo tehnoloģiju lietotāji vecumā no 13 līdz 65 gadiem ($M = 26.6$, $SD = 8.4$), galvenokārt pārstāvēt digitālos iezemiešus – personas, kuru ikdienas funkcionēšanā un identitātes attīstībā digitālās tehnoloģijas ieņem būtisku lomu. Datu vākšanā tika izmantota autora izstrādāta aptauja, kas apvienoja “Starpmediju pašklātesamības aptaujas” (CM-SPQ) un “Paplašinātās spēļu iegremdēšanās aptaujas” (E-GIQ) elementus, pielāgotus digitālās identitātes kontekstam. Datu analīzē tika izmantotas aprakstošās statistikas metodes, izziņošā un apstiprinošā faktoru analīze, korelācijas un dispersijas analīze, kā arī daudzfaktoru statistikas metodes.

Teorētiskās analīzes rezultātā tika formulētas divpadsmit pētnieciskās hipotēzes, kuru mērķis bija izpētīt attiecības starp digitālās identitātes lietošanas procesu un galvenajiem psiholoģiskajiem komponentiem – sociālo mijiedarbību, iegremdēšanos un pašklātesamību.

Rezultāti apstiprina pozitīvas saistības starp digitālās identitātes lietošanu un sociālo mijiedarbību, pašklātesamību un iegremdēšanos. Kustomizācija galvenokārt ietekmēja iesaisti un ķermenisko pašklātesamību, savukārt kontrole izrādījās izšķiroša emocionālās un identitātes līmeņa pašklātesamības, kā arī pilnīgas iegremdēšanās nodrošināšanai. Selektīvā pašreprezentācija (precīzs, uzlabots, pārveidots vai alternatīvs “es” tēls) ietekmēja gan emocionālo rezonansi, gan identitātes nozīmīgumu. Sociālā mijiedarbība darbojās kā psiholoģisks pastiprinātājs, kas uzlaboja visus pašklātesamības līmeņus un veicināja iegremdēšanos. Mijiedarbības ilgums pastiprināja šos efektus, apliecinot, ka jēgpilna un atkārtota digitālās identitātes izmantošana atbalsta identitātes saplūšanu.

Pamatojoties uz šiem rezultātiem, tika izstrādāts teorētisks digitālās identitātes attīstības konfigurācijas modelis, kurā pašklātesamība un iegremdēšanās tiek konceptualizētas kā galvenie psiholoģiskie mediatori, kas transformē digitālo pašreprezentāciju psiholoģiski internalizētā identitātes komponentē. Rezultāti paplašina “Proteja efekta” izpratni, parādot, ka noturīga mijiedarbība ar digitālo pašreprezentāciju var novest ne tikai pie uzvedības, bet arī identitātes līmeņa pārmaiņām.

Promocijas darbs sniedz ieguldījumu kibersiholoģijas un sociālās psiholoģijas jomā, pārdefinējot digitālo identitāti kā dinamisku, psiholoģiski adaptīvu konstrukt, kas attīstās mijiedarbībā starp lietotājiem un viņu digitālo vidi. Piedāvātais modelis nodrošina teorētisku un empīrisku pamatu izpratnei par to, kā digitālā pašreprezentācija piedalās identitātes veidošanās procesā digitālajā laikmetā.

Promocijas darba struktūru veido ievads, teorētiskā daļa ar piecām apakšnodaļām un empīriskais pētījums, kas prezentēts atsevišķā nodaļā ar piecām metodoloģiskām un analītiskām apakšnodaļām. Darbs ietver arī diskusiju un noslēguma secinājumus. Literatūras sarakstā iekļauti 159 avoti angļu un latviešu valodā. Disertācijas kopējais apjoms (bez pielikumiem) ir 172 lapaspuses. Darbā ir 56 tabulas un 7 attēli. Pielikumi apkopoti atsevišķā sējumā 18 lapaspusēs.

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Introduction

Relevance: A substantial portion of the global population – approximately 5.4 billion people – enjoys access to the Internet, as reported by the International Telecommunication Union in their 2023 publication, *Measuring Digital Development in Geneva: Facts and Figures for 2023* (ITU, 2023). This expansive connectivity underscores the pervasive influence of the digital realm in contemporary society. Moreover, this ubiquitous internet access points to the ongoing process of digitalization in various aspects of life (Hartl & Hess, 2017).

The ever-increasing number of internet users worldwide highlights a fundamental shift in how individuals engage with society and cultural products. It suggests that anyone aiming to adapt to the digital age, interact with society, and participate in contemporary cultural contexts must become a technology user (Przybylski et al., 2013). One of the central requirements of becoming a user is authentication in the digital space – the creation of a digital representation to access various digital environments and platforms. This development implies that individuals gain a new opportunity to construct a digital version of themselves and engage with the digital environment through it.

Digital technologies and the process of forming one's digital representation contribute to the transformation of the self, often referred to as self-transformation – a change in the concept of the self (Joseph & Zijian, 2022). The digitalized self is considered a new form of identity in the digital era. It is conceptualized as a new part of the human self, positioned at the interface between one's intrinsic identity and their digital representation, bridging the physical and digital worlds (Chan, 2022). Digital identity becomes a component of real identity – both subjective and social (e.g., professional) (Ruan et al., 2020) – serving as one of its projections into the digital environment and as a means of constructing and communicating personal identity in contemporary life.

Empirical findings support the view that digital self-representations significantly influence human behavior both within and beyond the digital environment (e.g., Bailenson et al., 2008; Chandler et al., 2009; Fox & Bailenson, 2009; Groom et al., 2009; Yee & Bailenson, 2007). This influence is often explained by the degree of fusion between the user and their digital representation. As noted in previous research (Ratan & Dawson, 2016), the extent to which users experience self-presence – the feeling that their digital representation is an authentic extension of themselves – determines the influence that the digital representation exerts on their psychological functioning and development. Integration between the individual and their digital representation can result in an expansion of identity (Dombrovskis & Berga, 2021), with observable effects extending beyond the digital space (Ratan et al., 2020).

These processes of transformation and identity expansion through interaction with the digital environment signal a new stage in human psychological development – one that warrants systematic scientific exploration. The present study focuses on this emerging phenomenon by examining the configuration of psychological constructs that underlie digital identity development.

Problem: While the influence of digital technologies on self-perception has been widely studied in the context of online gaming and virtual reality (Yee & Bailenson, 2007; Fox & Bailenson, 2009; Jin, 2011; Ratan & Dawson, 2016; Rosana & Fauzi, 2024; Soh, 2024), the complex interplay of psychological constructs related to digital identity among everyday users remains underexplored. Existing studies often isolate individual factors such as self-presence or immersion without integrating them into a broader model that reflects real-life digital

interaction (Jin, 2011; Witmer & Singer, 1998; Csikszentmihalyi, 1990). Additionally, most empirical research focuses on specific subgroups (e.g., gamers) (Yee & Bailenson, 2007; Fox & Bailenson, 2009; Teng, 2010), thereby overlooking the majority of digital social technology users who engage with platforms through self-representation in non-gaming contexts. This study includes both gamers and non-gamers; however, the majority of the sample represents users who created their digital identity through non-gaming platforms such as social media and video-hosting environments.

Purpose of research: The aim of this research is to uncover the interrelationships among key psychological components related to digital identity – including the process of use (customization and control), selective self-representation, duration of interaction, social interaction, self-presence, and immersion – and to propose an empirically grounded theoretical model that reflects their dynamic configuration among digital social technology users.

Based on the theoretical analysis, the following **hypotheses** have been formulated:

H1: The process of using digital identity (customization and control) is positively associated with the user's social interaction within the digital environment (Peña et al., 2021; Triberti et al., 2017; Wu et al., 2023).

H2: There is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital (Gorini et al., 2011; Nagy & Koles, 2014; Peña et al., 2021; Yee et al., 2011).

H3: There is an association between the process of using digital identity (customization and control) and types of selective self-representation in digital environments (Ratan & Hasler, 2009; Ratan & Hasler, 2010; Yee et al., 2011).

H4: The process of using digital identity (customization and control) increases the level of immersion (Csikszentmihalyi, 1990; Witmer & Singer, 1998; Segovia & Bailenson, 2012).

Sub-hypothesis H4a: Customization of digital identity (adjusting its characteristics) increases the level of immersion (Bailenson et al., 2003; Yee, 2006; Segovia & Bailenson, 2012).

Sub-hypothesis H4b: Control over digital identity interactions within the digital environment increases the level of immersion (Csikszentmihalyi, 1990; Witmer & Singer, 1998; Bailenson et al., 2003).

H5: Social interaction increases the level of immersion (Bailenson et al., 2003; Gonzales, & Hancock, 2008; Teng, 2010).

H6: Increased personalization (using original characteristics) of digital identity increases the level of immersion (Bailenson et al., 2003; Teng, 2010; Waltemate et al., 2018).

H7: The duration of interaction with digital identity will be positively associated with the level of immersion (Rahman et al., 2017; Tobin et al., 2010; Wood et al., 2007).

H8: The process of using digital identity (customization and control) increases the level of self-presence (Ratan, Hasler, 2010; Jin, 2011; Zhao et al., 2023; Wu et al., 2023).

Sub-hypothesis H8a: The process of customization of digital identity increases the level of self-presence (Lei et al., 2021; Gonçalves et al., 2022; Zhao et al., 2023; Wu et al., 2023).

Sub-hypothesis H8b: The process of control of digital identity increases the level of self-presence (Jin, 2011; Rainey, & Jones, 2019; Wang, & Zeng, 2021; Li et al., 2022).

H9: Increased personalization (using original characteristics) of digital identity increases the level of self-presence (Rahill, Sebrechts, 2021; Yee & Bailenson, 2007).

H10: Self-presence is positively associated with the presence of communication participants (Ratan, Hasler, 2010).

H11: The duration of interaction with digital identity will be positively associated with the level of self-presence (Skadberg, Kimmel, 2004).

H12: Self-presence is positively associated with immersion (Brown, Cairns, 2004).

Participants: The research included 227 active digital social technology users from Latvia, aged 13 to 65 years ($M = 26.6$, $SD = 8.4$), with 53.7% identifying as female. Although the group of digital social technology users in the sample exhibited diverse experiences of interaction with digital technologies, the study specifically focused on a psychologically distinct subgroup – digital natives – users for whom digital technologies constitute an integral part of both everyday functioning and digital identity development. Although the term “users” is applied throughout the dissertation, the theoretical framework and interpretation of findings emphasize the dynamics of digital identity among digital natives.

All participants maintained active digital identities, represented through visual components such as avatars, photographs, or symbolic characters, enabling interaction and communication within various digital environments. These users regularly engaged in digital activities such as social media participation and online gaming, where digital self-representation was used to establish connections with others and navigate social interactions in the digital environment.

Methodology: The sample for this research was intentionally composed of diverse user profiles to enable a comprehensive analysis of digital identity interactions. This included avid online gamers engaged in popular titles such as World of Warcraft, Albion Online, and Rust, alongside prominent bloggers and influencers within the Latvian digital sphere. The primary method of data collection was an author-developed survey that integrated components from the Cross-Media Self-Presence Questionnaire (CM-SPQ) (Dombrovskis et al., 2024) and the Extended Game Immersion Questionnaire (E-GIQ) (Dombrovskis et al., 2025). These established instruments were combined to form a unified measurement tool for assessing digital self-representation and immersion.

Data analysis methods: Psychometric analyses were conducted to confirm the factorial validity of the instruments used in the research. To establish the factorial validity of the Cross-Media Self-Presence Questionnaire (CM-SPQ), exploratory principal-axis factor analysis with oblique rotation was applied, consistent with the methodology used in the original development of the Self-Presence Questionnaire. Within the framework of Extending the Game Immersion Questionnaire (GIQ) to online users, principal component analysis (PCA) was conducted separately for each of the three scales containing adapted items. This approach ensured structural validity and theoretical applicability of the scales in non-gaming digital contexts.

The statistical data analysis was carried out using IBM SPSS Statistics 23.0. Descriptive statistics were applied to determine frequency distributions, central tendencies and a variability indicator (standard deviation), indicators of distribution (quartiles, skewness and kurtosis). To assess the normality of data distribution Kolmogorov-Smirnov test was used.

Depending on the aim of each hypothesis, the following statistical methods were applied: (1) chi-squared test and Pearson’s correlation coefficient to examine associations between types of digital use (customization and control, as well as time spent on creating and adjusting digital identity) and social interaction within the digital environment; (2) Cramer’s V

test and chi-squared test to examine associations between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment, as well as between types of selective self-representations of one's digital identity and the types of digital use (customization and control and additionally time spent on creating and adjusting digital identity); (3) Mann-Whitney U test, Kruskal-Wallis H test, Student's t-test for group comparisons in level of immersion depending on customization and control and their combination; (4) Mann-Whitney U test, Kruskal-Wallis H for group comparison in the level of self-presence depending on the process of customization and use of digital identity, as well as on combination of these two indicators; (5) Mann-Whitney U test for group comparisons in level of immersion depending on individual indicators of social interaction (social interaction aimed to search for information related to the creation of Cyber Me, the significance users place on social interaction, ongoing communication with other users); (6) Multivariate analysis of variance (MANOVA), following-up univariate ANOVAs for evaluating differences in the level of immersion (post hoc tests Tukey HSD) and in the level of self-presence (post hoc tests Games-Howell) between groups of respondents with different types of selective self-representation; (7) Spearman's rank correlation coefficient to examine whether there are correlations between duration of interaction and level of immersion, between the presence of communication participants (ongoing communication with other users) and the level of self-presence, correlation between duration of interaction and level self-presence, and between level of self-presence and level of immersion.

Theoretical origin and conceptual motivation

In 2021, the book *KIBER ES. Viss par kiberpasauli* (Dombrovskis & Berga, 2021) was published to introduce the core principles of cyberpsychology to a wider audience in Latvia. Although not a direct inspiration for this study, the book outlined key themes related to user psychology and the digital world. These themes later contributed to the conceptual development of a model based on five elements of digital space and the psychological mechanisms associated with digital identity. The recognition of the user as a psychological subject in digital environments served as a foundational step toward constructing a theoretical framework for empirical research related to digital identity and the psychological mechanisms underlying it.

The five elements of digital space

The digital space comprises five fundamental elements that form the structural framework for user interaction. These elements help differentiate the layers of digital functioning, each of which plays a distinct role in how users experience the digital realm:

Table 0.1
Elements of digital space

Element	Description
Digital space	Represents the technological infrastructure, including platforms, connectivity, and encoding systems, that enable digital activity. This space provides the conditions for interaction but does not include specific content.
Digital world	Encompasses the entire ecosystem of digital technologies, including social networks, online platforms, and other interactive systems. It reflects the full range of human experience and behavior within the digital realm.
Digital environment	Thematic or functional digital platforms and interfaces that are designed for specific purposes and audiences – such as social media, collaborative tools, or communication apps. These environments shape user behavior and expectations.
Digital room	A focused and often real-time space within a digital environment created for specific interaction, such as chat rooms, online meetings, or discussion groups. It is where the user engages in goal-oriented or spontaneous digital communication.
Digital social technology users (referred to as "Users" in this dissertation)	A subgroup of technology users who engage with platforms and software, interacting with other users and user-generated content through digital representation. This group includes two distinct types based on their psychological orientation and degree of integration with the digital environment: ♦ Digital immigrants – users for whom digital technologies are primarily tools for achieving specific goals (Prensky, 2006). They interact through digital representation, but typically do not experience fusion with it. Engagement with the digital environment requires conscious adaptation and effort. ♦ Digital natives – users for whom digital technologies are an integrated part of daily life (Autry, & Berge, 2011). They engage through digital identity and are more likely to experience fusion with their digital representation, which often becomes part of their core identity. In this dissertation, the primary focus is on digital natives, as they are most likely to undergo psychological transformation through the development of digital identity. <i>For clarity, the term users is used throughout the dissertation.</i>

Digital social technology users interact within all elements of digital space and both shape and are shaped by their experiences in the digital world.

The user development process

For digital experience to meaningfully contribute to the development of a user, it must involve active engagement with one's digital identity. In the digital world, developing this identity enables reflection, expression, and psychological transformation. Without such engagement, users may experience stagnation or a disconnection from the potential for digital development.

- **Digital identity** – a core component of a user's identity, encompassing all digital footprints and digital representation that symbolically and functionally reflect the user within the digital world.
- **Digital representation** – the user's expressive presence within digital environments; the outward form of self-presentation online. Not all representations evolve into digital identity, nor do they automatically become part of the **core identity**.

A meaningful developmental trajectory is possible only when the user experiences a **fusion** between their digital identity and digital representation. This fusion marks a psychological connection wherein the user begins to perceive their digital presence as a natural extension of their self.

Two core phenomena are required to initiate this fusion:

1. **Self-presence** – the user's perception that their digital representation is an authentic and embodied extension of the self. It reflects the internalization of digital presence as psychologically real.
2. **Immersion** – the user's experience of cognitive and emotional absorption in the digital environment through interaction with digital elements. It reflects the realism and engagement experienced during digital interaction.

When both self-presence and immersion are activated through interaction with the digital environment, the process of fusion begins. The stronger these two psychological conditions are, the more integrated the digital identity becomes with the user's core self. This integration accelerates the transformation of user behavior, self-perception, and worldview, not only within digital spaces but also in the material world. Understanding this transformational mechanism is the central motivation and theoretical foundation of this dissertation.

Structure: The doctoral thesis consists of an introduction, a theoretical section divided into five subchapters, and empirical research presented in a separate chapter with five methodological and analytical subchapters. The thesis also includes a discussion and a final conclusions. The reference list contains 146 sources in English and Latvian. The total length of the dissertation, excluding appendices, is 170 pages. The thesis includes 56 tables and 4 figures. Appendices are presented in a separate volume comprising 10 pages.

Chapter 1: Literature review

1.1. The concept of digital identity in digital world

Identity concept (Holistic self)



Identity is considered to encapsulate the essence of a human being. Within various psychological theories and approaches, the concept of digital identity encompasses diverse aspects, such as different layers of identity (individual, relational, social, material) (Vignoles et al., 2011) or types (physical, visual, etc.). Overall, identity can be described as the collection of biologically and socially determined individual differences that allow one to be identified and distinguished from others (Naseh, 2016). This collection of socially determined individual differences includes patterns of thought and behavior learned through experience, which influence how a person functions in the world.

Biologically determined differences include information inherited from previous generations through genes, such as physiological characteristics (body and organ system structure); properties of the nervous system – extroversion/introversion, emotional stability/instability, etc. The impact of biological aspects becomes especially evident in critical situations, when innate impulses (instincts) are activated, which in turn influence thinking and behavior. Since individual experience and inherited information vary, each person's set of characteristics – or essence – is unique.

In some psychological and interdisciplinary contexts, the term personality is used interchangeably with identity to describe the essence of a human being. This conceptual overlap is particularly common in non-specialist discourse or in classical psychological traditions (McAdams, 1989). However, in modern psychology, a clearer distinction has been made between the constructs of identity and personality. If personality is viewed in a broader sense, it can be seen as a synonym for identity, encompassing the whole person as a unified and indivisible system (Cervone & Pervin, 2022). In contrast, when approached from a narrower psychological or sociocultural perspective, personality refers to relatively stable traits and patterns formed through socialization and environmental influence, which differentiates it from identity as a broader construct of self (Schwartz et al., 2011).

In a broader sense, personality is the subject itself – a person as a unified and indivisible system. This means that one cannot separately distinguish a person's body, experience, emotions, thoughts, and behavior – all these components form an integrated whole. In this view, personality may be considered equivalent to identity, as it includes the individual's biological and psychological features that activate behavior and distinguish one person from another (Noonan, 2019). However, in a narrower sense – especially in contemporary psychological science – personality is primarily interpreted as a socially manifested construct, shaped by upbringing and environmental interaction. It is expressed in observable behavior, norms, communication patterns, and traditions. In this understanding, identity refers to the individual's sense of self – the internalized response to the question “Who am I?” – while personality reflects

learned behavioral tendencies formed by both biological predispositions and socialization (Fearon, 1999; Munley, 1975). Thus, personality should be viewed as a manifestation of identity, rather than a synonym. This distinction becomes evident in how individuals approach challenges:

1. Adopted – the individual has internalized others' behavioral strategies through socialization (Marano, 2017),
2. Individual – the person develops their own strategies, which may contradict or diverge from socially accepted norms (Smythe, 2013).

This distinction reveals how the concepts of identity and personality may coincide or differ in meaning, highlighting inconsistency in terminology use. Identity describes the person as a whole and their differentiation from others, while personality describes either the individual as a whole or one aspect of identity, particularly in the context of social interaction – including specific behaviors, attitudes, and beliefs.

From the above, it can be concluded that identity is a holistic construct – encompassing all parts and expressions of the individual. This structure represents a person's uniqueness, coherence, and continuity over time. Additional psychological perspectives support this holistic view: for instance, Erikson's developmental theory conceptualizes identity as the outcome of resolving psychosocial conflicts throughout life stages, while social identity theory emphasizes the role of group membership and social categorization in shaping the self (Tajfel et al., 1979; Hogg, 2016). These perspectives illustrate that identity is not only unified but also contextual and evolving.

In contrast, personality represents a relatively stable expression of identity – reflecting developed and practiced ways of interacting that are shaped by both biological predispositions and social experience (Howard, 2000; Fearon, 1999).

Based on this understanding, the development of the self begins with increased awareness of one's identity construct – including its biological and social components and how they manifest. Once this awareness is achieved, the person can begin consciously adjusting aspects of the self that are not biologically fixed – such as behavioral patterns, values, and personality traits. Since personality is one of the expressions of identity, any transformation in personality will inevitably contribute to modifications in the broader identity structure.

With the advent of the internet, the identity construct has expanded. It is now possible to digitally encode personal data, and the way individuals recognize each other and manage social relationships has fundamentally changed (Rannenberget al., 2009).

The digital world provides an additional “space” where individuals can continue to explore new characteristics inherent to themselves and attempt to digitally represent themselves to others. Due to the digital world, additional expressions of identity begin to form, which are now widely encountered in the digital world – photographs, videos, personal emails, social network profiles, accounts, etc. The ability to function both within the digital society and outside it has created a situation where all parts of our identity, both conscious and unconscious, can meet and form various types of self-representations – both real and true, as well as desired and idealized.

Furthermore, the digital world provides users with the opportunity to intensely observe other users' representations. This intense observation can lead to a more profound discovery and transformation of one's self and perceptions, potentially surpassing experiences in the external world. This transformative potential is evident in the digital “footprints” individuals leave or create. Uploading a photograph to the web becomes a digital representation of oneself. Creating a personal profile on social networks not only enhances one's digital representation

but also facilitates interaction with the digital world and its users. Engaging in communication with other users through these profiles and participating in specific digital environments can digitalize one's personality. These interactions cumulatively craft a digital version of identity or the digital self, offering new opportunities for self-naming, transformation, and expression (Nagy & Koles, 2014). Consequently, the digital environment becomes a platform for individuals to create representations or reflections of themselves (Talamo & Ligorio, 2001; Suler, 2016), further enabling the supplementation and expression of their identity or aspects of it.

According to scientists (Kondakov, & Kostyleva, 2019), the digital self-phenomenon awaits a conceptual challenge, as it is a relatively new phenomenon that differs from the concepts of identity and personality in the external world.

Identity and personality need to be redefined, taking into account the peculiarities of the digital world (Naseh, 2016). Although in the field of information technology, the digital entity phenomenon can be recognized by many and various terms, such as virtual identity, network identity, internet identity, electronic identity, online identity, and digital identity (Naseh, 2016), the most frequently mentioned are digital and virtual identity. In the web, one can also encounter terms such as digital personality or cyberpersonality, which are related to various contexts – individuals, groups, organizations, software, or artificial intelligence (Sartonen, Simola, Lovén & Timonen, 2020), but essentially reflect the overall image created from the content published online.

When considering how individuals express themselves in the digital world, it is most accurate to refer to this as self-representation in digital world (Talamo & Ligorio, 2001; Suler, 2016). Any user of the digital world can engage in such self-representation, both textually and visually – for example, by selecting characters (avatars) in gaming communities or participating in group chats.

Taking all of the above into account, it is clear that all activities in the digital world can serve as forms of digital self-representation. Through such activities, users convey various types of information that characterize, depict, and define their digital identity. This information may exist on several levels – semantic, physical, syntactic, and others (Sartonen et al., 2020). As a result, these expressions collectively form a digital projection of identity, in which personality is only one component. The digital identity thus complements the individual's self-expression in the material world, while also offering new dimensions for identity construction, transformation, and recognition.

Building upon the understanding of identity, personality, and digital self-representation, this dissertation proposes a conceptual framework that captures the complexity and dynamism of identity in the digital world. To represent this multifaceted phenomenon, a holistic identity concept – the “Holistic Self” – has been developed. This concept is structured in two dimensions and comprises eight interrelated identity units, collectively forming a coherent and unified identity system. The model integrates digital and virtual expressions of the self with both biologically and socially determined aspects, including unconscious processes. These aspects are grouped under three core components: digital identity, virtual identity, and hidden identity.

The development of this model is theoretically grounded in two key traditions. First, the “Super Identity Project” (Black et al., 2012; Zhang et al., 2018) introduced the notion of a “superidentity” – a central identity core that integrates diverse identity expressions. This idea emphasized that, despite the fragmented nature of identity in different domains (biometric, behavioral, digital), there is a unifying structure that connects them. Second, psychological theories of multiple identities (Gergen, 1995; Markus & Nurius, 1986; Ramarajan, 2014;

Schultze, 2014; Turkle, 1997) have argued that individuals simultaneously inhabit multiple identity roles, each representing different facets of the self in various contexts.

The “Holistic Self” model presented here draws on these theoretical foundations but offers a novel synthesis tailored to the digital era. It emphasizes the interplay between core identity components and their expressions in the digital world. The aim is to provide a structured yet flexible framework for understanding identity as both a psychological construct and a digital phenomenon.

In the following Figure 1, the eight identity units of the “Holistic Self” are schematically presented for users of the digital world. This visual model is followed by definitions and explanations of each unit, which together form a logically integrated framework for conceptualizing digital identity within the broader structure of holistic identity.

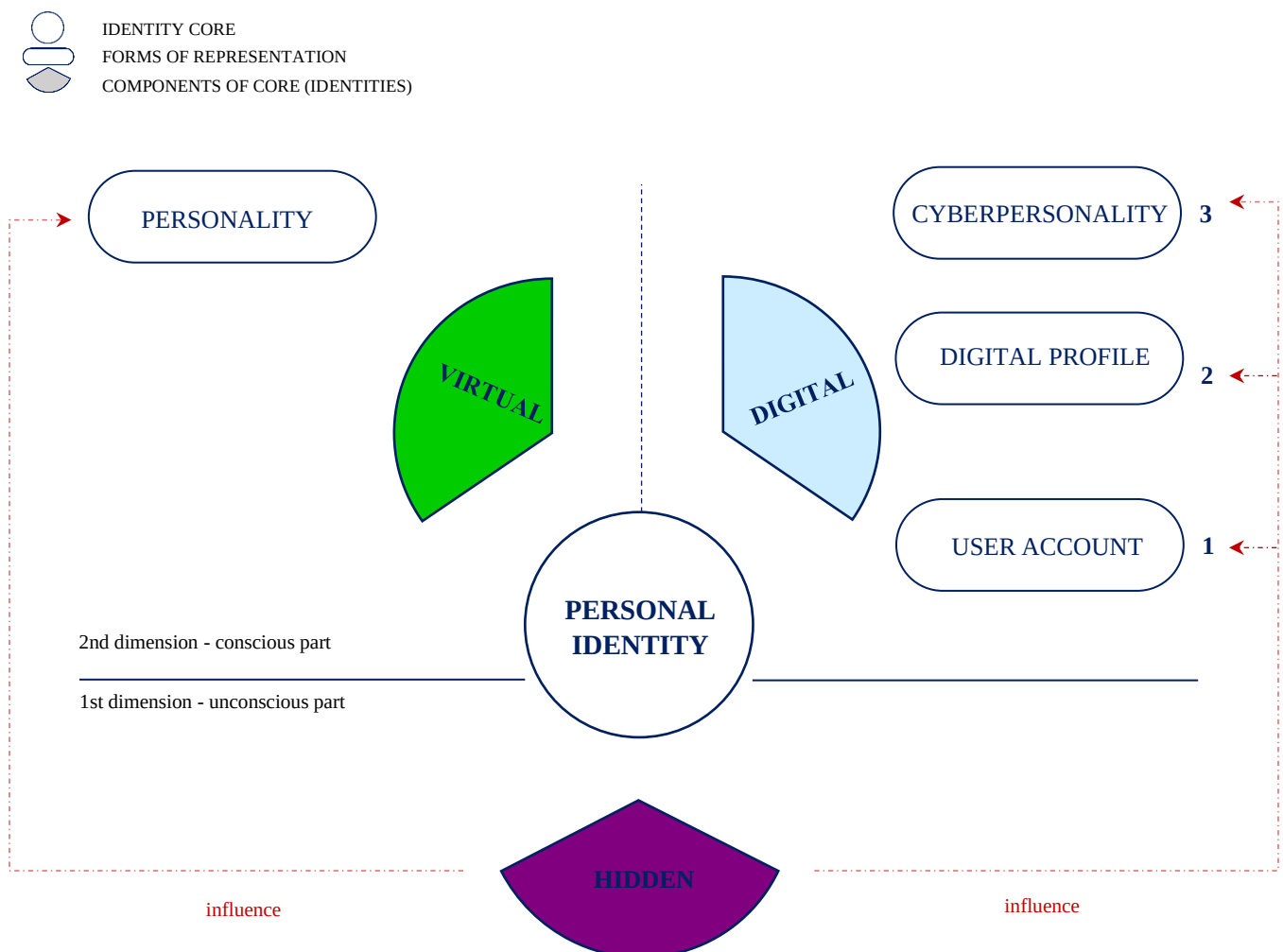


Figure 1. Identity concept (Holistic self)

Upon examining the model in Figure 1, it becomes clear that the eight identity units form an interconnected and coherent system. At the center is personal identity – the core unit that integrates three fundamental components: digital identity, virtual identity, and hidden identity. These components give rise to four distinct forms of self-representation. In the material world, self-representation is expressed through personality, whereas in the digital world, it is manifested through the user account, digital profile, and cyberpersonality.

Each form of self-representation reflects a specific mode through which identity is expressed, shaped by both internal characteristics and external contexts. While personality represents self-representation in the material world, the user account, digital profile, and cyberpersonality reflect self-representations in the digital world. Importantly, these forms should not be viewed as independent segments, but as interrelated expressions through which the “Holistic Self” manifests itself. Everything associated with a user’s self-representation – whether in the digital or material world – can thus be considered a valid expression of their identity.

To better understand the distinct content and functional scope of each identity unit, Table 1 presents a structured overview. Each unit is described according to two dimensions: its content (biological, social, or digital elements) and its level of consciousness – the degree to which the individual is aware of and can intentionally influence the processes represented by that unit. This analytical perspective supports a more nuanced understanding of identity as a dynamic and multilayered construct operating across both the material world and the digital world.

Table 1
Characteristics of identity units

Unit	Stability level	Awareness level	Definition	Explanation
IDENTITY CORE				
Personal identity	Stable	Partially conscious	The core of an individual that combines all parts and expressions of identity, reflecting the person as a holistic self.	Personal identity is challenging to change as it requires acquiring or losing characteristics. It's a stable phenomenon.
COMPONENTS OF CORE				
Hidden identity	Stable	Unconscious	Innate behavioral impulses influencing identity expressions and reflecting biological boundaries (Bargh & Morsella, 2008).	Comprises unconscious characteristics. Influenced by innate impulses, it's stable and not consciously alterable.
Virtual identity	Stable	Conscious	The conception of one's essence reflecting thoughts about oneself.	It consists of conscious characteristics about personal identity residing in the mind, forming a secondary self-image. Stable due to the significant influence needed for change.
Digital identity	Unstable (due to technological mediation)	Partially conscious	All digital “footprints” in digital world indicating the user and their representation.	Encoded conscious characteristics about personal identity in digital world, unstable as it can be edited with technology.
FORMS OF IDENTITY REPRESENTATION				
Personality	Partially stable (due to societal norms)	Conscious	The representation of self-conception in interaction with others.	Based on societal norms learned, representing limited expressions of the secondary self-image. Partly dependent on society.
User account	Stable	Conscious	A user's representation limited by digital world requirements, indicating presence and reflecting formal user data.	Encoded conscious characteristics based on digital world requirements, stable as changes usually require administrative permission.
Digital profile	Unstable	Partially conscious (as technology)	The user's self-representation indicating the user in digital world.	Encoded conscious characteristics formed by the user and technology. Continuously editable, hence unstable.

		also forms the profile)		
Cyberpersonality	Partially Stable (due to technological mediation and community norms)	Conscious	A limited representation of one's identity based on cyber community norms.	Involves finding an individual solution for self-representation within the community. Changing it requires altering the digital “footprint” formation structure.

Personal identity serves as the core or the base template for all resulting units of identity, while the core itself is composed of several components. When considering personal identity, it's impossible for an individual to be fully aware of all parts and forms of representation of their Self. The psyche consists of several separate yet interacting systems, which can be divided into two parts – the conscious and the unconscious (Bargh & Morsella, 2008).

The conscious part contains thoughts, memories, and emotions that an individual is aware of. Building on the idea of the psyche's conscious part and its content, the notion has been put forward that this content reflects people's perceptions (primary and secondary images that function in the virtual world) and user images (cyber identities that are encoded and function in digital world). Therefore, the conscious components of personal identity can be referred to as virtual and digital identity. At moments when we cannot clearly justify the reasons for our actions or thoughts, we are likely under the influence of the psyche's unconscious part, which includes a collection of forgotten or suppressed thoughts, feelings, attitudes, and memories. Based on the idea of the psyche's unconscious part, the term “hidden identity” has been proposed to denote that part of identity that is difficult or even impossible for an individual to be aware of during their lifetime and which goes beyond societal projections of a person. Considering the image formation and retention process described in the first chapter, this can be applied to unconscious characteristics about oneself. Thus, the level at which personal identity can be conscious is partial, as the hidden identity is its unconscious component. Each component has been identified to have its manifestations: virtual identity is expressed in personality, digital in the user account, digital profile, and cyberpersonality. No manifestation was defined for the hidden identity because it's not possible to identify what no one can fully be aware of. From the identity concept, it follows that the hidden identity influences the other components of identity, limiting their forms of representation.

Regarding individuals who have voluntarily chosen to function in digital world for development – essentially, it's the personality that chooses to transition into the digital environment, with the account facilitating access to digital environment, the profile allowing the personalization of one's digital self, and the cyberpersonality being the result of these stages. The cyberpersonality is not a direct digital copy of the personality but an expression of human identity that previously did not find another way to realize itself. Unlike just a profile or account, the cyberpersonality provides the opportunity to be an active and social participant in the development process in digital environment. If an individual does not feel affiliated with any digital community and does not seek a cyber society, it could mean they have found other ways to feel complete and self-sufficient. Socialization with others is not always necessary to find solutions.

Building upon established psychological theories that emphasize the multidimensional nature of identity – including the theory of multiple identities (Markus & Nurius, 1986; Gergen, 1995) and the holistic approaches to self-concept (Black et al., 2012; McAdams, 1989) – it can be hypothesized that a significant task in human life is self-understanding, aimed at integrating diverse identity units into a unified whole – the Holistic Self. This integration enables

individuals to act consistently across both the digital and material worlds, experiencing inner coherence in their actions, speech, and digital expressions. In this context, the creation of a digital identity can serve as an entry point for self-exploration and personal integration.

The creation and forms of digital identity representation

The creation and forms of digital identity representation are foundational to the interaction with technologies and other users in digital world. Digital identity, broadly considered in literature as the representation of oneself in digital world, is an all-encompassing construct of the user's data representation in digital format (Sarma, Matos, Girão & Aguiar, 2008). In crafting their digital identity, users can undertake numerous and varied actions, but for research purposes, the focus is on those digital “footprints” that allow user identification.

Clare Sullivan, in her comprehensive research on digital identity from a legal perspective, emphasizes that digital identity can exist in various forms and be used for a wide range of rapidly changing purposes, from national databases and online transactions to interactions across different social networks (Sullivan, 2011). As users expand their operating territory and engage more actively in digital world, the digital identity conceptually can undergo transformation in at least three forms of digital identity representation:

1. **User account** – fulfillment of formal requirements;
2. **Digital profile** – self-representation;
3. **Cyberpersonality** – becoming a community member.

It can thus be concluded that an individual begins to form their digital identity at the individual level, but its transformation can occur at both **micro** and **macro** levels. Therefore, a more comprehensive part of the identity research is yet to follow, where detailed information about the mentioned forms of digital identity representation will be compiled.

The most commonly accepted and simplest way to start reflecting identity in digital world is the creation of a user account. This is the initial stage through which any user begins interaction in the digital world. Based on the entered formal data, both the user and applications can start to create a profile for the specific user, revealing more information beyond formal requirements. Through the profile, users can interact with others and develop a cyberpersonality. Reaching this stage, an individual's operation in the digital world can begin to resemble life in the external world.

An individual can simultaneously create multiple user accounts, digital profiles, and cyberpersonalities, but this process is gradual and consists of three stages. Without a user account and digital profile, one cannot create a cyberpersonality. However, it is essential to understand that each separate stage can serve as the user's digital identity in its own right.

The choice of digital identity representation form is determined by the need for interaction with other users during the problem-solving stage, the level of openness and transparency (Sherman & Craig, 2019), and the awareness of one's identity characteristics. It follows that the greater the user's openness and need for others, the more advanced is the degree of digital identity transformation (resulting in the creation of a profile or cyberpersonality).

Micro level (user account)

As soon as a user starts using a new device (computer, mobile phone, etc.), a transformation of conscious self-characteristics into digital content typically occurs. Most sites, including search engines, prefer that the user sign in (or register). If digital environment has

specific terms of use (regulations) requiring registration, then based on the requirements of digital environment, the individual creates their user account and gains the opportunity to reside there authorized, create their profile, and initiate interaction through it. A single user account can leave multiple digital “footprints” from various email addresses or online activities. It's important to note that the user account is the basis for further activities in digital environment and is associated with all digital “footprints” left by the specific user.

The user account initiates a mechanism that transforms characteristics about the user into digital format.

Once an individual has created an account, the program on the server creates an identifier. The Internet Society (2017) has compiled information explaining that the identifier represents a collection of the user's digital “footprints” within a digital environment framework. It is a way for technology to store information about a user's identity and build its profile about them. For example, if you have an “Apple MobileMe” account, your “MobileMe” identifier could be something like “myID@me.com” (Gill et al., 2016). Conversely, if you use “Microsoft Bing” to search the internet, the search engine will assign you an identifier (creating a profile) and store it in your web browser as a cookie. Every time you use “Bing”, the cookie it stored in your web browser acts as an identifier, linking all your digital characteristics together in “Bing's” idea of you.

If a person uses the same program from multiple devices, such as both a laptop and a smartphone, they may be assigned several identifiers, each representing you to that specific program.

Identifiers assigned by sites do not actually describe identity but collect data to later offer you personalized services, linking them to the specific user account.

It can be said that identifiers include technology and various sites' “perceptions” of the user's digital identity.

Users limit themselves to creating a user account in cases where interaction with other users' cyber identities is sufficient to achieve the goal. Users may even avoid registering in special (created by other users) digital environments and operate in their local digital environment offline, for example, by creating a personal digital photo library or playing video games individually, either by themselves or with the computer in place of another player.

Activities that indicate the form of representation of the user's digital identity – user account:

1. Self-representation does not extend beyond formal requirements;
2. Digital “footprints” (reading, researching, and sharing content) do not indicate the user's individual characteristics;
3. Interaction with users and sharing in digital environment is not purposeful or may not exist at all.

The user account is the foundation for existence, problem-solving, and development, as well as for further transformation of digital identity in digital environment. From the perspective of digital environment, without a user account, there is no user.

Micro level (digital profile)

In society, when meeting new people, it's customary to introduce oneself based on one's characteristics. Similarly, in cyber society, initiating interaction can reflect certain individualized user traits. If the reason for a user's operation in digital environment, in addition to the user account (formal requirements), requires presenting informal characteristics about themselves, then through self-discovery, the user supplements their cyber identity by integrating significant characteristics about themselves into it. In other words, the user

transforms the user account into the next form of digital identity representation – the digital profile.

A user's digital profile is discussed when they begin to express their conscious characteristics in digital environment in an identifiable way to others. For example, the user has made their account publicly available, describing their hobbies or discussing their likes and dislikes while chatting with others. Consequently, based on the digital “footprints” left, it's possible to start making judgments about the specific individual behind the user account. This is no longer a hidden or local action but an open and active stance in digital environment.

The structure of the digital profile in digital environment: Content – all information about the user and their activity history available in digital environment.

Forms of social interaction – the forms and structure used by the user to communicate with others (e.g., synchronous and asynchronous communication; information is both textual and visual; interaction context) to convey and receive cyber identities (Talamo & Ligorio, 2001).

Activities indicating the form of representation of the user's digital identity – user profile:

1. Self-representation in the digital environment considers the user's self-conception, behavior, and psychological and biological characteristics.
2. The content published by the user includes their self-conception.
3. Purposeful interaction with other users can be observed – a specific form of interaction is chosen to make the user's self-conception understandable to others.

The digital profile, as a form of digital identity representation, influences the virtual identity and vice versa – the virtual identity affects the digital profile. In this way, the identity development process is ongoing.

Macro level (cyberpersonality)

Once a user begins interacting with digital environment where a specific community with a particular purpose consistently functions, they experience the clash of two phenomena – the disinhibition effect (Suler, 2004) and the operational conditions and rules of digital environment. On one hand, the user profile provides a sense of security in self-expression, as there's the possibility to remain completely anonymous and invisible behind the computer screen. On the other hand, the community may set conditions and limit expression opportunities. The greater the restriction of opportunities, the more likely it is that the user will be forced to leave the community or transform their digital profile.

The digital profile is transformed into the next form of digital identity representation – cyberpersonality, if the user's operational reason requires creating a sense of belonging with the community. Considering the part of the identity represented in cyber society, literature (Black, Creese, Guest et al., 2012) emphasizes the concept of “cyberidentity”. It seems that researchers have tried to encompass all aspects of the digital self with this term. However, viewing digital identity as a social phenomenon, the term “cyberpersonality” more aptly reflects the transformed digital identity represented in a specific community.

Thus, if the user interacts with others and seeks a place in the community, their digital identity is no longer limited to electronic usernames, passwords, or online responses but transforms into a social construct – cyberpersonality. This aligns with the notion outlined at the beginning of this module that personality can be discussed when behavior is expressed in society. The cyber society is no exception, and its members exhibit specific behavior and thinking patterns in the digital environment. Just like in the external world, the formation of personality in digital environment is fundamentally based on the identification process with a

group to which the person feels belonging (Tajfel et al., 1979). Digital communities are characterized by membership or belonging to a group, united by digital environment (one or several) and/or its purpose of creation. The community members primarily consist of independently functioning cyberpersonalities.

If a user chooses to join a community, they can feel a sense of belonging to the cyber society. It can be said that communities provide users with the opportunity to gradually integrate into digital environment. Accordingly, users must accept the rules of digital environment and also observe community traditions, requirements, and norms to establish social connections with other community members. By adopting group and cultural norms, the social aspects of cyber society are formed and maintained, which, in turn, influences the creation of digital identity (Nagy & Koles, 2014).

Thus, the basis of cyberpersonality is the user's sense of belonging to a digital community. Hence, the creation of cyberpersonality is based on community requirements. This means that the user identifies with a specific digital environment and community, i.e., accepts the norms of the specific community, considers themselves as belonging to this community, and the specific community accepts the user's cyberpersonality. Once the user is fully identified with the specific community, their cyberpersonality may begin to protect or advocate for the community's interests, both in digital environment and beyond.

Activities indicating the forms of digital identity representation – cyberpersonality (Cachia, 2008):

1. Self-representation in the digital environment considers the structure of the digital profile;
2. The content published by the user is based (coordinated) on community norms;
3. The user controls their actions both in digital world and beyond to protect or defend their community.

The exploration of digital identity within digital world delineates its multifaceted nature, emphasizing formation and representation across various interaction levels. Personal identity, residing at the core, functions as the foundational template from which virtual, digital, and hidden identities emanate. These units encapsulate both the conscious and unconscious elements of an individual's self-conception, influenced by biological and social determinants.

At the micro level, the user account emerges as the initial stage in the formation of digital identity, marking the commencement of an individual's interaction within digital environment through formal engagements. This evolves into the digital profile, a nuanced representation allowing for the expression of individual traits beyond formal requirements. The digital profile signifies a crucial transition, mirroring real-life interactions and revealing personal interests and connections within the digital realm.

The macro level introduces the cyberpersonality, highlighting the transformation of digital identity within community contexts. This aspect of identity is shaped by engagement with and belonging to specific online communities, emphasizing the social construction of digital identity. The balance between the freedom of self-expression and community-imposed constraints is influenced by the disinhibition effect and the operational norms of digital environment.

The progression from user accounts to cyberpersonality illustrates the dynamic evolution of digital identity, encompassing individual and social dimensions. This development reflects the broader identity formation process, where digital environments present new avenues for self-exploration and social interaction.

Progressing to the forthcoming chapter, “Understanding self-presence in digital environments”, the inquiry shifts towards the phenomenological aspect of individual experiences within digital realms. Anchored in the foundational insights gleaned from the concept of digital identity, the subsequent discourse will delve into the essence of self-presence, explicating its conceptual framework and its consequential relevance for users of digital social technologies. This examination seeks to unravel the nuanced interrelation between identity and presence within digital contexts, thereby shedding light on the psychological and social dimensions of digital engagements.

1.2. The phenomenon of self-presence in digital environments



Upon their initial engagement with the digital world, users confront the necessity to assert their presence within this expansive digital domain. The deliberation concerning the depth and manner in which to sculpt their digital persona, alongside the choice of interactions and engagement strategies with digital entities, constitutes a critical juncture in the articulation of one's digital existence. This phase necessitates an astute awareness among users regarding the array of strategies available for the construction of their self-representation and the communication of their presence to the collective ensemble of digital world participants.

The focus will be directed towards an in-depth exploration of “Presence”, including its dimensions and implications within digital environments. This will be followed by an examination of “Self-presence”, elucidating the distinctions between presence and self-presence, and culminating in a discussion of the specific concept of self-presence as applied in the practical component of this research. Through this inquiry, the chapter aims to illuminate the intricate dynamics of presence and self-presence in digital environments, contributing to a nuanced understanding of these phenomena and their significance for users.

The concept of presence

The conceptual evolution of “presence” within digital environments delineates a nuanced journey from sensory immersion to a more comprehensive analysis that integrates various facets of the user experience. Initially, the interpretation of presence spanned a broad spectrum of user experiences, from the authenticity of digital representations and the sensation of being transported to alternate spaces, to interactions with digital entities as social actors, and engagements with the medium itself as a social entity.

As depicted in Table 2, the concept of presence included various manifestations and experiences of presence.

Table 2
Key stages in the conceptual evolution of presence

Key stage	Explanation
Presence as social richness (Rice, 1992; Short et al., 1976)	Focuses on the medium's capacity to convey human-like qualities and support rich social interactions. It emphasizes the extent to which a medium is perceived as sociable, warm, sensitive, personal, or intimate when used for interaction.
Presence as realism (Hatada et al., 1980; Potter, 1988)	Centers on the degree to which a medium can produce seemingly accurate representations of objects, events, and people, assessing the closeness of the medium to reality. It includes both social realism (plausibility of media portrayals) and perceptual realism (sensory fidelity of the media).
Presence as transportation (Biocca & Levy, 1995; Sheridan 1992; Rheingold, 1991)	Involves the psychological sensation of being transported to another place or having another place brought to the user. It can manifest as “You are there”, “It is here”, or “We are together”, each offering a different dimension of spatial immersion and shared experience.
Presence as immersion (Biocca & Delaney, 1995; Kim, 1996)	Highlights the perceptual and psychological immersion in a digital environment where the user's senses are fully engaged, and the real world is obscured. It includes both the sensory immersion provided by the digital environment and the psychological state of involvement, engagement, and absorption experienced by the user.
Presence as social actor within medium (Horton & Wohl, 1956; Lombard, & Ditton, 1997)	Emerges from interactions with media personas or characters, leading users to respond to these entities as if they were real social actors. This conceptualization is particularly relevant in environments where users engage with digital characters or avatars that exhibit human-like qualities and behaviors.
Presence as medium as social actor (Nass et al., 1996; Nass & Moon, 1996a, 1996b)	Arises when users respond to the medium itself as if it were a social entity, prompted by the medium's social cues. This occurs when users anthropomorphize the medium, attributing human characteristics and autonomy to it, thereby engaging in social interactions with the technology itself.

Table 2 delineates the shift in the perception of presence from an initial focus on social richness to a comprehensive framework that incorporates aspects of immersion, transportation, and the engagement with media as if they were social entities. This progression elucidates the intricate nature of presence, showcasing the manifold ways in which individuals engage with and perceive digital environments. The evolving conceptualization of presence accentuates the fluidity of human-media interactions, which are continually reshaped by technological progress and the evolving expectations of users.

The development of presence was attributed to a wide array of factors, encompassing both the intrinsic attributes of media platforms and the unique characteristics of users. A key element in understanding the emergence of presence involved distinguishing between its manifestation as an invisible medium and as a transformed medium.

1. Presence as an invisible medium

Form variables - the formal characteristics of media, such as sensory richness and vividness, played a crucial role in facilitating presence. The sensory breadth and depth offered by a medium significantly influenced a user's sense of presence (Zeltzer, 1992).

Content variables - the nature of the content disseminated through media was equally influential. Factors such as social realism and adherence to media conventions shaped users' perceptions of content realism and authenticity, thereby modulating the sense of presence (Dorr, Graves, & Phelps, 1980).

User characteristics - variations in user characteristics, including their propensity for suspension of disbelief and their familiarity with the medium, significantly affected the degree of presence experienced (Mehrabian, 1976).

2. Presence as a transformed medium. In scenarios where media transcended their tool-like utility and were perceived as social entities, aspects such as the level of interactivity (Steuer, 1995), the use of anthropomorphic cues like human-like voices (Nass, & Steuer, 1993), and even the medium's physical dimensions and form could sway the perception of presence (Biocca & Levy, 1995). The more a platform facilitated interactive engagement and adopted characteristics that users associated with social interaction, the more it was likely to be perceived as a transformed medium, encapsulating presence.

Understanding the conceptual evolution and causative factors of presence shed light not only on the dynamics of user-media interaction but also on the potential of these environments to influence human experiences and social constructs. As digital technologies advanced, the conceptualization of presence evolved. This ongoing evolution underscore the significance of presence in shaping user experiences in the digital environments.

Presence in digital environments

The trajectory of the “presence” concept within digital environments reflects a significant evolution, guided by technological advancements and a deepened insight into human interactions within digital realms. Originally, presence was defined as a psychological state or subjective perception in which technology mediates the user's experience, yet it is perceived transparently, as if the technology were absent. Over time, this concept has been acknowledged for its complexity and the multiple dimensions it encompasses.

Understanding the factors that influence the subjective experience of presence has been pivotal for disciplines utilizing digital environments to probe human responses. Now, in the digital age, the efficacy of digital environments is often measured by the level of presence they elicit from users, with “complete presence” denoted when sensory and cognitive experiences in the digital realm closely resemble those in the physical world (Cummings, & Bailenson, 2016; Wei et al., 2019).

Delving into the evolution of the concept of presence enables a deeper appreciation of the subtleties involved in human interactions with digital environments and highlights the persisting challenges in refining these experiences for users across varied sectors. This progression towards recognizing the multidimensionality of presence has been instrumental in shaping our understanding of digital environments and their impact on user experience. In Table 3, the evolution of multidimensionality of presence is illustrated.

Table 3
Dimensions of presence

Stage	Dimension	Key features
Early research	Basic immersion (Lombard, & Ditton, 1997)	Initial focus on the technological aspects enabling a user to feel “immersed” in a digital environment.
Development	Spatial presence (Hartmann, et al., 2015)	Emphasis on the sensory and perceptual experience of being in a digital environment.
Expansion	Social presence (Biocca, Harms, & Burgoon, 2003)	Introduction of social interaction within digital environments, enhancing the feeling of presence.

Further depth	Self-presence (Biocca, 1997)	Understanding presence as the user's self-representation and embodiment within the digital environment.
Current views	Multidimensional presence (Lee, 2004)	Comprehensive view incorporating spatial, social, and self-presence, influenced by interactivity and realism.

This table elucidates the intricate evolution of the presence concept over time, illustrating its broadening from an initial emphasis on immersion to a complex framework shaped by sensory experiences, social interactions, and personal embodiment within digital environments. Presence is now understood as a multidimensional construct, with spatial presence, social presence, and self-presence emerging as key dimensions. Spatial presence denotes the user's sensation of being physically located within a digital world, while social presence highlights the experience of social connectivity with other entities in the digital realm. Self-presence, distinctively, involves the user's projection of their identity into the digital environment, perceiving their digital avatar as a continuation of their own physical self.

Given the research focus on digital identity as an integral component of the user's holistic self, as previously discussed in the “Identity concept (Holistic self)” section, this research will particularly delve into the dimension of self-presence. This decision is driven by the understanding that digital identity extends beyond an online persona to become a core part of the user's identity, a notion fully embodied by the dimension of self-presence. This examination of self-presence is anticipated to provide deeper insights into the ways individuals engage with and perceive their digital embodiments, thereby laying the groundwork for the forthcoming sub-chapter “The concept of self-presence”, where this theme will be explored in greater depth.

The concept of self-presence

The concept of self-presence in digital interactions is pivotal in shaping user experience, going beyond mere environmental presence to include cognitive and emotional engagement with virtual self-representations. Biocca (Biocca, 1997) initially framed self-presence as the user's internalized model within the digital realm, capturing not only the avatar's visual aspects but also physiological and emotional states, alongside identity nuances. Lee (Lee, 2004) further enriched this notion, defining self-presence as a psychological state where virtual and actual selves merge, encompassing both sensory and non-sensory dimensions.

Self-presence is closely intertwined with the “sense of presence”, where the authenticity of simulated experiences significantly impacts users' perception of being in a digital environment. This highlights the importance of ecological validity in virtual environments to ensure that sensory and emotional experiences reinforce users' digital self-perception.

Furthermore, self-presence holds substantial implications for the design and application of digital environments, advocating for immersive experiences that resonate with users' self-perception and identity. The focus on self-presence, intensified with the emergence of immersive virtual reality technologies (Held & Durlach, 1992; Sheridan, 1992; Steuer, 1995), marking a shift towards considering presence as an essential design goal directly linked to virtual environments' effectiveness and immersion.

Exploring the factors influencing self-presence in digital realms reveals a complex interplay between users' engagement with their digital representations of themselves and the affordances of the digital environment. This includes technological affordances and design, where the quality of graphics, user interfaces, and controls significantly affect users' ability to

project themselves into digital representations, enhancing their sense of presence (Lee, 2004; Belk, 2013). The degree of control users have over their digital representation and environment deepens their connection with their digital selves (Brubaker, 2020). Engaging narratives and emotional experiences draw users further into the digital world, fostering a stronger identification with their digital representations (Bareither, 2019). The ability to interact and form connections within digital environments reinforces users' sense of self (Carr, & Hayes, 2015). Individual differences in imagination, immersion susceptibility, and escapism influence users' engagement with their digital representations. The design of digital self-representations, including body morphology and expressiveness, impacts users' self-presence, highlighting the need for thoughtful design to avoid intersensory conflicts and enhance immersion (Sun, 2021). Addressing these multifaceted influences is crucial for developing digital platforms that support and enhance self-presence, highlighting its significance for digital identity and user engagement strategies.

The examination of factors influencing self-presence provides a comprehensive understanding of the formation and perception of digital identity, extending its influence beyond the digital environment into the extrapersonal space.

The effects of self-presence in digital environments are multifaceted, encompassing physiological and psychological dimensions:

Physiological effects – self-presence can induce specific physiological responses, such as increased arousal, vection, and in certain cases, simulation sickness (Ratan, 2013). These responses are closely associated with the immersive qualities of the digital experience, which can mimic physical sensations or elicit strong emotional reactions.

Psychological effects – on a psychological level, self-presence can significantly enhance engagement, enjoyment, and involvement of users with the media content (Seo et al., 2017). It is crucial in improving task performance, aiding in skill training, and influencing the efficacy of desensitization and persuasion within digital environments.

The interaction of these factors with the sense of self-presence and emotional response highlights their importance in shaping digital identity. The subsequent section will explore the model developed by Ratan, which elucidates the complex and strong connection between aspects of self-presence and digital identity.

The theoretical framework and the model of self-presence developed by Ratan and co-authors

Extending the conceptualizations within the realm of digital interactions, a comprehensive theoretical framework for self-presence was constructed, integrating insights from neuroscience, psychology, embodied cognition, and communication (Ratan, 2009). This framework anchors on the foundational work delineating three pivotal layers of self: *the proto-self*, *core self*, and *autobiographical self* (Damasio, 1999). The proto-self refers to an intrinsic sense of physical existence, grounded in the neural representations of the body schema. The core self emerges as an emotional condition engendered by the interplay between the proto-self and environmental entities. The autobiographical self, or extended self, encapsulates the individual's identity, shaped by personal history and accumulated experiences (Damasio, 1999).

Further expansion within the neuroscientific domain applied this triadic self-concept to the presence, articulating the ability for action-perception coupling, engagement with immediate tasks and environmental elements, and the recognition of one's personal narrative (Riva, Waterworth, & Waterworth, 2004). While primarily addressing presence, this delineation laid an essential foundation for exploring self-presence, especially in relation to digital representations.

Based on these insights, the initial rendition of a self-presence model by Ratan (2009), as depicted in Figure 2, was unveiled. This model aims to encapsulate the multifaceted nature of self-presence, informed by the intertwined layers of self and contextualized within digital environments.

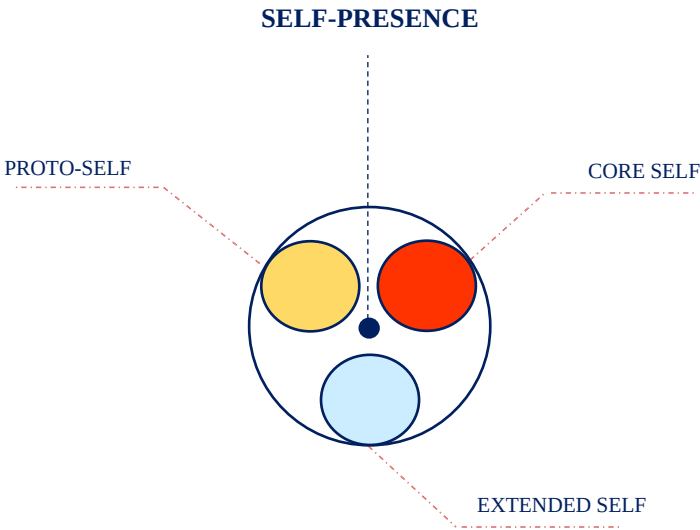


Figure 2. Initial model of self-presence

Table 4
Summary of the self-presence framework (Ratan, 2009)

Aspect	Proto self-presence	Core self-presence	Extended self-presence
Definition	The extent to which a media tool and corresponding virtual self-representation are integrated into body schema.	The extent to which mediated interactions between a virtual self-representation and virtual objects cause emotional responses.	The extent to which some mediated identity is important to the individual.
High self-presence implies	Media tool feels and is treated like an extension of the body.	Strong emotional responses when interacting with virtual objects.	Mediated identity holds great personal significance.
Relevant aspect of self	Body schema	Emotional responses	Identity

The table illustrates how each dimension contributes to a comprehensive understanding of self-presence, moving from the physical integration of digital representations (proto self-presence), through the emotional engagement elicited by digital interactions (core self-presence), to the incorporation of these experiences into the user's identity and personal narrative (extended self-presence).

- *Proto self-presence* emphasizes the integration of digital tools and representations within the user's body schema, highlighting the immediate and tangible connection between the user and their digital embodiment. This dimension reflects the initial layer of self-presence, where the digital interface becomes an extension of the physical self, blending seamlessly with the user's sensory and motor experiences.
- *Core self-presence* delves into the emotional resonance elicited by interactions within the digital realm. This dimension captures the affective responses triggered by virtual

engagements, signifying a deeper, more visceral level of presence that transcends mere physical interaction to include emotional involvement with digital content and entities.

- *Extended self-presence* explores the significance of digital identities and representations in relation to the user's overall sense of self. This dimension extends the concept of self-presence to encompass the user's identity, weaving their digital experiences and representations into the fabric of their personal narrative and self-concept.

This layered approach offers a holistic view of self-presence, underlining its complexity and the multifaceted ways in which individuals relate to and embody their virtual selves in digital environments. As a result of this approach and concept, Ratan (2009) forms a definition of self-presence, defining it broadly as “the extent to which some aspect of a person’s media use is relevant to the user’s proto (body-schema) self, core (emotion-driven) self, and/or extended (identity-relevant) self”.

Key components of revised self-presence model

In his pivotal 2012 publication (Ratan, 2012), Ratan advances the theoretical framework of self-presence, elaborating on a refined three-tiered model. This updated model delineates self-presence into three distinct but interrelated domains: *body-level self-presence*, previously referred to as proto self-presence; *emotion-level self-presence*, evolving from core self-presence; and *identity-level self-presence*, an advancement of extended self-presence. Figure 3 illustrates the integral components of this model, encapsulating self-presence through bodily, emotional, and identity perspectives. This refined framework underscores the complex and multidimensional nature of individual engagement with digital environments.

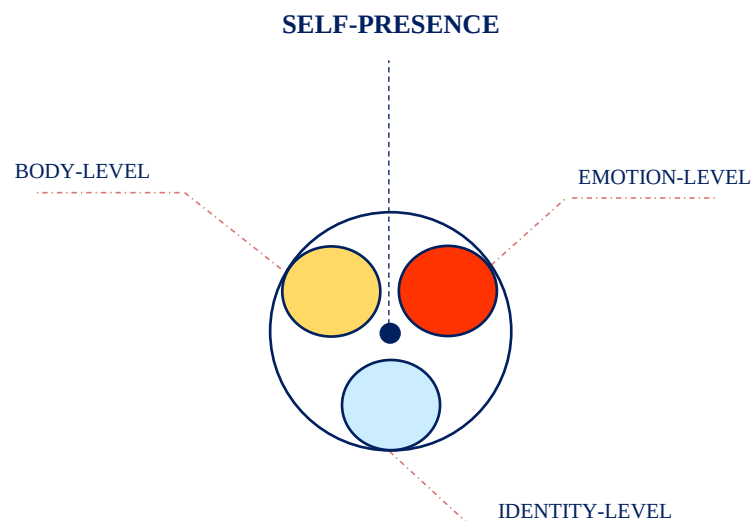


Figure 3. Revised model of self-presence

Table 5
Summary of the self-presence framework (Ratan, 2012)

Aspect	Body-level self-presence	Emotion-level self-presence	Identity-level self-presence
Definition	The extent to which a mediated self-representation is integrated into body schema	The extent to which mediated interactions between a self-representation and mediated objects cause emotional responses	The extent to which some aspect of a self-representation is related to some aspect of personal identity
High self-presence implies	Self-representation treated as an extension of the body without conscious consideration of the media interface	Interactions between self-representation and mediated objects cause strong emotional responses	Self-representation reflects important aspects of personal identity
Temporal facets	Arises and persists only during avatar use, dissipates immediately or seconds afterwards	Arises during media use, may linger afterwards for minutes or hours	Arises during avatar customization and use, dissipates at rate of personal identity change – days, months, years.

The exploration of Ratan's evolved model unveils refined dimensions of self-presence for the user, encompassing body-level, emotion-level, and identity-level self-presence. This framework provides an in-depth perspective on the complex interactions within digital environments.

- *Body-level self-presence* entails the merge of digital representations into the user's body schema, highlighting the seamless nature of digital interactions. The extent of immersion achieved at this level enhances the user's engagement with the digital environment, blurring the lines between virtual and physical actions.
- *Emotion-level self-presence* focuses on the genuine emotional responses evoked by digital engagements. This dimension reflects the profound impact of digital experiences on the user's emotional state, fostering a rich, emotionally engaging digital milieu.
- *Identity-level self-presence* stresses the congruence between digital personas and the user's personal identity, presenting the digital domain as a space for identity articulation and exploration. A heightened identity-level self-presence reinforces the linkage between the user and their digital persona, affirming the integration of digital identity as an essential element of the user's self.

These dimensions, while distinct, are intricately interwoven, underscoring the complex nature of self-presence and its critical influence in crafting the digital identity of users. The nuanced relationship between users and their digital representations is thoroughly explored, highlighting the integral function of self-presence in facilitating fusion with digital identity.

Reflecting on this theoretical foundation and based on the psychological logic of perception and identification (Goffman, 2023; Turkle, 2011; Ratan, 2013), the following formula is proposed to represent the core relationship:

The formula: **PDSR = k * SP**

- **PDSR** represents the *perception of digital self-representation* as “Me”, which is the degree to which a user perceives their self-representation as an authentic extension of their core identity within the digital environment.
- **k** is a constant of proportionality, signifying the strength of the relationship between self-presence and the perception of digital self-representation as “Me”.
- **SP** denotes *self-presence*, which is the process of transforming a user's perception, leading them to view their self-representation as an authentic extension of their core identity in the digital environment.

This formula conceptually reflects how the intensity of self-presence influences the subjective perception of digital representation as one's own. The stronger the self-presence, the greater the likelihood that the user will identify with their digital form, integrating it into their digital identity.

Self-presence is the process of transforming a user's perception such that their digital representation within the digital environment is increasingly experienced as an authentic and integral part of their core identity.

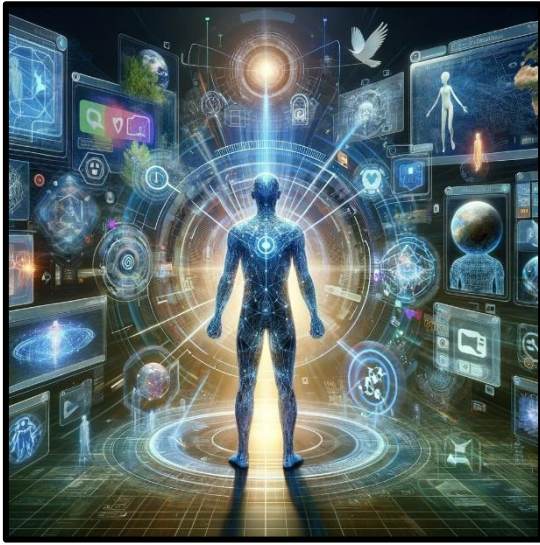
It brings the user into a psychological state in which the self-representation and the actual self-experience fusion, encompassing both sensory and non-sensory dimensions. This fusion is essential in shaping how users perceive and regulate themselves through their digital representation.

Self-presence produces significant physiological and psychological effects on users:

- **Physiological effects** arise when self-presence triggers physical responses such as increased arousal, vection (the sensation of movement), and, in some cases, simulation sickness.
- **Psychological effects** occur when self-presence enhances engagement, involvement, and affective resonance. It contributes to improved performance in goal-directed digital tasks, facilitates digital skill development, and influences susceptibility to persuasion, desensitization, or behavior modeling within digital environments.

This deepened sense of self within the digital environment not only reinforces personal identification with digital representation, but also amplifies the perception of such representation as a legitimate projection of the self. The proposed model illustrates how increased self-presence strengthens the authenticity of one's digital experience and contributes to digital identity by supporting a meaningful “I am” within digital environments.

1.3. Immersion as a psychological experience in the digital environment



Transitioning from the exploration of self-presence and its significant influence on the affirmation of digital identity within digital environments, this section shifts focus towards the phenomenon of immersion in digital platforms. Immersion, fundamental to the users experience in digital contexts, warrants a comprehensive examination to elucidate its diverse levels and the pivotal functions it serves in enriching user's engagement with digital environment. The ensuing information aims to provide a thorough analysis of immersion, delineating its dimensions and underscoring its critical importance in facilitating transformative interactions for users within digital environments.

The concept of immersion

Immersion, a concept sometimes used interchangeably with presence, signifies a deep state of engagement within narratives and environments crafted in pseudo-realities. This engagement plays a pivotal role when we step into virtual realities embedded across various media, such as books, films, or video games. Immersion influences our interaction with these alternate realities, affecting the time we invest and, most importantly, the level of satisfaction and enjoyment we derive from them.

Janet Murray, in “Hamlet on the Holodeck, updated edition: The Future of Narrative in Cyberspace” (2017), provides a comprehensive definition of immersion. She posits that an engaging narrative, regardless of the medium, can be perceived as a form of virtual reality because our minds are wired to deeply engage with stories, sometimes to the extent that the real-world fades into the background. Murray compares the experience of immersion to the sensation of being submerged in water. Just as immersion in water encompasses us in a reality distinctly different from air, psychological immersion in a story or digital environment captivates our full attention and engages our entire perceptual system. In interactive media, immersion transcends mere engagement, requiring users to adapt and perform actions that the new environment facilitates, thus heightening the enjoyment derived from immersive experiences. While immersion and presence are often used synonymously, Murray's distinctions clarify that immersion encompasses a broader spectrum of engagement and it goes beyond merely feeling physically or socially present in a digital environment.

Based on the multifaceted concept of immersion, immersion experiences are categorized along two distinct axes: participation, ranging from active to passive, and connection, spanning from absorption to immersion (Mäyrä and Ermi, 2011). This classification not only deepens the understanding of immersion but also highlights the spectrum of engagement levels within digital experiences. Absorption is defined as the directed attention towards a mentally conjured experience, whereas immersion signifies a more profound involvement, marking a transition from mere mental engagement to becoming an integral part of the experience, either through physical actions or mental presence.

Overall, immersion pertains to an emotional or psychological state – the sensation of being fully engrossed and living through a specific experience. The term emphasizes that immersion can pertain to both mental and physical (or sensory) engagement with an experience, highlighting its capacity to fully engage individuals on multiple levels (Sherman & Craig, 2019). This broad understanding of immersion underpins its significance in shaping the user experience within digital platforms, setting the stage for a deeper exploration of immersion's various levels and its pivotal role in digital environments.

The concept of immersion in the digital environment

Immersion within digital environments embodies a state of profound engagement, where individuals navigate the realms of digital environment with distinct objectives and tasks, leading to the formation of their digital identity. This experience of immersion transcends mere presence in digital environment, offering users the opportunity to immerse themselves to such an extent that they experience a robust sense of being within these digital environments (McMahan, 2013). Such specific process facilitate user interactions, socialization, and the experience of a reality distinct from the physical world.

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The digital environment, pivotal to contemporary social interaction, facilitates connections among users and serves as a primary source of social information, fundamentally influencing societal dynamics. In the field of cyberpsychology, immersion, particularly within video gaming contexts, is recognized as distinct from Csikszentmihalyi's (1990) concept of flow, representing a suboptimal yet engaging state. This distinction emphasizes that individuals can be deeply immersed in gaming activities without necessarily experiencing flow (Cheng, Shet, & Annetta, 2015).

Beyond the realm of gaming, the concept of immersion remains relevant, providing a framework to understand the levels of engagement exhibited by users within the digital environment. This key dimension of immersion impacts the overall experience of users in the digital environment, highlighting its crucial role in shaping online experiences.

Immersion in digital environment typically refers to the quality of digital reality systems in physically and sensorimotorily connecting the user with the digital realm, offering a cohesive, vivid, and inclusive experience (Elor & Kurniawan, 2020; Rose, Nam, & Chen, 2018). Immersion also denotes the degree to which users perceive their digital identity as part of their personal identity. For example, following the completion of a game, users may continue to experience mental or physical distress over the demise of a game character. It is proposed that the more significant the user's constructed digital identity, the greater its influence on the user's immersion in digital environment.

Higher levels of immersion lead to a more authentic experience, enabling individuals to genuinely perceive themselves as part of a specific place, space, and community. This can enhance the sense of being a meaningful of the digital environment and cybersociety. Immersion is acknowledged as a suboptimal and non-extreme state, characterizing the level of involvement in a process (Brown & Cairns, 2004; Jennett et al., 2008).

Digital space includes not only websites and the interfaces of computers and smartphones but also simulated virtual environments created by virtual reality systems. Within such virtual worlds, through aids like haptic suits and VR goggles, individuals can experience a level of immersion where the boundaries between the physical world and the digital world begin to merge (Sherman & Craig, 2019).

The levels of immersion in the digital environment

Immersion, as defined above, entails a state of profound mental involvement, potentially leading to a disassociation from the awareness of the physical world, driven by a shift in attentional focus (Agrawal et al., 2019), though not obligatory. It is acknowledged that various levels of involvement can coexist.

The impact of immersion in the digital environment on users' experience is profound. Users, when immersed, establish a deep connection with the digital realm, experiencing a sense of presence and a diminished self-awareness, akin to being within the digital world itself (Huang et al. 2020). This heightened engagement yields positive outcomes, including increased motivation, enjoyment and a sense of accomplishment.

Conversely, a lack of immersion leads to a less positive digital experience (Guerra-Tamez, 2023). Users may feel disconnected, disinterested and exhibit reduced motivation to participate, limiting their ability to fully comprehend and engage with the digital environment. Overall, the level of immersion emerges as a pivotal factor influencing users' experience and their connection to the digital environment (Nah, et al, 2022).

As one of the most cited papers on the subject of immersion, what it is and what it consists of, *A Grounded Investigation of Immersion in Games* by Emily (Brown & Cairns, 2004), an interview-based research about video game players' thoughts on what immersion is, is probably the best written paper about immersion and its complex structure. In the exploration of involvement stages in gaming (Brown & Cairns, 2004), three distinct levels have been identified (refer to Figure 4): engagement, engrossment and total immersion.



The lowest level of immersion is
“Engagement”



The average level of immersion is
“Engrossment”



The highest level of immersion is
“Total Immersion”

Figure 4. Immersion levels

- *Engagement* represents the initial and lowest level of involvement. Users experiencing engagement in the digital environment may exhibit a low level of interaction and involvement in the digital space, yet maintaining awareness of their physical surroundings.
- *Engrossment* marks the subsequent stage of involvement, characterized by a heightened emotional investment in the digital environment. Users at this level are less aware of their surroundings, with attention and emotions directly influenced by the game, fostering emotional attachment to the digital environment.
- *Total immersion* signifies the pinnacle, equating to a state of presence where the digital environment takes precedence. Users in a state of total immersion are wholly absorbed in the digital realm and are detached from the physical world around them.

Most modern views of immersion are based on this simple approach and it is the one that this thesis will adopt.

The psychological and emotional state of a users within the digital environment is significantly impacted by the experienced level of immersion. These factors, in their turn, influence a user's behavior and actions within the digital environment, ultimately shaping the impact of a digital identity on human development.

The categorization of immersion levels in the digital environment serves to provide a framework for comprehending the diverse stages of involvement and connection individuals may undergo while interacting within digital realms (Lombard & Ditton, 1997).

The interplay between immersion and digital identity underscores the profound impact that an individual's level of immersion in the digital environment can exert on the process of self-transformation. When users experience a high level of immersion, particularly in case of total immersion, they may undergo substantial changes to their self-concept and identity (McCreery et al., 2013). Conversely, individuals with a low level of immersion, such as those in a state of engagement, may exhibit limited involvement in the digital environment, resulting in a diminished likelihood of significant self-transformation. This immersive experience also plays a pivotal role in shaping users' self-perception and their overall environmental experience, thereby influencing the trajectory of self-transformation (Tombul, & Sari, 2021).

As users traverse from engagement to engrossment and eventually reach total immersion, their self-concept may meld with their digital identity. This fusion can lead to self-transformation, wherein a person's sense of self is molded by their interactions and experiences within the digital realm (Kim et al., 2014).

However, it is crucial to acknowledge the complexity of the relationship between immersion and digital identity, which can vary significantly based on individual differences and specific attributes of the digital environment. For example, total immersion in a digital setting may prompt users to undergo a sense of self-transformation. This transformation is facilitated by acquiring an authentic and realistic experience through the interaction of digital identity with elements of digital environment (Bailenson, Blaskovich, & Guadagno, 2008). Conversely, insufficient immersion may lead users to experience a disconnection from digital environment, diminishing the potential for authentic and realistic experiences, and consequently, reducing the likelihood of integrating their digital identity with their self-concept (Zimmermann, Wehler & Kaspar, 2023).

Reflecting on the intricate dynamics between levels of immersion in the digital environment and the potential for self-transformation, which significantly influence the perceived authenticity of the user's digital experience (Slater, & Wilbur, 1997; Klimmt et al., 2009; Riva et al., 2019), the following formula is proposed to conceptually describe this phenomenon:

The formula: **DIE = k * I**

- **DIE** represents the *digital identity experience*, which is the degree to which a user perceives realism and authenticity in their experience when interacting with elements of the digital environment through their self-representation. This encompasses how real the digital environment feels, including the entities and occurrences within it.
- **k** is a proportionality constant, indicating the strength of the relationship between *immersion* and the *digital identity experience*. This constant modulates how changes in immersion influence the digital identity experience.
- **I** denotes *immersion*, which is the process of transforming a user's perception, whereby their engagement with elements of the digital environment through self-representation increasingly aligns with a sense of realism and authenticity.

This formula succinctly captures the connection between immersion and the perception of realism, illustrating how immersion transforms the user's experience of the digital space. It sets the foundation for further exploration of how immersion contributes to the formation and integration of digital identity, particularly in relation to self-presence.

Immersion in the digital environment is the process of transforming a user's perception, whereby interaction with elements of the digital environment through their self-representation is experienced with an increasing degree of realism and authenticity.

It brings users into a psychological state in which elements of the digital environment take on the characteristics of objects from the material environment, intensifying the sense of being psychologically present and fostering fusion with digital identity across both sensory and non-sensory dimensions.

Immersion exerts a significant psychological effect on users, influencing motivation, emotional involvement, and enjoyment. The deeper the immersion, the stronger the user's sense

of connection and identification with the digital environment. Conversely, a lack of immersion may lead to detachment and reduced engagement, limiting the potential for psychological integration and identity transformation.

1.4. The interrelationship between digital identity, self-presence, and immersion

The necessary transformation

Digital space provides an additional “space” where users can experience transformation – continuing to explore new, inherent characteristics, as well as attempting to digitally represent themselves to others. The ability to function both within and outside of cybersociety has created a situation where all parts of one's identity, both conscious and unconscious, can converge and form various types of self-representations – both genuine and truthful, as well as desired and idealized. Additionally, digital space affords users the opportunity to more intensely observe other users' representations, thereby potentially making the discovery and transformation of their own identity much more profound than in the external world.

Upon first entering digital space, users face the challenge of how to reflect their presence online. Each individual chooses how extensively and in what specific ways to construct their digital representation in the digital environment and how much and in what ways to interact with elements of the digital environment. In other words, someone who wants to become a user must understand that there are various ways to create their digital representation and announce their presence in digital space to other users.

The simplest way a person can do this is directly. This means that the person transfers original characteristics about themselves to the digital environment. In a more advanced version, a person can completely transform the original characteristics into new traits that the user has not previously attributed to the original.

If a person uploads their photograph online, it is their digital representation. If a person creates their personal profile on social networks, they have augmented their digital representation and gained the opportunity to interact with the digital environment and other users. If a person begins to communicate with other users through their profile and resides in a certain digital environment, then it can be said that their personality also becomes digital. All these interactions create a digital version of identity, offering new possibilities to name, transform, and express oneself (Nagy & Koles, 2014). Thus, digital space fundamentally provides people with the opportunity to create a representation of themselves (Talamo & Ligorio, 2001; Suler, 2016) and to supplement and express their identity or a part of it.

In most cases, users have the opportunity to remain both anonymous and reveal themselves (Talamo & Ligorio, 2001). Through digital identity, users can disclose and display even those characteristics that have never been expressed in society for various reasons. In revealing themselves, digital self-representation can include the user's true self – what the user is actually like (Bargh, McKenna & Fitzsimons, 2002); the real self – what the user genuinely expresses; the ideal self (Koles & Nagy, 2012; Sung & Moon, 2011) – what the user could potentially be; or the desired self – what the user would like to be (Bargh, McKenna & Fitzsimons, 2002).

Table 5
Conceptualizations of self in digital identity representation

TRUE SELF	REAL SELF
True aspects of identity that a person wants to understand and reveal but may find difficult due to various reasons. Includes both conscious and unconscious traits, and both socially acceptable and unacceptable traits and their manifestations	Observable characteristics and behaviors that form the perception of an individual. Represents a limited representation of oneself due to societal conditions.
IDEAL SELF	DESIRED SELF
Characteristics and manifestations that the individual does not currently possess but believes would make them ideal and perfect. Each person's ideal version is different.	Traits and characteristics that an individual aspires to possess. Generally, these are traits the individual does not have but desires to obtain, regardless of social norms.

Based on such understanding, the desired Self may encompass the adoption or theft of another digital identity while remaining anonymous. Similar to trying on clothes, digital space allows an individual to temporarily “try on” a ready-made identity template to see what it is like to be someone else: to call oneself by a different name, to portray oneself with a different hair color, or perhaps to adopt a different gender, etc. Even an anonymous user has the opportunity to create alternative, completely different versions of “self”, which help them interact in digital space. Even in these versions, a part of the user's identity is hidden, yet to other users, they appear entirely different.

Given all of the above, it can be clearly delineated that all activities in digital space can represent one of a person's Selves (true, real, ideal, or desired), thus carrying various types of information that collectively depict the user's identity. This information can be of various levels (semantic, physical, syntactic, etc.) (Sartonen et al., 2020), but together it reflects identity and for such transformation to occur, it is necessary that the user perceives the digital representation as a form of their identity representation. This is facilitated by the chosen strategy for representing individual characteristics and the experience gained through interaction with elements of digital world through this digital identity.

The connection between forms of digital identity representation and immersion

Digital space provides an additional “space” for users to experience transformation, allowing them to explore and express different facets of their identity. The opportunity to function both within and beyond the cyber community creates a venue where all parts of a user's identity, both conscious and unconscious, can converge. This leads to the formation of various types of self-representations – ranging from real and true to desired and idealized. Additionally, digital world provides users the chance to intensely observe other users' representations, thus potentially enhancing the process of identity discovery and transformation compared to the physical world (Talamo & Ligorio, 2001; Suler, 2016).

The interactivity within digital world is pivotal in enabling users to immerse themselves so deeply that they can experience a powerful sense of presence known as immersion. Certain digital environments allow users to interact and socialize, offering an experience distinctly different from the outside world. Immersion in these environments enhances the experience of the digital identity as part of the user's personal identity narrative. For instance, after completing a game, a user may continue to feel mental or physical pain for the game character's demise, indicating significant immersion influencing their perception of digital identity (Elor & Kurniawan, 2020; Rose, Nam & Chen, 2018).

In digital world, the complexity of digital identity representation varies, influencing the depth and authenticity of the user's interaction with digital elements. The form of digital identity

refers to the level of permission granted by platforms for user involvement, behavioral control, and customization of digital self-representation:

- The **simplest form** is the user account, which fulfills formal requirements and serves as the initial interaction phase in digital environment. This form offers a basic level of engagement with digital environment elements but with limited immersion and depth of identity expression.

- A **more complex form**, the digital profile, allows for richer representation and interactions. A digital profile not only represents the user but also enables them to build connections and express facets of their identity more dynamically, thus enhancing the immersion and authenticity of the experience (Sullivan, 2011).

- The **most complex form**, the cyberpersonality, involves becoming a community member, where users significantly control their behavior and interactions. This form offers the highest level of immersion, allowing users to experience a sense of belonging and a realistic representation of their identity in digital environment (Vasalou & Joinson, 2009).

The level of immersion significantly shapes the user's perception of their digital identity, enhancing the realism and authenticity of their interactions with elements of digital environment. This authenticity is crucial for users to perceive their digital representation as a true extension of their identity, influenced by the strategies chosen to represent individual characteristics and interactions experienced within digital environment. Further exploration reveals that users immersed in digital environment have the opportunity to experiment with its elements through their digital self-representation, and these interactions can begin to feel like personal experiences (Nagy & Koles, 2014). Users who identify with their digital representation find the digital experience more realistic (Gorini et al., 2011). When users refer to experiences encountered through their digital identity as their own, a robust emotional and cognitive connection is observed, facilitating a more natural engagement and immersion within digital environment (Yee et al., 2011).

The relationship between immersion and self-transformation emphasizes the multifaceted nature of immersion's influence on an individual's self-concept and digital identity. High levels of immersion, especially total immersion, are often associated with significant changes in self-concept and identity. However, this relationship is influenced by dynamic interactions between the user's psychological characteristics and the digital environment's attributes (McCreery et al., 2013). It is important to note that immersion does not uniformly lead to self-transformation; even lower immersion levels, such as engagement or engrossment, can result in meaningful yet less intense forms of self-representation adjustment (Tombul & Sari, 2021). Moreover, individual differences significantly shape this relationship. Users predisposed to imaginative involvement or seeking intense digital experiences typically experience deeper immersion and more pronounced self-transformation, whereas those engaging primarily for practical purposes exhibit a more stable self-concept (Bailenson, Blascovich, & Guadagno, 2008; Zimmermann, Wehler & Kaspar, 2023).

Understanding the nuances of immersion and self-transformation necessitates examining the specific encoding strategies used by users to create and regulate their digital identity representations, as explored in the subsequent section.

The connection between encoding strategies of self-representation and self-presence

In the realm of digital space immersion, it is not sufficient for users to merely undergo transformation. A profound emotional and cognitive connection with the digital identity is necessary for the digital representation to be perceived as an extension of oneself (Nagy & Koles, 2014). For users who identify with their digital identity, the digital experience becomes significantly more realistic (Gorini et al., 2011). It is only when users refer to experiences encountered through their digital identity as their own that a strong emotional and cognitive

connection is observed, facilitating easier acceptance and immersion within the digital environment and enabling natural interaction within it (Yee et al., 2011). By establishing this connection, users can forge emotional bonds with others. Often, interaction in a social network or game is sufficient to feel a human closeness or a sense of belonging to a particular group or community at large.

The creation of a digital identity serves as a starting point for self-understanding and exploration of one's identity. Given the freedom users have in creating and choosing various types of digital identities, questions naturally arise about how closely a digital identity resembles their virtual identity. The more the characteristics of the created or chosen digital identity align with significant personal characteristics, the stronger the connection with it (Nagy & Koles, 2014). The significance of a digital identity increases the user's sense of self-presence in the digital environment. This significance is determined by the choice of encoding strategies of self-representation used in developing the digital identity.

Digital identity comprises a multitude of information, including characteristics, images, and functionalities encoded within an artificial memory and potentially accessible to the public. It encompasses various forms of representation, such as user accounts, digital profiles, and cyber personalities. Users employ information encoding strategies of self-representation to craft their digital identities (see Figure 5). Encoding strategies are methods used by users to selectively transform personal information into coded types of digital self-representation, determining how their identity is represented, communicated, and perceived by themselves and others within the digital environment.

These strategies are (Dombrovskis et al., 2024):

1. Information enhancement (substitution and augmentation): Users enrich their digital identity by transferring, adding, or supplementing new attributes.
2. Information transformation (modification and redefinition): Users transform, convert, or modify their digital identity, altering its characteristics and features.



Substitution: The original information is transferred.



Augmentation: Specific portions of information are highlighted or emphasized.



Modification: Manipulations are performed to transform the inherent information.



Redefinition: It is replaced with a template, or new characteristics are attributed to it.

Figure 5: Encoding strategies for creating a digital identity

Each encoding strategy results in a distinct selective self-representation of one's digital identity, defined as the final outcome of encoded personal information that reflects how users selectively represent, highlight, modify, or redefine aspects of their identity in digital environments (Dombrovskis, & Berga, 2021):

- **Substitution** – precise copy of self. The digital identity directly represents the user's real self-concept, accurately reflecting original characteristics, such as actual name, gender, age, and other authentic characteristics.
- **Augmentation** – improved copy of self. The digital identity reflects the user's real self-concept but emphasizes selected significant qualities, such as highlighting personal interests or hobbies through visual enhancements or additional elements.
- **Modification** – modified version of self. The digital identity alters original characteristics, such as employing photo-editing applications to improve one's appearance.
- **Redefinition** – alternative version of self. The digital identity entirely replaces original characteristics with new ones, such as adopting different names, appearances, ages, or genders.

In the process of development and transformation within the digital environment, it is crucial for users to establish a connection with their digital identity. This connection is influenced by two key factors: the sense of self-presence, which allows users to perceive their digital self-representation as “Me”, and immersion, which refers to the realism and authenticity of the user's experience interacting with elements of the digital environment through their digital identity.

Considering the importance of encoding strategies for establishing self-presence and immersion, the following formula is proposed:

The formula: $IDF = k * (SP + I)$

- **IDF** represents *identity fusion*, which signifies the integration of the user's digital identity with other core components of their identity, producing a cohesive self that encompasses both digital and physical realms.
- **k** is a constant of proportionality, representing the strength of the relationship between the combined processes of self-presence and immersion and their impact on identity fusion.
- **SP** denotes *self-presence*.
- **I** denotes *immersion*.

1.5. Theoretical foundations and hypothesis-based framework

This section will introduce the foundational theories that will guide the empirical investigation of the dissertation, connecting them to a set of 12 hypotheses. These hypotheses are designed to explore various dimensions of interaction within digital environments, focusing on users.

Grounded in the interdisciplinary fields of cyberpsychology, human-computer interaction, and social psychology, these hypotheses will provide a structured pathway for analyzing interactions between users and digital environment.

The hypotheses in this research examine direct associations between components related to digital identity and users' psychological experiences within the digital environment. These hypotheses explore how processes such as customization, control, self-representation, immersion, and self-presence are interconnected, focusing on the ways in which users experience and interpret their interactions with the digital environment.

The focus is not placed on identifying mediating variables or constructing causal models. Instead, the research aims to reveal how key psychological components function together to form digital identity and how this formation is shaped by the user's perception, emotional connection, and behavior within the digital environment.

H1: The process of using digital identity (customization and control) is positively associated with the user's social interaction within the digital environment.

The hypothesis suggests that the user's engagement in customizing and controlling digital identity (the user's ability to manage and personalize digital identity by adjusting its characteristics and regulating its interactions within the digital environment) will positively correlate with his/her social interaction within the digital environment.

Digital identity customization offers users the ability to manage their digital representation, creating a more controlled and meaningful presence within digital environments. Research indicates that digital identity customization not only provides users the opportunity to express themselves more accurately, but it also serves as a mechanism through which users can enhance their social interactions within digital environments (Wu et al., 2023). By refining their digital identities, users can create representations that foster deeper engagement with others, thereby improving the quality of social interactions (Peña et al., 2021).

The ability to control various aspects of one's digital identity, including its appearance and behavior, plays a critical role in shaping how users interact with others. This control fosters a sense of confidence, making users feel more comfortable engaging with their peers in digital environments (Triberti et al., 2017). Such a sense of empowerment enhances the likelihood that users will participate in meaningful social exchanges, as they feel more in control of their representation and, by extension, their interactions (Bozkurt & Tu, 2016).

Customization practices are often driven by the desire to present oneself in a way that aligns with the expectations of social groups, which further reinforces the social relevance of digital identity customization. Users are likely to disclose personal information and engage in social interactions based on how well they can control and modify their digital identity to match social norms and expectations, emphasizing the connection between customization and social interaction (Adjei et al., 2020). Customization impacts not only the user's social engagement but also their emotional connection with their digital identity, which in turn facilitates more meaningful interactions. Emotional attachment to a digital identity strengthens the user's desire to engage with others in digital environments, creating richer social connections and a greater sense of community (Dechant et al., 2021).

Empirical studies further support the connection between the process of using digital identity and social interactions. Customization and control allow users to curate their identities in ways that align with their social goals, which leads to more fulfilling and engaging social interactions (Teng, 2021). This connection emphasizes the importance of digital identity customization not just for self-representation but also for fostering meaningful social connections in digital environments (Triberti et al., 2017; Teng, 2021).

By allowing users to adjust and control their digital identity, online platforms facilitate richer and more personalized social experiences. The process of customization thus serves as a connection, linking the digital representation to real-world social outcomes, ultimately enhancing the user's sense of belonging and participation within the digital community (He et al., 2016).

H2: There is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment.

The hypothesis suggests that different types of selective self-representation in digital environments are associated with social interaction.

Selective self-representation allows users to consciously present themselves in ways that align with their social goals and personal preferences. This selective process not only enhances individual expression but also makes users more relatable and recognizable to others in digital environments (Peña et al., 2021). By strategically choosing how to present themselves, users reduce social barriers and foster more meaningful connections. This foundational idea supports the notion that personalized self-representation directly influences the quality of social interactions.

Research has shown that selective self-representation facilitates more authentic social exchanges by mirroring real-world interactions. This can help reduce biases and promote empathy between users (Nagy & Koles, 2014). Through the selective modification of characteristics in their digital identity, users are able to navigate and enhance social interactions, fostering greater understanding and cooperation across various groups. This deeper level of engagement leads to more relevant and enriching social interactions, thus improving overall social connectivity.

In addition, selective self-representation extends to intergroup relations, where it can serve as a means of promoting positive social change. By enabling users to present a range of identity traits, digital environments become platforms for exploring complex identity dynamics that might be difficult to address in the physical world (Gorini et al., 2011). These interactions help build social bonds and reduce intergroup conflicts, ultimately enhancing the quality of social interactions in digital environments.

Empirical studies further validate the connection between selective self-representation and social interaction. Users who consciously curate their digital identities often report more fulfilling and engaged social interactions (Yee et al., 2011). This relationship underscores the importance of intentional self-representation in building a stronger connection to the digital community, making interactions within it more meaningful and rewarding.

The types of selective self-representation employed by users play a key role in shaping and enriching social interaction within digital environments. By facilitating authentic and engaging exchanges, selective self-representation enhances the overall social experience in these spaces.

H3: There is an association between the process of using digital identity (customization and control) and types of selective self-representation in digital environments.

The hypothesis suggests that the process of customizing and controlling digital identities is associated with the types of selective self-representation employed by users.

Frequent modifications and adjustments to digital identities allow users to continuously refine their self-representation in digital environments. This ongoing customization enables the expression of different aspects of their personalities, reflecting changes in self-perception and social roles (Yee et al., 2011). As users modify their digital identity, they engage with more diverse and adaptive forms of self-representation.

The positive correlation between digital identity customization and selective self-representation is further supported by studies showing that the ability to align digital identities with users' desired social identities is enhanced through the use of customization tools (Ratan & Hasler, 2009). This relationship highlights how the intensity of digital identity customization directly influences the diversity of self-representation strategies users employ.

Moreover, sustained interaction with digital environments and continued customization efforts significantly impacts how users present themselves (Ratan & Hasler, 2010). This engagement allows users to not only represent their current identities but also explore alternate versions of themselves, fostering the evolution of self-representation.

The process of digital identity customization, which includes both frequency and depth of changes, critically shapes the self-representation strategies in digital environments. By supporting frequent updates and personalized control over digital identities, platforms enable users to present more varied and nuanced forms of self, enhancing their social presence and interactions in digital contexts.

H4: The process of using digital identity (customization and control) increases the level of immersion.

The hypothesis suggests that the process of using digital identity (customization and control) increases the level of immersion for users in digital environments. Immersion is a multidimensional psychological experience that involves a deep cognitive and emotional

absorption in the digital environment, leading users to perceive interactions within it as increasingly real and engaging (Witmer & Singer, 1998).

Both customization and control influence immersion by shaping the way users experience and interact with the digital environment. Customization enhances immersion by allowing users to modify their digital identity in ways that align with their self-concept and psychological comfort zones, fostering a stronger sense of presence and connection with the digital world (Teng, 2010). Control, on the other hand, plays a key role in sustaining immersion by enabling users to regulate and direct their interactions, ensuring coherence between their intentions, behaviors, and the digital environment (Csikszentmihalyi, 1990).

Research indicates that immersion is not a passive state but an active cognitive and emotional process, influenced by the degree to which users can shape and manage their digital identity (Bailenson et al., 2003). When users are able to personalize their digital identity and maintain control over their digital interactions, they experience a deeper engagement and prolonged involvement in digital environments (Segovia & Bailenson, 2012). The combined effect of these processes strengthens the psychological integration of users into the digital space, making interactions more authentic and engaging.

Sub-hypothesis H4a: Customization of digital identity (adjusting its characteristics) increases the level of immersion.

Customization in digital environments, particularly through adjustments to the characteristics of digital identity, contributes to higher immersion levels by enabling users to align their digital self-representation with their personal preferences and psychological comfort zones (Teng, 2010). The ability to modify digital identity fosters a stronger psychological connection with the digital environment, reinforcing the sense of presence and engagement.

Furthermore, research indicates that customization supports deeper emotional and cognitive engagement by allowing users to construct a digital identity that aligns with their self-perception and interaction preferences (Bailenson et al., 2003; Segovia & Bailenson, 2012). This process not only enhances sensory engagement but also increases the perceived authenticity of digital interactions, contributing to a more immersive experience.

Additionally, customization serves as an intrinsic motivational factor that sustains user engagement. The process of actively modifying and refining digital identity fosters continuous interaction with the digital environment, strengthening immersion over time. This aligns with findings that customization is associated with greater user satisfaction and prolonged involvement in digital experiences (Yee, 2006).

Empirical evidence supports the positive impact of customization on immersion. Studies using structural equation modeling demonstrate that customization significantly predicts immersion satisfaction, reinforcing its role in enhancing user engagement and commitment to digital platforms (Teng, 2010). This correlation underscores the importance of customization in fostering immersive digital experiences, which is essential for sustaining user involvement in dynamic digital environments.

The process of customizing digital identity is a key factor in increasing immersion in digital environments. By enabling users to personalize their digital self-representation, digital platforms can create a more engaging and immersive experience, thereby enhancing user interaction and the psychological depth of digital engagement.

Sub-hypothesis H4b: Control over digital identity interactions within the digital environment increases the level of immersion.

Control in digital environments allows users to regulate how their digital identity interacts with elements of the digital environment, ensuring that their actions align with their intentions and interaction goals. This control is instrumental in creating a seamless and immersive user experience. Research indicates that when users can direct the interactions of their digital identity, their sense of presence within the digital environment is significantly enhanced, leading to deeper immersion (Bailenson et al., 2003).

Moreover, the extent of control over digital identity interactions directly influences the psychological state of being fully engaged in the digital environment. The ability to regulate digital identity interactions fosters a continuous stream of meaningful engagement, reinforcing the user's connection to the digital environment (Witmer & Singer, 1998). These experiences are fundamental to achieving a high level of immersion, which is often characterized by a shift in attentional focus from the material environment to the digital experience.

Further supporting this hypothesis, studies have shown that greater autonomy in digital environments, which enables users to exert control over digital identity interactions, is associated with higher levels of cognitive absorption and Flow. This enhanced engagement is not merely about the ability to interact with the digital environment but also the capability to influence digital interactions in meaningful ways (Csikszentmihalyi, 1990). The ability to navigate and modify digital interactions fosters an immersive experience by reducing disruptions and reinforcing a sense of control within the digital environment.

Empirical research using structural equation modeling has demonstrated that control over digital identity interactions significantly impacts user immersion, supporting the relationship between these elements (Teng, 2010). Users report greater satisfaction with their digital experience when they perceive a higher level of control over their interactions within the digital environment, as this facilitates deeper involvement and sustained engagement.

The process of controlling digital identity interactions within the digital environment is a critical determinant of immersion. This capability allows users to regulate and refine their digital interactions, leading to a more engaging and immersive experience by enhancing their psychological connection to the digital environment.

H5: Social interaction increases the level of immersion

The hypothesis suggests that social interaction within digital environments significantly enhances the level of immersion experienced by users.

Social interaction in digital environments plays a pivotal role in fostering a sense of presence and belonging, which are key components of immersion. The opportunity to engage with other users not only makes the digital experience more enjoyable but also more meaningful, as it mirrors social complexities and connections found in the real world (Gonzales, 2008). This mirroring helps in sustaining the user's attention and deepening their engagement with the digital environment.

Moreover, the integration of social interactions within digital platforms has been shown to enhance the user's psychological immersion. This is achieved by providing them with social cues and feedback that contribute to a richer and more compelling experience. Studies suggest that when users can communicate, collaborate, or compete with others, their cognitive absorption in the digital activity increases, leading to a stronger sense of immersion (Bailenson et al., 2003).

Empirical evidence further supports this hypothesis by demonstrating that social interactions in digital environments can substantially increase immersion satisfaction, which in turn promotes a continued engagement with the digital platform (Teng, 2010). Users report a

higher level of satisfaction and a greater feeling of being ‘in the zone’ when they are able to interact with others in meaningful ways.

The opportunity for social interaction is a crucial factor in enhancing immersion in digital environments. By allowing users to engage socially, digital platforms can create more vibrant and engaging virtual experiences that significantly deepen immersion.

H6: Increased personalization (using original characteristics) of digital identity increases the level of immersion.

The hypothesis suggests that increasing the personalization of digital identities using original characteristics enhances the level of immersion experienced by users within digital environments.

Personalization in digital environments allows users to infuse their digital identities with unique, self-reflective traits, which significantly bolsters their connection to the digital environment. This connection is facilitated by the ability of personalized avatars to act as extensions of the users' real-world selves, thereby enhancing the authenticity and emotional engagement of the interaction (Bailenson et al., 2003). The inclusion of original characteristics, such as physical likeness or behavior patterns, deepens this effect by increasing the congruence between the user's offline identity and their online persona.

Research has demonstrated that when users perceive their digital identities as accurate reflections of their real selves, they experience higher levels of presence and immersion. This heightened sense of presence, often described as the feeling of “being there”, is critical for immersive experiences in digital settings (Teng, 2010). Moreover, the psychological impact of seeing one's personalized avatar navigate and interact within a digital environment can lead to a stronger emotional investment in the activities of the virtual world.

Empirical studies further support this hypothesis by showing that personalization of avatars can significantly influence the extent to which users feel immersed in the digital environment. For instance, findings indicate that customization features that allow for detailed personalization of avatars – such as adjusting physical features, choosing clothing, and selecting behavioral attributes – directly correlate with increased levels of user immersion (Waltemate et al., 2018).

Increasing the personalization of digital identities using original characteristics is a fundamental driver of immersion in digital environments. By enabling users to create digital identities that reflect their real-world selves, digital platforms can foster a more engaging and psychologically fulfilling experience, thereby enhancing the overall effectiveness and attractiveness of virtual environments.

H7: The duration of interaction with digital identity will be positively associated with the level of immersion.

The hypothesis suggests that the higher will be a level of immersion, the more time users will spend online.

The level of immersion experienced by users affects their subjective time perception as though chronological time has passed more quickly during highly immersive digital interactions than it has, and as a result, users spend more time online.

Significant research on immersion and time perception demonstrates that players often experience a loss of awareness of their surroundings and time during highly immersive digital interactions. This phenomenon results in a state where the digital environment dominates the

user's attention, making external time cues irrelevant to the immersion experience (Brown & Cairns, 2004). Such findings suggest that immersion, once established, is maintained through cognitive and emotional engagement rather than the duration of interaction.

Players frequently underestimate the amount of time they spend engaged in games when immersed (Nordin, 2014). This misperception is supported by Flow theory, which describes a distortion of temporal experience, often feeling as though time has passed more quickly than it has (Nakamura & Csikszentmihalyi, 2014). This indicates that immersive experiences are not constrained by actual time but are influenced by the user's psychological and emotional state.

Players' perceptions of session durations are significantly shorter than the actual time spent playing (Wood, Griffiths, & Parke, 2007; Tobin, Bisson, & Grondin, 2010). Such evidence underscores that immersion effectively alters time perception, enabling a sustained immersive state irrespective of the length of interaction.

The duration of interaction with digital identities does not impact the level of immersion is robustly supported by literature demonstrating that immersion can alter time perception (Rahman, Nordin, Denisova, 2017), allowing users to remain deeply engaged without a direct awareness of the passage of time.

H8: The process of using digital identity (customization and control) increases the level of self-presence.

The hypothesis suggests that the process of using digital identity (customization and control) significantly enhances the level of self-presence for users in digital environments. Self-presence, as a psychological construct, refers to the extent to which individuals experience their digital representation as an extension of themselves, perceiving it as an authentic part of their identity in digital environments (Ratan et al., 2010). The ability to personalize and regulate digital identity within a digital environment fosters a deeper psychological connection between users and their digital self-representation, reinforcing self-presence (Jin, 2011).

Both customization and control serve distinct but complementary roles in shaping self-presence. Customization enables users to align their digital identity with their self-concept, reinforcing identification with their representation in the digital environment. Meanwhile, control allows users to manage their digital identity's interactions, ensuring coherence between their real-world intentions and digital actions. The combined effect of these mechanisms creates an environment where users feel deeply integrated with their digital identity, enhancing self-presence and reinforcing the experience of authenticity in digital interactions (Wu et al., 2023; Zhao, Wang, & Wang, 2023).

Sub-hypothesis H8a: The process of customization of digital identity increases the level of self-presence.

Customization plays a central role in establishing self-presence by allowing users to shape their digital identity to reflect their self-image, preferences, and psychological needs. When users personalize the appearance, characteristics, and behavioral traits of their digital identity, they develop a stronger sense of identification with it, which in turn enhances their self-presence within the digital environment (Gonçalves et al., 2022).

Empirical studies suggest that higher degrees of self-representation similarity lead to increased self-presence, as users perceive their digital identity as an extension of their real-world identity (Zhao, Wang, & Wang, 2023). This effect is particularly evident in virtual environments where users actively modify their digital representation to align with their

idealized self or social identity. Research on avatar customization has demonstrated that the closer a digital representation matches a user's self-concept, the greater their sense of presence and engagement within the digital world (Wu et al., 2023).

Additionally, customization fosters emotional and cognitive investment in digital interactions. When users engage in self-expressive customization, they become more psychologically attached to their digital identity, leading to increased self-awareness in digital environments (Lei et al., 2021). This process reinforces the continuity of self across digital and material environments, making interactions within digital spaces feel more immersive and personally meaningful.

Customization is a key driver of self-presence, as it allows users to anchor their digital identity in their self-concept, fostering a seamless transition between digital and material interactions.

Sub-hypothesis H8b: The process of control of digital identity increases the level of self-presence

Control over digital identity interactions serves as a crucial mechanism in reinforcing self-presence by ensuring that users' actions in digital environments align with their real-world control and intentions (Jin, 2011). Digital environments that allow users to exercise greater control over their digital identity's behavior, decision-making, and interactions provide a stronger foundation for self-presence, as users perceive their digital self as a direct extension of their own deliberate actions (Wang & Zeng, 2021).

Studies show that users who have greater autonomy in controlling their digital identity report higher levels of self-presence because they experience a stronger connection between their digital self and real-world decision-making processes (Rainey & Jones, 2019). When digital identity interactions feel self-directed rather than externally imposed, users develop a heightened sense of presence in digital environments, reinforcing their perception of authenticity in digital interactions.

Additionally, control mechanisms allow users to regulate their social interactions within the digital environment, ensuring consistency between their digital and real-world persona. The ability to manage how other users engage with their digital identity plays a critical role in maintaining self-presence, as unwanted disruptions or loss of control over digital identity actions can weaken the psychological connection between the user and their digital self (Wang & Zeng, 2021).

Empirical research indicates that higher degrees of control correlate with greater psychological absorption in digital environments, strengthening the fusion between self and digital identity (Li et al., 2022). This suggests that not only does control maintain coherence in digital self-representation, but it also reinforces a user's cognitive and emotional engagement with their digital identity, thereby increasing self-presence.

The ability to regulate and direct digital identity interactions within the digital environment is essential for reinforcing self-presence. Control allows users to maintain autonomy over their digital self, ensuring a seamless integration of their digital identity into their broader sense of self, which is crucial for sustained presence and engagement in digital space.

H9: Increased personalization (using original characteristics) increases the level of self-presence.

The hypothesis suggests that heightened personalization of digital identities enhances the level of self-presence experienced by users in digital environments.

Enhanced personalization allows users to incorporate detailed personal characteristics into their avatars, aligning these digital identities with their real-world identities or ideal self-concepts. Such alignment bolsters the users' sense of self-presence, as it enhances the authenticity of their interactions within the digital environment. Avatars designed by the users themselves, which closely mirror their actual or ideal selves, substantially improve the users' perceptions of presence and performance in digital environments (Rahill & Sebrechts, 2021). Moreover, the research highlighted that the origin of the avatar design – whether crafted by the user or another – significantly influences the user's sense of self-presence. Personalized avatars, especially those created by the users, lead to heightened levels of perceived control and presence, affirming the critical role of individual autonomy in digital interactions (Rahill & Sebrechts, 2021).

The research findings support the notion that increased personalization not only enhances performance but also enriches the perceptual experience within the game. Users experience a greater sense of presence and report enhanced performance when their avatars closely match their personal or ideal identities (Yee & Bailenson, 2007).

Increased personalization enhances self-presence is robustly supported by empirical evidence indicating that such customization of digital identities significantly impacts users' level of self-presence and interaction in digital environments.

H10: Self-presence is positively associated with the presence of communication participants.

The hypothesis suggests that the presence of communication participants and self-presence are positively correlated within collaborative digital environments.

Self-presence, conceptualized through a tripartite framework encompassing body, emotions, and identity (Ratan, 2012), is significantly correlated with the perceived social presence among participants in such settings.

Self-presence not only influences how individuals perceive their representation in the digital environment but also their interactions with other digital entities, elucidating the interplay between self-presence and social presence. Furthermore, the presence of other communication participants actively contributes to this dynamic. When participants perceive others as present, it reinforces their own sense of being within the digital environment, thus enhancing their self-presence (Ratan & Hasler, 2010).

This mutual reinforcement suggests a positive correlation between the presence of communication participants and self-presence, a relationship crucial for fostering a sense of community and enhancing collaborative outcomes in digital teams.

H11: The duration of interaction with digital identity will be positively associated with the level of self-presence.

The hypothesis suggests that the duration of interaction with a digital identity will have a positive relationship with the level of self-presence.

As individuals spend more time interacting within digital environments, their connection to their digital identities deepens, enhancing their self-presence. This hypothesis draws on the concept of flow, where prolonged engagement in an activity can lead to a state of heightened focus and involvement (Csikszentmihalyi, 1990; Skadberg, Kimmel, 2004). In digital settings, such as navigating websites or interacting within digital communities, this

extended engagement can enhance the perception of self within the digital context. As users experience greater immersion, their sense of self-presence – defined as the psychological state in which digital self-representations are experienced as real (Lee, 2004) – is likely to increase.

The extended duration of interaction not only reinforces a user's sense of presence but also deepens their engagement with the digital content, making this relationship particularly crucial for understanding user experiences in interactive digital settings.

H12: Self-presence is positively associated with immersion.

The hypothesis suggests that the level of self-presence is positively correlates with the level of immersion within digital environments.

This relationship indicates that full immersion is a prerequisite for self-presence, meaning that a high degree of engagement is necessary for users to feel that their digital identity is an extension of themselves. Self-presence is attainable solely at the level of full immersion within digital environments. This notion is underpinned by research (Brown, Cairns, 2004), which articulates that immersion can be stratified into three levels: engagement, engrossment, and total immersion. It posits that genuine self-presence only emerges at the stage of total immersion. This state is marked by the player's profound disconnect from the physical world and deep integration into the game, characterized by a loss of self-awareness and an enveloping focus. Here, players experience a sense of actual presence within the digital setting, fully embodying their digital identities.

Achieving total immersion is crucial for the realization of self-presence, suggesting its exclusivity to this deepest level of engagement with digital environments.

A summary of the theoretical framework

The theoretical framework presented in this chapter introduces a multidimensional conception for understanding how users form their digital identity within the layered structure of the digital space. This conception is built upon five interrelated subchapters, each of which explores the psychological mechanisms and contextual factors contributing to the formation of digital identity and the user's experience of self in the digital environment.

1. The concept of digital identity in digital world introduces a five-level structure of digital space and distinguishes between *digital self-representation* and *digital identity*. It emphasizes that digital identity becomes part of personal identity only when users experience *fusion* with their digital representation. The digital world is presented as the broader ecosystem in which users operate, while the formation of identity occurs within specific digital environments and rooms.
2. The phenomenon of self-presence in digital environments presents a three-level model of *self-presence* – body-level, emotion-level, and identity-level – and defines self-presence as the process through which users experience their digital self-representation as an authentic extension of their core identity. This section outlines the psychological and physiological effects of self-presence and introduces a formula linking self-presence to the subjective perception of digital self as “Me”.
3. Immersion as a psychological experience in the digital environment defines *immersion* as the user's perceived realism and authenticity of interaction within the digital environment. A three-stage structure – engagement, engrossment, and total immersion – is used to describe how immersion intensifies, supporting the experience of fusion

with digital identity. The section also includes a formula describing the relationship between immersion and perceived authenticity of digital experience.

4. The interrelationship between digital identity, self-presence, and immersion conceptualizes *fusion* as a dynamic outcome resulting from simultaneous self-presence and immersion. This section highlights how digital identity becomes psychologically internalized through meaningful interaction, emotional resonance, and repetition. It emphasizes that fusion occurs only when digital identity is experienced as both present and real.
5. Theoretical foundations and hypothesis-based framework outlines the conceptual basis for the twelve hypotheses tested in the empirical part of the research. These hypotheses examine the role of four key components – *the process of digital identity use* (customization and control), *selective self-representation*, *duration of interaction*, and *social interaction* – in relation to *self-presence* and *immersion*, and explore how these psychological phenomena contribute to digital identity formation.

Derived from interdisciplinary insights, these hypotheses are poised to scrutinize and elucidate the interactions between users and the multifaceted realms of digital environment. Structured to examine relationships among customization and control of digital identity, selective self-representation, duration of interaction, level of immersion, social interaction, and their collective impact on self-presence, this empirical inquiry seeks to provide a deeper understanding of these complex dynamics.

Chapter 2: Empirical research

2.1. Research scheme

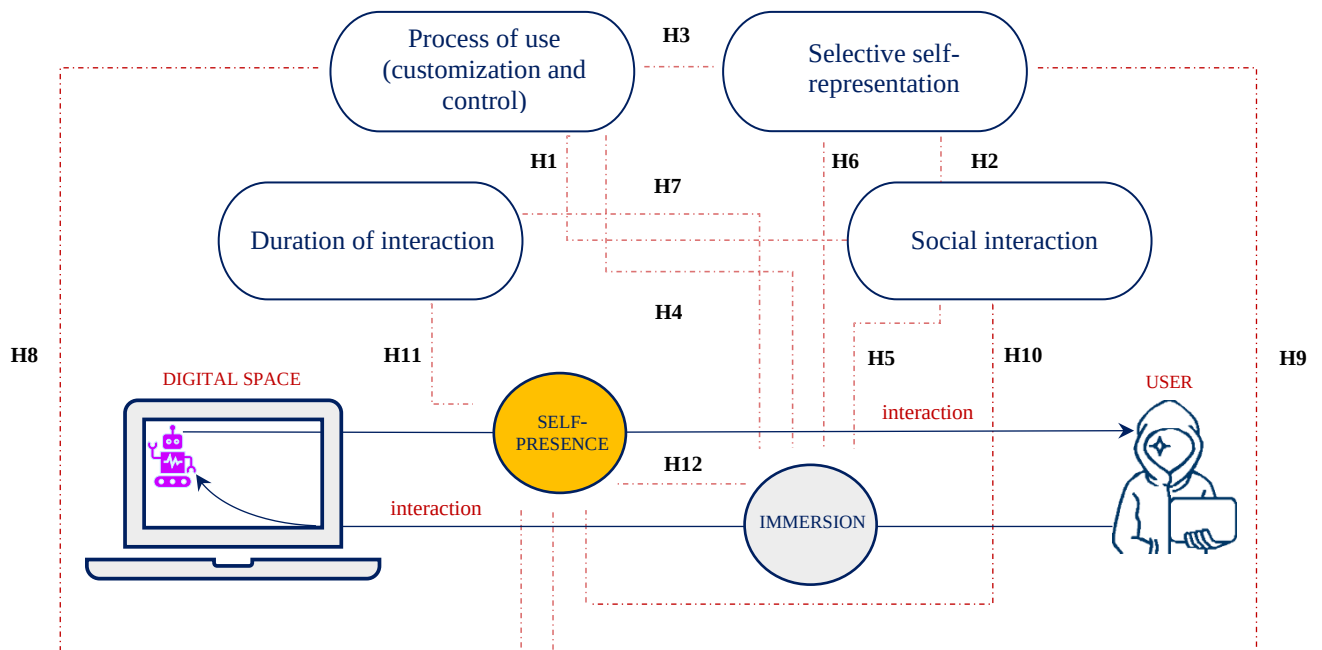


Figure 6. Research scheme

Description of the research scheme illustrating the psychological components related to digital identity (see Fig. 6).

The research scheme presents eight theoretical components that reflect the psychological and contextual mechanisms involved in the experience and expression of digital identity. At the center of the scheme is the (1) **user**, emphasizing their role as the key element in interaction with the elements of the digital space. The (2) **computer icon** symbolizes the digital space, and within this space lies a robot icon, representing digital self-representation.

This scheme introduces two primary phenomena: (3) **self-presence** and (4) **immersion**. Self-presence refers to the extent to which users identify their digital selves with their core identity, while immersion signifies a deep mental engagement in digital environments, where users become absorbed in their digital experience.

The scheme further identifies four key factors that influence both self-presence and immersion:

(5) **Process of use** (customization and control) – reflects the user's ability to manage and personalize their digital identity by adjusting its characteristics and regulating its interactions within the digital environment. The additional characteristic related to the process of use of digital identity is time spent on creating and adjusting digital identity.

(6) **Selective self-representation** – refers to the deliberate selection, encoding, and presentation of personal information as one's digital identity in digital environments, where users selectively represent, highlight, modify, or redefine specific characteristics of their identity for themselves and others.

(7) **Duration of interaction** – represents the amount of time users spend engaging with their digital identities.

(8) **Social interaction** – encompasses the user's interaction with others within digital environments, shaping their digital experience.

This structure indicates that users engage with elements of the digital space through their digital self-representation, experiencing immersion during this process. Their digital identity becomes integrated with their core identity, shaping their sense of self-presence in the digital space. The four influencing components – the process of use (customization and control), selective self-representation, duration of interaction, and social interaction – jointly shape the user's experience of immersion and self-presence. The lines connecting these components in the scheme represent conceptual associations, which are reflected in twelve hypotheses developed in this dissertation. Two of these hypotheses (H4 and H8) are expanded into sub-hypotheses (H4a, H4b and H8a, H8b) to distinguish between the effects of customization and control. In total, the scheme outlines fourteen distinct relationships, highlighting the dynamic interconnections between digital identity, digital self-representation, and core psychological constructs in the digital environment.

2.2. Data collection methods

To accurately capture the relationships outlined in the research scheme, a structured survey (see Appendix A) was chosen as the primary data collection method. The survey was carefully crafted to capture insights into digital identity, self-presence and immersion and consisted of four key sections (see the structure of the questionnaire in Table 6): **SECTION A.** Introductory information about the research; **SECTION B.** General demographics and information about the creation of the user's digital identity; **SECTION C.** Self-presence questionnaire; **SECTION D.** Immersion questionnaire. An extended version of the questionnaire structure, providing detailed information on the purpose, scale type, and score conversion for each scale, is included in Appendix B.

Table 6
The structure of the questionnaire

SECTION A. Introductory information about the research		
Information:	Overview of the research and its purpose	
	Ethical considerations and data privacy guidelines	
	Explanation of the term “Cyber Me” and its relevance to the research	
	Participants description	
	Details on participant eligibility and contact information for queries	
SECTION B. General demographics and information about the creation of the user's digital identity		
Scale		QN
Gender		1
Age		2
My Cyber Me was created in: • Social media (for instance, Instagram, Facebook, Twitter) • Online game • Video hosting (for instance, YouTube, Tik Tok)		3
Duration of interaction		4
Process of use (customization and control)		5,6,7
Social interaction		8,9,10
Selective self-representation		11
SECTION C. Self-presence questionnaire		
Scale	Subscale	QN
Self-presence	Body-level	12,13,14,15,16
	Identity-level	17,18,19
	Emotion-level	20,21,22,23,24
SECTION D. Immersion questionnaire		
Scale	Subscale	QN
Immersion	Engagement	25,26,27,28,29,30,31,32,33
	Engrossment	34,35,36,37,38,39,40
	Total immersion	41,42,43,44,45,46,47,48,49

SECTION A. Introductory information about the research

Section A of the questionnaire was designed to provide participants with essential information about the research's objectives, scope, and context. This section introduces the participants to the concept of “Cyber Me”, a versatile term that captures the broad range of digital identity representations. Its purpose is to help participants understand the significance of their involvement in the research, as well as familiarize them with the requirements for participation, including the need to have an active digital profile or character.

This section outlines participants' rights, emphasizing the voluntary nature of the research and their ability to withdraw at any point. It ensures confidentiality and compliance with data protection laws, and offers contact information for the researchers, allowing participants to seek further clarification on any aspect of the research. This section lays the groundwork for informed participation by providing a clear and concise overview of the research's aim, methodologies, and ethical considerations.

SECTION B. General demographics and information about the creation of the user's digital identity

Section B was dedicated to gathering foundational demographic data and specific information regarding the creation of the participant's digital identity. Key demographic variables such as gender and age were recorded, offering a foundational understanding of the respondent pool. Additionally, this section aimed to identify the digital environment where the respondent's primary digital identity was established, ensuring that subsequent responses pertained to this primary digital identity. Moreover, this section collected data on the four critical factors identified in the research scheme: Duration of interaction, Process of use (including customization and control), Social interaction, and Selective self-representation. These factors are vital as they potentially influence the two primary phenomena being investigated.

SECTION C. Self-presence questionnaire

The Cross-Media Self-Presence Questionnaire (CM-SPQ) was adapted for this research (Dombrovskis et al., 2024), based on the foundational Self-Presence Questionnaire (SPQ) by Ratan and Dawson (2016). The primary aim of developing the CM-SPQ was to increase the applicability of the original SPQ by extending its use to a broader population of users with digital identities, including those on social media and video hosting platforms, not only within online games.

The original SPQ is publicly available and does not require special permissions for academic use. Nonetheless, in accordance with good scientific practice, the author of the SPQ was contacted directly. A screenshot of this correspondence is provided in Appendix C, confirming that permission was granted and that the author himself proposed the new title for the adapted version of the questionnaire. This exchange reinforces the legitimacy of the adaptation and supports the methodological transparency of the current study.

To delineate the scope of applicability:

- The SPQ was originally designed to assess self-presence in online gaming environments.
- The CM-SPQ was adapted to measure self-presence among users who maintain digital identities across diverse digital platforms.

Several modifications were implemented to ensure relevance outside the context of gaming. Specifically, the term “avatar” was replaced with “Cyber Me”, and items were reformulated to capture the psychological experience of digital identity across various platforms.

Notable revisions were made to the “Avatar-Body Connection” subscale, which became “Body-level self-presence” in the CM-SPQ. For example, the item “hand is inside of the game” was revised to “hand/hands can influence the digital space” to reflect a broader range of digital interactions.

Similarly, the “Avatar-Identity Connection” subscale was transformed into “Identity-level self-presence”, with items adapted to emphasize behavioral, attitudinal, and emotional characteristics of the digital identity (“Cyber Me”) relevant across social media and other platforms:

- B3 “avatar’s race” was changed to “behavior of Cyber Me”;
- B4 “avatar’s clothing” was changed to “orientation (view on the world/life)”;
- B5 “avatar’s skin color” was changed to “emotional background (dominant emotions/feelings or mood)”.

Responses were recorded using a 5-point Likert scale (from 1 – not at all to 5 – absolutely).

The section contains 13 questions in total, organized into three subscales:

- Body-level self-presence: 5 items (Questions 12-16)
- Emotion-level self-presence: 3 items (Questions 17-19)
- Identity-level self-presence: 5 items (Questions 20-24)

SECTION D. Immersion questionnaire

The Extended Game Immersion Questionnaire (E-GIQ), originally developed as the Game Immersion Questionnaire (GIQ) by Cheng, Shet, and Annetta (2015), was extended in this research to evaluate immersion experiences among a broader spectrum of users beyond online gaming (Dombrovskis et al., 2025). The original GIQ was structured around three key dimensions – Engagement, Engrossment, and Total Immersion – and developed through a rigorous two-stage process involving item generation, scale construction, and validation. Each dimension included psychological and perceptual aspects such as attraction, time investment, usability, emotional attachment, decreased perceptions, presence, and empathy.

The GIQ is publicly available in peer-reviewed open-access publications and has been repeatedly used in research without restriction. In this study, the questionnaire was not modified but rather extended in its scope of application to include a wider variety of digital environments and user contexts. Although an attempt was made to contact the original authors, no reply was received. Given the open-access nature of the instrument and the absence of restrictive licensing, the use and contextual extension of the GIQ in this research was conducted in line with ethical academic practice.

To ensure applicability beyond gaming contexts, essential modifications were introduced. The term “avatar” was replaced with “digital identity”, and “game” was substituted with “digital environment”, aligning the questionnaire with a broader range of digital interactions. These changes were critical for capturing the immersive experiences of users in contexts such as social media platforms, video hosting services, and other non-gaming digital environments.

As with the CM-SPQ, these adaptations were necessary to maintain the conceptual integrity of the immersion construct while extending its relevance to the research of digital identity.

Responses were recorded using a 5-point Likert scale (from 1 – strongly agree to 5 – strongly disagree).

The section contains 25 questions in total, distributed across the three dimensions of immersion:

- Engagement: 9 items (Questions 25-33)
- Engrossment: 7 items (Questions 34-40)
- Total Immersion: 9 items (Questions 41-49)

2.3. Research sample description

The sample comprised 227 inhabitants of Latvia aged from 13 to 65 years ($M = 26.6$, $SD = 8.4$). With regard to the statement “My Cyber Me was created in...”, the responses were categorized as follows: 1) Online games (33.9%), 2) Social media platforms (e.g., Instagram, Facebook, Twitter) (48.5%), and 3) Video hosting sites (e.g., YouTube, TikTok) (17.6%). As the study included participants under the age of 18, formal *Research Ethics Approval* was obtained in accordance with ethical research standards for minors. A copy of the approval letter, bearing the original signature, will be submitted together with the dissertation, and a photographic version is included in Appendix D.

2.4. Research procedure

To facilitate a comprehensive and culturally sensitive research approach, the translation of the original surveys, the Self-Presence Questionnaire (SPQ) (Ratan & Dawson, 2016) and Game Immersion Questionnaire (GIQ) (Cheng, Shet, & Annetta, 2015), into Latvian was conducted with meticulous attention to accuracy and clarity for the research participants. This translation process began with the work of two independent professional translators proficient in both English and Latvian. These initial translations were then subjected to rigorous evaluation by the third expert, who meticulously assessed and selected the most precise and linguistically appropriate translation.

Once the translation phase was completed, the recruitment of research participants commenced, guided by two key criteria: 1) their status as digital social technology users and 2) possessing a Cyber Me (digital profile, video game character, etc.) actively used for communication and interaction with other users, whether through content creation on social media platforms or engagement in online gaming. A prerequisite for inclusion in the research was the presence of a visual component within their Cyber Me (such as an image, embodiment, picture, avatar, etc.) that participants identified with during digital communication and interaction. This requirement was clearly communicated in the questionnaire instructions under the “Participants” section, stipulating that participants' Cyber Me must include a visual component they perceive while interacting with others online.

The participant pool was drawn from various sources, including online gamers who play titles such as World of Warcraft, Albion Online, and Rust, as well as notable bloggers and influencers in Latvia. To recruit gamers, approximately 400 invitations were disseminated across 7 Discord servers associated with these games. Influential figures, including bloggers and influencers, were identified using the “AoR Indeks 2022”, and individual contacts were established. This approach resulted in the involvement of around 200 active social media users and 50 recognized content creators from video hosting platforms.

Participants were included in the research based on the following criteria:

- Participants had to possess a digital identity (Cyber Me), actively used for communication and interaction with others (e.g., digital profiles, video game characters, online avatars).
- Their “Cyber Me” had to include a visual component (e.g., an image, picture, avatar, or any other visual representation) that they perceived during interactions with other online users.
- Participants needed to actively use their Cyber Me for interactions with other online users.

Participants were excluded if:

- They did not possess a visual component in their Cyber Me.
- They were not actively engaged in online interactions.
- They did not complete the questionnaire or were unable to follow instructions.

During the research, it became evident that the participant recruitment methodology inadvertently excluded users of virtual reality (VR). This exclusion was not a reflection of VR's irrelevance in studying digital identity; rather, it was an oversight regarding the significance of VR's unique components. The absence of VR users in the sample represents a notable limitation, suggesting potential avenues for future research.

Participants received detailed information clearly defining the concept of “Cyber Me” as their digital self-representation used in interactions online. If participants possessed multiple digital identities, they were instructed to select one that best reflected their true identity, even if it did not resemble their physical appearance.

The questionnaire was uploaded into Google Forms and sent to respondents for online completion.

Data were collected from 12 October 2022 until 16 January 2023.

The questionnaire and all relevant information, including detailed instructions, are available in Appendix A. Participants were encouraged to review this material thoroughly before completing the questionnaire.

2.5. Results and interpretation

The empirical results of the research are presented in three sequential stages, each reflecting a specific research objective and methodological focus. These stages collectively support the comprehensive examination of the psychological components related to digital identity and the mechanisms underlying their interaction:

- **Stage 1:** *Establishing factorial validity for the Cross-Media Self-Presence Questionnaire (CM-SPQ)* – this stage focuses on verifying the structural validity of the adapted questionnaire.
- **Stage 2:** *Extending the Game Immersion Questionnaire (GIQ) to online users* – this stage assesses the applicability of the immersion model beyond gaming contexts.
- **Stage 3:** *Hypothesis testing and analysis of results* – the final stage involves testing twelve hypotheses that explore the associations between key components of digital identity formation.

Stage 1. Establishing factorial validity for the CM-SPQ

Exploratory principal-axis factor analysis

To establish the factorial validity of the Cross-Media Self-Presence Questionnaire (CM-SPQ), an exploratory principal-axis factor analysis with an oblique rotation was conducted in the present research, consistent with the original research on the psychometric properties of the SPQ.

Like in the SPQ, three factors emerged from the factor analysis of the CM-SPQ, with a Kaiser-Meyer-Olkin measure of .87 and a significant Bartlett test $\chi^2(78) = 1484.66$ ($p = .00$). The results indicated that all of the items formed distinct factors that corresponded to the levels of self-presence (body-level, identity-level, and emotional-level self-presence) stated in the theoretical framework. The structure matrix can be found in Table 7.

Table 7

The results of exploratory principal-axis factor analysis with an oblique rotation: Structure matrix of the CM-SPQ¹

	Factor Loadings

¹ Variables correspond with questions of the CM-SPQ. See Appendix E.

		<i>F1</i>	<i>F2</i>	<i>F3</i>
Body-level	When using your Cyber Me, to what extent do you feel like your arm is stretched into the digital space through your Cyber Me?	.89	.25	-.29
	When you are in the digital space, to what extent do you feel like your hand/hands can influence the digital space?	.82	.27	-.22
	When using your Cyber Me, to what extent do you feel like you can reach into the digital space through your Cyber Me?	.75	.44	-.67
	When you are in the digital space, how much do you feel your Cyber Me is a part of your body?	.74	.40	-.57
	When you are in the digital space, how much do you feel that the Cyber Me is an extension of your body?	.69	.42	-.56
Identity-level	Is the behavior of the Cyber Me related to some aspect of your personal identity?	.29	.86	-.33
	Is the orientation (view on the world/life) of the Cyber Me related to some aspect of your personal identity?	.27	.81	-.39
	Is the emotional background (dominant emotions/feelings or mood) of the Cyber Me related to some aspect of your personal identity?	.22	.79	-.43
	To what extent is your Cyber Me appearance related to some aspect of your personal identity?	.45	.79	-.33
	To what extent does your Cyber Me name represent some aspect of your personal identity?	.21	.71	-.15
Emotion-level	When sad events happen to your Cyber Me, to what extent do you feel sad?	.28	.31	-.88
	When scary events happen to your Cyber Me, to what extent do you feel afraid?	.32	.43	-.82
	When arousing events happen to your Cyber Me, to what extent do you feel aroused?	.46	.31	-.78

The exploratory principal-axis factor analysis with an oblique rotation supported the factors the CM-SPQ was designed to measure. All factors had high loadings for items from equivalent the CM-SPQ dimensions and could be identified as Body-level self-presence (F1), Identity-level self-presence (F2), and Emotion-level self-presence (F3).

F1: Body-level self-presence in digital environments refers to the subjective experience of physical presence and embodiment that individuals perceive when interacting with digital environments through a digital representation of themselves, also known as Cyber Me. This experience is characterized by the sense of arm extension and hand influence in the digital space, the degree of integration between Cyber Me and the body schema and the sense of Cyber Me as an extension of the body schema. The integration between the mediated self-representation and the body schema is assessed through subscales that measure the extent to which Cyber Me is experienced as a part of the body schema and the extent to which individuals feel they can reach into and influence the digital space through their Cyber Me. This complex and multidimensional construct involves the interplay between cognitive, perceptual and motor processes.

The respondents with digital representations received high scores on this scale, which suggests that they experienced a robust sense of embodiment and physical presence in the digital environment through their digital representation (Cyber Me). It indicates that they perceived their created digital body of digital representation as an extension of their physical body and felt a high degree of integration between their physical and digital selves. Furthermore, the sense of arm extension and hand influence in the digital space would suggest that they experienced a high level of autonomy and control over their digital environment. Overall, high scores on this scale imply a strong sense of immersion in the digital environment, which could have important implications for various aspects of human-computer interaction.

F2: Identity-level self-presence refers to the subjective experience of the self that emerges from individuals' digital interactions and the way they are perceived by others in relation to specific aspects of their personal identity. This experience is characterized by a strong connection between the individual's sense of the self and their Cyber Me, which reflects aspects of their personal identity. The modified scale captures this connection by assessing the extent to which Cyber Me is related to some aspects of a personal identity through subscales that measure behavior, orientation, name, emotional background and appearance of Cyber Me.

The respondents in the research of digital representations received high scores on the identity-level self-presence scale, which suggests that individuals perceive a strong link between their personal identity and their Cyber Me, resulting in a sense of the self that is closely tied to their digital representation. The subscales measuring the relationship between Cyber Me and a personal identity reflect different aspects of the self that are significant to an individual, such as their behavior, emotional states and appearance. This connection between Cyber Me and a personal identity has profound implications for the research of digital identity and virtual social interactions as it can influence how individuals present themselves and are perceived by others in digital environments.

F3: Emotion-level self-presence describes the affective responses that individuals have during digital interactions and the degree to which these responses are shaped by the mediated interaction between digital self-representation and digital objects. This construct operationalized through subscales that measure the extent of emotional contagion between the user and their digital representation, including affective responses to negative, positive or arousing events experienced by the self-representation. Examples of subscales include measures of sadness, fear and arousal experienced by the user in response to sad, scary or arousing events happening to digital self-representation.

The respondents in the research of digital representations received high scores on the Emotion-level self-presence scale, which suggests that they are emotionally involved in their digital interactions and experience emotional responses to mediated events involving their digital representations. It means that individuals have developed a strong sense of emotional connection and attachment to their digital selves, and that their digital interactions have the potential to evoke genuine emotional reactions like those experienced in face-to-face interactions. The results of this research provide insights into how individuals interact with and respond to digital environments and may have implications for understanding the emotional and psychological impact of digital technology on human well-being.

Cronbach's alpha for body-level self-presence was .86, for emotion-level self-presence was .80, and for identity-level self-presence .85 respectively, indicating high internal consistency for the items within each factor.

The interrelations between the levels of self-presence

Theoretical accounts state that dimensions of self-presence are interrelated. A zero-order Pearson correlation analysis was used to test the interrelations between the levels of self-presence as well as relationships with the other variables measured. The correlation coefficients for these relationships can be found in Table 8.

Table 8
Pearson correlations between CM-SPQ subscales

	Body-level self-presence	Emotion-level self-presence	Identity-level self-presence
Body-level self-presence	-	.58**	.47**
Emotion-level self-presence		-	.44**

** $p < .01$

The results showed that the levels of self-presence were positively related to each other.

CM-SPQ questionnaire

Following the correlation analysis, the factorial structure of the CM-SPQ was finalized and confirmed to include three distinct subscales: Body-level self-presence, Emotion-level self-presence, and Identity-level self-presence. Each subscale comprises several items rated on a 5-point Likert scale ranging from 1 – not at all to 5 – absolutely. The Body-level self-presence subscale consists of 5 items (maximum score: 25), the Identity-level subscale includes 5 items (maximum score: 25), and the Emotion-level subscale contains 3 items (maximum score: 15). Higher scores on each subscale indicate a stronger experience of the respective dimension of self-presence. These scores serve as indicators of the psychological integration of the user's digital identity with their bodily perception, emotional responses, and personal identity components, allowing for a differentiated analysis of self-presence in digital environments. A complete list of CM-SPQ items is provided in.

Stage 2. Extending the game immersion questionnaire (GIQ) to online users

First, the principal component method was utilized separately for three scales with modified items. These scales were like the modified scales of the original Game Immersion Questionnaire (GIQ) (Cheng, Shet, & Annetta, 2015), namely – for engagement, engrossment and total immersion.

Engagement

KMO = .754, $\chi^2 (36) = 399.55$, $p = .000$.

In this research we obtained a factor structure that differs from the factor structure in the original research, as this scale was modified for all online users, not only for online gamers. The results are presented in Table 9.

Table 9
The results of principal component analysis for the scale "Engagement"

	Factor loadings
--	-----------------

Item	C1	C2
Engagement 7: I like the type of the digital space	.70	-.15
Engagement 1: I would like to spend more time in the digital space	.67	.21
Engagement 2: I like the appearance and style of the digital space	.66	.29
Engagement 8: I would like to spend time collecting information of the digital space and discussing it with friends	.64	.26
Engagement 6: The user interface of the digital space makes me feel comfortable	.63	-.19
Engagement 5: It is easy for me to control all the processes of the digital space	.60	-.56
Engagement 4: Generally, I can handle all the difficulties associated with being in the digital space	.51	-.27
Engagement 3: I like being in the digital space because it is new and interesting	.48	.45
Engagement 9: The time I spend being in the digital space is always more than I expected	-.02	.69
Eigenvalues	3.03	1.29

As the second component includes the only item (which cannot form the whole scale) - Engagement 9: The time I spend being in the digital space is always more than I expected – it was deleted from the following principal component analysis.

The results of the principal component analysis without item 9 are presented below. $KMO = .756$, $\chi^2 (28) = 388.38$, $p = .000$.

Table 10

The results of principal component analysis for the scale “Engagement” without item 9

Item	Factor loadings	
	C1	C2
Engagement 7: I like the type of the digital space	.70	-.25
Engagement 1: I would like to spend more time in the digital space	.67	.33
Engagement 2: I like the appearance and style of the digital space	.66	.35
Engagement 8: I would like to spend time collecting information of the digital space and discussing it with friends	.64	.22
Engagement 6: The user interface of the digital space makes me feel comfortable	.63	-.30
Engagement 5: It is easy for me to control all the processes of the digital space	.60	-.59
Engagement 4: Generally, I can handle all the difficulties associated with being in the digital space	.51	-.26
Engagement 3: I like being in the digital space because it is new and interesting	.48	.55
Eigenvalues	3.03	1.15

As the second component now also includes only one item, Engagement 3: 'I like being in the digital space because it is new and interesting', which cannot form the entire scale, it was also excluded from the subsequent factor analysis. The results of the third principal component analysis without items 9 and 3 are presented below: $KMO = .736$, $\chi^2 (21) = 346.72$, $p = .000$.

Table 11

The results of principal component analysis for the scale “Engagement” without items 9 and 3

Item	Factor loadings	
	C1	C2
Engagement 7: I like the type of the digital space	.72	.17
Engagement 1: I would like to spend more time in the digital space	.65	-.43

Engagement 6: The user interface of the digital space makes me feel comfortable	.65	.16
Engagement 2: I like the appearance and style of the digital space	.65	-.52
Engagement 5: It is easy for me to control all the processes of the digital space	.65	.52
Engagement 8: I would like to spend time collecting the information of the digital space and discussing it with friends	.63	-.25
Engagement 4: Generally, I can handle all the difficulties associated with being in the digital space	.52	.42
Eigenvalues	2.86	1.03

Now two items (Engagement 2: 'I like the appearance and style of the digital space' and Engagement 5: 'It is easy for me to control all the processes of the digital space') exhibit very similar loadings on two factors. Therefore, at the next stage, factor analysis was conducted without these two items. The results of the fourth analysis without items 9, 3, 2 and 5 are presented below: $KMO = .713$, $\chi^2 (10) = 165.99$, $p = .000$.

Table 12

The results of principal component analysis for the scale “Engagement” without items 9, 3, 2 and 5

Item	Factor loadings	
	C1	
Engagement 7: I like the type of the digital space	.75	
Engagement 8: I would like to spend time collecting the information of the digital space and discussing it with friends	.71	
Engagement 6: The user interface of the digital space makes me feel comfortable	.66	
Engagement 1: I would like to spend more time in the digital space	.63	
Engagement 4: Generally, I can handle all the difficulties associated with being in the digital space	.53	
Eigenvalues	2.19	

A single component with high factor loadings was obtained, which can be interpreted as Engagement.

Additionally, internal consistency of the scale was checked. Cronbah’s α was .67²

During the factor analysis of the Engagement factor, several items were eliminated due to their low or inconsistent factor loadings or limited applicability in the context of online users. Specifically, the following items were excluded: A2 “I like the appearance and style of the digital space”, A3 “I like being in the digital space because it is new and interesting”, A5 “It is easy for me to control all the processes of the digital space”, A7 “I like the type of the digital space”, and A9 “The time I spend being in the digital space is always more than I expected”. These items, which were originally designed to capture user engagement in gaming environments, were deemed less relevant for online users interacting across diverse digital platforms, where engagement may be driven by different factors.

Engrossment

Principal component analysis was conducted using the principal component method, and the results yielded a KMO of .783, $\chi^2 (21) = 389.01$, $p = .000$. Similar to the first scale in this

2 As with other reliability coefficients, alpha should be above .70, however, it is common to see journal articles where one or more scales have somewhat lower alphas (e.g., in the .60-69 range), especially if there is only a handful of items in the scale (Leech, Barret, & Morgan, 2008)

research, we obtained a factor structure that differs from the original research as this scale had also been modified for all online users, not just online gamers.

Table 13

The results of principal component analysis for the scale “Engrossment”

Item	Factor loadings	
	C1	C2
Engrossment 6: It frequently happens that I forget my schedule and/or to-do things in the real world while I am in the digital space	.71	-.53
Engrossment 5: I often forget the passage of time while I am in the digital space	.70	-.44
Engrossment 3: When I am in the digital space, I often cannot hear people	.69	.09
Engrossment 2: I am impatient when someone interrupts me when I am in the digital space	.67	.50
Engrossment 1: My ability to perceive the environment surrounding me is decreased while I am in the digital space	.64	-.23
Engrossment 7: While I am in the digital space, I feel unhappy if someone interrupts me	.61	.50
Engrossment 4: I often feel nervous or excited because of the digital space	.60	.22
Eigenvalues	3.04	1.08

Due to the item (Engrossment 7: While I am in the digital space, I feel unhappy if someone interrupts me) displaying very similar loadings on two factors, the subsequent factor analysis was conducted without this item. The results of the second principal component analysis without item 7 are presented below: $KMO = .759$, $\chi^2 (15) = 316.11$, $p = .000$.

Table 14

The results of principal component analysis for the scale “Engrossment” without item 7

Item	Factor loadings
	C1
Engrossment 6: It frequently happens that I forget my schedule and/or to-do things in the real world while I am in the digital space	.76
Engrossment 5: I often forget the passage of time while I am in the digital space	.73
Engrossment 3: When I am in the digital space, I often cannot hear people	.69
Engrossment 1: My ability to perceive the environment surrounding me is decreased while I am in the digital space	.66
Engrossment 2: I am impatient when someone interrupts me when I am in the digital space	.63
Engrossment 4: I often feel nervous or excited because of the digital space	.60
Eigenvalues	2.76

A single component with high factor loadings was identified, which can be interpreted as Engrossment.

Additionally, internal consistency of the scale was checked. Cronbah’s α was .76.

In the Engrossment factor, item B7 “While I am in the digital space, I feel unhappy if someone interrupts me” was removed due to low factor loadings and limited relevance in the broader context of online user experiences. This item was more suitable for gaming contexts, where engrossment often involves uninterrupted concentration, and thus did not generalize well to other types of digital spaces. Excluding this item helped improve the content validity of the scale for a wider audience.

Total immersion

Principal component analysis was conducted using the principal component method. $KMO = .904$, $\chi^2 (28) = 1050.41$, $p = .000$. In this research, we obtained a factor structure that differs from the original research as this scale had been modified for all online users, not only for online gamers.

Table 15

The results of principal component analysis for the scale “Total Immersion”

Item	Factor loadings
	C1
Total immersion 2: My consciousness completely transfers from the real world to the digital space while I am solving the problems or tasks in the digital space	.88
Total immersion 4: I feel happy or sad depending on what happens to my Cyber Me and sometimes I even feel that it exists	.84
Total immersion 1: While I am in the digital space, it seems to me that everything that happens there, happens to me	.82
Total immersion 5: I used to be so integrated into the Cyber Me in the digital space that I could feel his/her feelings	.80
Total immersion 7: I lose the ability of perceiving the surroundings around me; however, it seems natural for me to be totally immersed in the atmosphere of the digital space	.78
Total immersion 8: I used to feel that the Cyber Me in the digital space is controlled by my will, and not by the mouse or the keyboard, so that the Cyber Me does just what I want to do. It seems like the thoughts and consciousness of the Cyber Me and Me are connected	.76
Total immersion 3: I lose the perception of time and the real world surrounding me as if everything just stops	.68
Total immersion 6: All of my senses, including vision, learning and my mind, are concentrated on and engaged in the digital space	.68
Eigenvalues	4.90

A single component with high factor loadings was derived, interpreted as “Total Immersion”. Additionally, the internal consistency of the scale was checked, resulting in Cronbach’s α of .91.

Table 16

Correlations among the obtained first-order factors

Scale	Engagement	Engrossment	Total Immersion
Engagement	-	.13*	.41**
Engrossment		-	.46**
Total Immersion			-

* $p < .05$, ** $p < .001$

As shown in Table 16, there is a statistically significant positive correlation between Engagement and Engrossment ($r = .13$, $p < .05$). Additionally, there is a statistically significant positive correlation between Engagement and Total Immersion ($r = .41$, $p < .001$). Finally, there is a statistically significant positive correlation between Engrossment and Total Immersion ($r = .46$, $p < .001$).

A global model comprising three obtained first-order factors (Engagement, Engrossment and Total Immersion) was analyzed. Factor analysis for the obtained first-order factors was conducted using the principal component method. $KMO = .517$, $\chi^2 (3) = 97.490$, $p = .000$.

Table 17
Results of the factor analysis

Second order factors	Factor loadings
	C1
F3 Total immersion	.87
F2 Engrossment	.69
F1 Engagement	.67
Eigenvalues	1.69

The obtained three first-order factors – Engagement, Engrossment, and Total Immersion – were originally treated as second-order factors in the Extended Game Immersion Questionnaire (E-GIQ). However, in the current research, based on the results of the factor analysis, these factors demonstrated sufficiently high and distinct loadings, warranting their reinterpretation as first-order factors. This change reflects the observed structure of correlations among these factors, where each contributes directly to the global construct of immersion. Consequently, the Level of Immersion in the Digital Environment was defined as a second-order factor that encompasses these three core dimensions. Such a reconfiguration better aligns with the immersion experiences reported by online users across various digital platforms, further supporting the validity of the adapted E-GIQ for assessing immersion beyond gaming contexts.

As a result of the conducted factor analysis and subsequent theoretical reconceptualization, three core components of immersion were validated within the Extended Game Immersion Questionnaire (E-GIQ): Engagement, Engrossment, and Total immersion. Each component reflects a distinct level of psychological involvement in the digital environment and has been operationalized through a dedicated subscale.

E-GIQ questionnaire

Each of the three subscales in the E-GIQ is measured on a 5-point Likert scale ranging from 1 – strongly disagree to 5 – strongly agree. The subscales vary in length and are designed to assess different depths of immersion experienced by users in digital environments:

Engagement was originally composed of 9 items. Based on factor loadings and contextual relevance, 5 items were retained. The maximum score for this subscale is 25 points. This subscale assesses the user's initial motivation, attention, and willingness to remain in the digital environment. Higher scores reflect active interest and usability perceptions, indicating the user's readiness to interact with the digital content.

Engrossment initially consisted of 7 items, from which 6 were retained after item reduction. The maximum score is 30 points. This subscale evaluates the user's emotional and cognitive absorption, as well as a temporary shift of awareness from the physical to the digital context. High scores signal that users become mentally and emotionally immersed to the point of reduced sensitivity to their surroundings.

Total immersion retained all 8 of its original items due to strong psychometric performance. The maximum score for this subscale is 40 points. It measures the deepest level of immersion, characterized by full psychological absorption, time distortion, and

identification with the digital identity. High scores reflect a sense of subjective realism and a fusion between the user's digital self and their core identity.

These three validated components form a coherent structure for assessing immersion as a multifaceted psychological experience in digital environments. A complete list of E-GIQ items is available in Appendix F.

Stage 3. Hypothesis testing and analysis of results

H1: The process of using digital identity (customization and control) is positively associated with the user's social interaction within the digital environment.

In order to test the first hypothesis which states that the process of using digital identity (customization and control) will be positively associated with the user's social interaction with other users within the digital environment, a χ^2 test and Pearson's correlation coefficient were employed.

The analysis aimed to assess whether an association exists between 1) three indicators related to the process of use of digital identity, and 2) three indicators of social interaction.

Three indicators related to the process of use of digital identity are:

1. **Time spent on creating and adjusting digital identity:** "I spent a lot of time to create and adjust my Cyber Me".
2. **Ongoing adjustments to digital identity:** "I continue to adjust my Cyber Me from time to time".
3. **Use of platform capabilities to control digital identity:** "I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it".

Three indicators of social interaction are:

1. **Information-seeking behavior from other users prior to Cyber Me creation:** "Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better".
2. **The significance users place on social interaction:** "It is important for me how other users perceive characteristics of my Cyber Me in the digital environment".
3. **Ongoing communication with other users:** "I actively communicate with other users".

The results obtained are presented below.

The results of the assessment of the association between the time spent on creating and adjusting digital identity and social interaction aimed to search for information related to the creation of Cyber Me

Firstly, it was assessed whether there is the association between frequencies of responses ("yes" and "no") to the statement "I spent a lot of time to create and adjust my Cyber Me" and frequencies of responses ("yes" and "no") to the statement "Prior to the creation of my Cyber Me, I looked for/asked for some information how to do it better". The frequencies of responses to these two statements are presented in Table 18.

Table 18

Association between time spent on creating and adjusting digital identity and information-seeking behavior from other users prior to Cyber Me creation

		Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better		Total
		no	yes	
I spent a lot of time to create and adjust my Cyber Me	no	89	33	122
	yes	34	71	105
Total		123	104	227

It was found that there is a statistically significant association between the indicator of the process of using digital identity “I spent a lot of time to create and adjust my Cyber Me” and the indicator of social interaction “Prior to the creation of my Cyber Me, I looked for/asked for some information how to do it better” ($\chi^2(1) = 37.42, p = .000$). The correlation between these two indicators is statistically significant and positive ($r = .41, p = .000$).

Additionally, it was checked whether there were differences in the indicator “Prior to the creation of my Cyber Me, I looked for/asked for some information how to do it better” in the groups of people who did not spend a lot of time to create and adjust their Cyber Me and those who did. A χ^2 test was used.

As is shown in Table 18 of 122 respondents who did not spend a lot of time to create and adjust their Cyber Me, 89 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while only 33 respondents did. It was found that in the group of respondents who did not spend a lot of time to create and adjust their Cyber Me there are statistically significantly more persons who did not look for/ask for information on how to improve their Cyber Me before its creation ($\chi^2(1) = 25.71, p = .000$).

In contrast, of 105 respondents who spent a lot of time to create and adjust their Cyber Me, only 34 persons did not look for/ask for information on how to improve their Cyber Me before its creation, while 71 respondents did. It was found that in the group of respondents who spent a lot of time to create and adjust their Cyber Me there are statistically significantly more persons who looked for/ask for information on how to improve their Cyber Me ($\chi^2(1) = 13.04, p = .000$).

It was also checked whether there were differences in the indicator “I spent a lot of time to create and adjust my Cyber Me” in the groups of people who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did. A χ^2 test was used.

As is shown in Table 18 of 123 respondents who did not look for/ask for information on how to improve their Cyber Me before its creation, 89 respondents did not spend a lot of time to create and adjust their Cyber Me and only 34 respondents did. It was found that in the group of respondents who did not look for/ask for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who did not spend a lot of time to create and adjust their Cyber Me ($\chi^2(1) = 24.59, p = .000$).

In contrast, of 104 respondents who looked for/ask for information on how to improve their Cyber Me before its creation, only 33 respondents did not spend a lot of time to create and adjust their Cyber Me, while 71 respondents did. It was found that in the group of respondents who looked for/ask for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who spent a lot of time to create and adjust their Cyber Me ($\chi^2(1) = 13.89, p = .000$).

The results of the assessment of the association between the time spent on creating and adjusting digital identity and the significance users place on social interaction

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I spent a lot of time to create and adjust my Cyber Me” and frequencies of responses (“yes” and “no”) to the statement “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”. The frequencies of responses to these two statements are presented in Table 19.

Table 19

Association between time spent on creating and adjusting digital identity and the importance of other users’ perception of Cyber Me characteristics

		It is important for me how other users perceive characteristics of my Cyber Me in the digital environment		
		no	yes	Total
I spent a lot of time to create and adjust my Cyber Me	no	29	93	122
	yes	16	89	105
Total		45	182	227

It was found that there is no statistically significant association between the indicator of the process of using digital identity “I spent a lot of time to create and adjust my Cyber Me” and the indicator of social interaction “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment” ($\chi^2(1) = 2.59$, $p = .11$). The correlation between these two indicators is not statistically significant ($r = .11$, $p = .11$).

Additionally, it was checked whether there were differences in the indicator “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment” in the groups of people who did not spend a lot of time to create and adjust their Cyber Me and those who did. A χ^2 test was used.

As is shown in Table 19 of 122 respondents who did not spend a lot of time to create and adjust their Cyber Me, for 29 respondents it is not important how other users perceive characteristics of their Cyber Me in the digital environment, but 93 respondents said that it is important for them. It was found that in the group of respondents who did not spend a lot of time to create and adjust their Cyber Me there are statistically significantly more persons for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 33.57$, $p = .000$).

In its turn of 105 respondents who spent a lot of time to create and adjust their Cyber Me, only for 16 persons it is not important how other users perceive characteristics of their Cyber Me in the digital environment, but 89 respondents said that it is important for them. It was found that in the group of respondents who spent a lot of time to create and adjust their Cyber Me also there are statistically significantly more persons for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 50.75$, $p = .000$).

It was also checked whether there were differences in the indicator “I spent a lot of time to create and adjust my Cyber Me” in the groups of people for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment and those for whom it is important. A χ^2 test was used.

As is shown in Table 19 of 45 respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment, 29 respondents did not spend a lot of time to create and adjust their Cyber Me and 16 respondents did. It was found that in the group of respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment there are no statistically significant differences in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and who did ($\chi^2(1) = 3.76, p = .053$).

In its turn of 182 respondents who for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment, 93 respondents did not spend a lot of time to create and adjust their Cyber Me and 89 respondents did. It was found that in the group of respondents for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment there are no statistically significant differences in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and those who did ($\chi^2(1) = 0.09, p = .77$).

The results of the assessment of the association between the time spent on creating and adjusting digital identity and ongoing communication with other users

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I spent a lot of time to create and adjust my Cyber Me” and frequencies of responses (“yes” and “no”) to the statement “I actively communicate with other users”. The frequencies of responses to these two statements are presented in Table 20.

Table 20

Association between time spent on creating and adjusting digital identity and active communication with other users

		I actively communicate with other users		Total
		no	yes	
I spent a lot of time to create and adjust my Cyber Me	no	26	96	122
	yes	16	89	105
Total		42	185	227

It was found that there is no statistically significant association between the indicator of the process of using digital identity “I spent a lot of time to create and adjust my Cyber Me” and the indicator of social interaction “I actively communicate with other users” ($\chi^2(1) = 1.38, p = .24$). The correlation between these two indicators is not statistically significant ($r = .09, p = .24$).

Additionally, it was checked whether there were differences in the indicator “I actively communicate with other users” in the groups of people who did not spend a lot of time to create and adjust their Cyber Me and those who did. A χ^2 test was used.

As is shown in Table 20 of 122 respondents who did not spend a lot of time to create and adjust their Cyber Me, 26 respondents reported that they do not communicate actively with other users, but 96 respondents said that they do. It was found that in the group of respondents who did not spend a lot of time to create and adjust their Cyber Me there are statistically significantly more persons who actively communicate with other users ($\chi^2(1) = 40.16, p = .000$).

In its turn of 105 respondents who spent a lot of time to create and adjust their Cyber Me, 16 respondents reported that they do not communicate actively with other users, but 89

respondents said that they do. It was found that in the group of respondents who spent a lot of time to create and adjust their Cyber Me also there are statistically significantly more persons who actively communicate with other users ($\chi^2(1) = 50.75, p = .000$).

It was also checked whether there were differences in the indicator “I spent a lot of time to create and adjust my Cyber Me” in the groups of people who do not communicate actively with other users and those who do. A χ^2 test was used.

As is shown in Table 20 of 42 respondents who do not communicate actively with other users, 26 respondents did not spend a lot of time to create and adjust their Cyber Me and 16 respondents did. It was found that in the group of respondents who do not communicate actively with other users there are no statistically significant differences in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and those who did ($\chi^2(1) = 2.38, p = .12$).

In its turn of 185 respondents who communicate actively with other users, 96 respondents did not spend a lot of time to create and adjust their Cyber Me and 89 respondents did. It was found that in the group of respondents who communicate actively with other users there are no statistically significant differences in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and those who did ($\chi^2(1) = .27, p = .61$).

The results of the assessment of the association between ongoing adjustments to digital identity and social interaction aimed to search for information related to the creation of Cyber Me

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I continue to adjust my Cyber Me from time to time” and frequencies of responses (“yes” and “no”) to the statement “Prior to the creation of my Cyber Me, I looked for/asked other users for some information how to do it better”. The frequencies of responses to these two statements are presented in Table 21.

Table 21

Association between digital identity adjustment and information-seeking behavior prior to Cyber Me creation

		Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better		
		no	yes	Total
I continue to adjust my Cyber Me from time to time	no	28	14	42
	yes	95	90	185
Total		123	104	227

It was found that there is no statistically significant association between the indicator of the process of using digital identity “I continue to adjust my Cyber Me from time to time” and the indicator of social interaction “Prior to the creation of my Cyber Me, I looked for/asked for some information on how to do it better” ($\chi^2(1) = 3.23, p = .07$). The correlation between these two indicators is not statistically significant ($r = .12, p = .07$).

Additionally, it was checked whether there were differences in the indicator “Prior to the creation of my Cyber Me, I looked for/asked for some information on how to do it better” in the groups of people who do not continue to adjust Cyber Me from time to time, and those who do. A χ^2 test was used.

As is shown in Table 21 of 42 respondents who do not continue to adjust their Cyber Me from time to time, 28 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while 14 respondents did. It was found that in the group of respondents who do not continue to adjust Cyber Me from time to time, there are statistically significantly more people who did not look for/ask for information on how to improve their Cyber Me before its creation ($\chi^2(1) = 4.67, p = .03$).

In contrast, of 185 respondents who continue to adjust their Cyber Me from time to time, 95 respondents did not look for/ask for information on how to improve their Cyber Me before its creation and 90 respondents did. No statistically significant differences were found in the group of people who continue to adjust Cyber Me from time to time ($\chi^2(1) = .14, p = .71$).

It was also checked whether there were differences in the indicator “I continue to adjust my Cyber Me from time to time” in the groups of people who did not look for/ask for some information on how to improve their Cyber Me before its creation and those who did. A χ^2 test was used.

As is shown in Table 21 of 123 respondents who did not look for/ask for information on how to improve their Cyber Me before its creation, 28 respondents do not continue to adjust their Cyber Me from time to time, while 95 respondents do. It was found that in the group of respondents who did not look for/ask for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who continue to adjust their Cyber Me from time to time ($\chi^2(1) = 36.50, p = .000$).

Also of 104 respondents who looked for/ask for information on how to improve their Cyber Me before its creation, 14 respondents do not continue to adjust their Cyber Me from time to time, while 90 respondents do. It was found that in the group of respondents who looked for/ask for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who continue to adjust their Cyber Me from time to time ($\chi^2(1) = 55.54, p = .000$).

The results of the assessment of the association between ongoing adjustments to digital identity and the significance users place on social interaction

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I continue to adjust my Cyber Me from time to time” and frequencies of responses (“yes” and “no”) to the statement “It is important for me how other users perceive the characteristics of my Cyber Me in the digital environment”. The frequencies of responses to these two statements are presented in Table 22.

Table 22

Association between digital identity adjustment and the importance of user perception of Cyber Me characteristics

		It is important for me how other users perceive characteristics of my Cyber Me in the digital environment		
		no	yes	Total
I continue to adjust my Cyber Me from time to time	no	19	23	42
	yes	26	159	185
Total		45	182	227

It was found that there is a statistically significant association between the indicator of the process of using digital identity “I continue to adjust my Cyber Me from time to time” and

the indicator of social interaction “It is important for me how other users perceive the characteristics of my Cyber Me in the digital environment” ($\chi^2(1) = 20.94, p = 0.000$). The correlation between these two indicators is statistically significant and positive ($r = .30, p = .000$).

Additionally, it was checked whether there were differences in the indicator “It is important for me how other users perceive the characteristics of my Cyber Me in the digital environment” in the groups of people who do not continue to adjust Cyber Me from time to time and those who do, using a χ^2 test.

As is shown in Table 22 among the 42 respondents who do not continue to adjust their Cyber Me from time to time, 19 respondents reported that it is not important how other users perceive their Cyber Me's characteristics in the digital environment, while for 23 respondents it is important. No statistically significant differences were found in the group of respondents who do not continue to adjust their Cyber Me from time to time ($\chi^2(1) = .38, p = .54$).

Conversely, among the 185 respondents who continue to adjust their Cyber Me from time to time, only 26 said that it is not important how other users perceive their Cyber Me's characteristics, while 159 indicated that it is important. It was found that in the group of respondents who continue to adjust their Cyber Me from time to time, there are statistically significantly more people for whom it is important how other users perceive the characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 95.62, p = .000$).

It was also checked whether there were differences in the indicator “I continue to adjust my Cyber Me from time to time” in the groups of people for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment and those for whom it is important. A χ^2 test was used.

As is shown in Table 22 of 45 respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment, 19 respondents do not continue to adjust Cyber Me from time to time and 26 respondents do. No statistically significant differences were found in the group of respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 1.10, p = .30$).

In its turn of 182 respondents for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment, 23 respondents do not continue to adjust Cyber Me from time to time, while 159 respondents do. It was found that in the group of respondents for whom it is important how other users perceive the characteristics of their Cyber Me, there are statistically significantly more people who continue to adjust their Cyber Me from time to time ($\chi^2(1) = 101.63, p = .000$).

The results of the assessment of the association between ongoing adjustments to digital identity and ongoing communication with other users

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I continue to adjust my Cyber Me from time to time” and frequencies of responses (“yes” and “no”) to the statement “I actively communicate with other users”. The frequencies of responses to these two statements are presented in Table 23.

Table 23
Association between digital identity adjustment and active communication with other users

I actively communicate with other users		Total
no	yes	

I continue to adjust my Cyber Me from time to time	no	15	27	42
	yes	27	158	185
Total		42	185	227

It was found that there is a statistically significant association between the indicator of the process of using digital identity “I continue to adjust my Cyber Me from time to time” and the indicator of social interaction “I actively communicate with other users” ($\chi^2(1) = 10.13, p = 0.001$). The correlation between these two indicators is statistically significant and positive ($r = .21, p = .001$).

Additionally, it was examined whether there are differences in the indicator “I actively communicate with other users” in the groups of people who do not continue to adjust their Cyber Me from time to time and those who do, using the χ^2 test.

As shown in Table 23 of 42 respondents who do not continue to adjust their Cyber Me from time to time, 15 respondents do not actively communicate with other users, while 27 respondents communicate actively. No statistically significant differences were found in the group of respondents who do not continue to adjust their Cyber Me from time to time ($\chi^2(1) = 3.43, p = .06$).

In its turn among 185 respondents who continue to adjust their Cyber Me from time to time, only 27 respondents do not actively communicate with other users, while 158 respondents do. It was found that in the group of respondents who continue to adjust their Cyber Me from time to time, there are statistically significantly more people who actively communicate with other users ($\chi^2(1) = 92.76, p = .000$).

It was also checked whether there were differences in the indicator “I continue to adjust my Cyber Me from time to time” in the groups of people who do not communicate actively with other users and those respondents who do. A χ^2 test was used.

As is shown in Table 23 of 42 respondents who do not communicate actively with other users, 15 respondents do not continue to adjust Cyber Me from time to time and 27 respondents do. It was found that in the group of respondents who do not communicate actively with other users there are no statistically significant differences in the number of persons who do not continue to adjust Cyber Me from time to time ($\chi^2(1) = 3.43, p = .06$).

In its turn of 185 respondents who communicate actively with other users, 27 respondents do not continue to adjust Cyber Me from time to time and 158 respondents do. It was found that in the group of respondents who communicate actively with other users there are statistically significantly more persons who continue to adjust Cyber Me from time to time ($\chi^2(1) = 92.76, p = .000$).

The results of the assessment of the association between use of platform capabilities to control digital identity and social interaction aimed to search for information related to the creation of Cyber Me

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and frequencies of responses (“yes” and “no”) to the statement “Prior to the creation of my Cyber Me, I looked for/asked other users for some information how to do it better”. The frequencies of responses to these two statements are presented in Table 24.

Table 24*Association between digital identity control and information seeking before creating Cyber Me*

		Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better		Total
		no	yes	
I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	no	46	16	62
	yes	77	88	165
Total		123	104	227

It was found that there is a statistically significant association between the indicator of the process of using digital identity “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and the indicator of social interaction “Prior to the creation of my Cyber Me, I looked for/ asked for some information on how to do it better” ($\chi^2(1) = 13.76, p = 0.000$). The correlation between these two indicators is statistically significant and positive ($r = .25, p = .000$).

Additionally, it was checked whether there are differences in the indicator “Prior to the creation of my Cyber Me, I looked for/ asked for some information on how to do it better” in the groups of people who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact, and the group of people who do.

As is shown in Table 24 of 62 respondents who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, 46 respondents did not look for/ ask for information on how to improve their Cyber Me before its creation, while only 16 did. Using the χ^2 test, it was found that in the group of people who do not use all opportunities of the platform (limitations), there are statistically significantly more people who did not look for/ ask for information on how to improve their Cyber Me before its creation ($\chi^2(1) = 14.52, p = .000$).

In its turn of 165 people who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact of other users, 77 people did not look for/ ask for such information, while 88 people did. No statistically significant differences were found in the group of people who use all opportunities of the platform (limitations) ($\chi^2(1) = .73, p = .39$).

It was also checked whether there were differences in the indicator “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” in the groups of people who did not look for/ask for some information on how to improve their Cyber Me before its creation and those who did. A χ^2 test was used.

As is shown in Table 24 of 123 respondents who did not look for/ask for information on how to improve their Cyber Me before its creation, 46 respondents do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact, but 77 persons do. It was found that in the group of respondents who did not look for/ask for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it ($\chi^2(1) = 7.81, p = .005$).

In its turn of 104 respondents who looked for/asked for information on how to improve their Cyber Me before its creation, only 16 respondents do not use all opportunities of the

platform (limitations) to control the actions of their Cyber Me and other users' impact, but 104 persons do. It was found that in the group of respondents who looked for/asked for information on how to improve their Cyber Me before its creation there are statistically significantly more persons who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it ($\chi^2(1) = 49.85, p = .000$).

The results of the assessment of the association between use of platform capabilities to control digital identity and the significance users place on social interaction

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and frequencies of responses (“yes” and “no”) to the statement “It is important for me how other users perceive the characteristics of my Cyber Me in the digital environment”. The frequencies of responses to these two statements are presented in Table 25.

Table 25

Association between digital identity control and importance of perception by other users in the digital environment

		It is important for me how other users perceive characteristics of my Cyber Me in the digital environment		Total
		no	yes	
I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	no	17	45	62
	yes	28	137	165
Total		45	182	227

It was found that there is no statistically significant association between the indicator of the process of using digital identity “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and the indicator of social interaction “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment” ($\chi^2(1) = 3.10, p = 0.08$).

Additionally, it was checked whether there were differences in the indicator “It is important for me how other users perceive the characteristics of my Cyber Me in the digital environment” in the groups of people who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it and those who do, using a χ^2 test.

As is shown in Table 25 of 62 people who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, 17 respondents do not consider that it is important how others perceive their Cyber Me’s characteristics in the digital environment, while 45 people do. Using the χ^2 test, it was found that in the group of people who do not use all opportunities of the platform (limitations) there are statistically significantly more people for whom it is important how others perceive the characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 12.65, p = .000$).

In its turn among 165 respondents who use all opportunities of the platform (limitations), 28 respondents do not consider that it is important how others perceive their Cyber Me’s characteristics, while for 137 respondents it is important. It was found that in the group

of respondents who use all opportunities of the platform (limitations), there are also statistically significantly more people for whom it is important how others perceive the characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 72.01, p = .000$).

It was also checked whether there were differences in the indicator “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” in the groups of people for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment and those for whom it is important. A χ^2 test was used.

As is shown in Table 25 of 45 respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment 17 respondents do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, while 28 respondents use all opportunities. No statistically significant differences were found in the group of respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment ($\chi^2(1) = 2.69, p = .10$).

In its turn of 182 persons for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment only 45 respondents reported that they do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, while 137 respondents use all opportunities. It was found that among those respondents for whom it is important how others perceive the characteristics of their Cyber Me, there are statistically significantly more people who use all opportunities of the platform (limitations) to control their Cyber Me and the impact other users may have on it ($\chi^2(1) = 46.51, p = .000$).

The results of the assessment of the association between use of platform capabilities to control digital identity and ongoing communication with other users

Firstly, it was assessed whether there is the association between frequencies of responses (“yes” and “no”) to the statement “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and frequencies of responses (“yes” and “no”) to the statement “I actively communicate with other users”. The frequencies of responses to these two statements are presented in Table 26.

Table 26

Association between digital identity control and active communication with other users

		I actively communicate with other users		Total
		no	yes	
I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	no	20	42	62
	yes	22	143	165
Total		42	185	227

It was found that there is a statistically significant association between the indicator of the process of using digital identity “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and the indicator of social interaction “I actively communicate with other users” ($\chi^2(1) = 10.70$,

$p = .001$). The correlation between these two indicators is statistically significant and positive ($r = .22, p = .001$).

Additionally, it was examined whether there are differences in the indicator “I actively communicate with other users” in the groups of people who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it and those who do, using a χ^2 test.

As is shown in Table 26 of 62 people who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, 20 respondents do not actively communicate with other users, while 42 respondents do. It was found that in the group of respondents who do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, there are statistically significantly more people who actively communicate with other users ($\chi^2(1) = 7.81, p = .005$).

In its turn of 165 users who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, only 22 respondents do not actively communicate with other users, while 143 respondents communicate actively. It was found that in the group of respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, there are also statistically significantly more persons who actively communicate with other users ($\chi^2(1) = 88.73, p = .000$).

It was also checked whether there were differences in the indicator “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” in the groups of people who do not communicate actively with other users and those respondents who do. A χ^2 test was used.

As is shown in Table 26 of 42 respondents who do not communicate actively with other users, 20 respondents reported that they do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, while 22 respondents use all opportunities. No statistically significant differences were found in the group of respondents who do not communicate actively with other users ($\chi^2(1) = .10, p = .76$).

In contrast of 185 respondents who communicate actively with other users, only 42 respondents reported that they do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it, while 143 respondents use all opportunities. It was found that in the group of respondents who communicate actively with other users there are statistically significantly more persons who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it ($\chi^2(1) = 55.14, p = .000$).

Regarding the first hypothesis, which posits that the process of using digital identity (customization and control) will be positively associated with the user’s social interaction with other users within the digital environment, the following findings were made.

(1) There is a positive association between **time spent on creating and adjusting digital identity** (“I spent a lot of time to create and adjust my Cyber Me”) and **information-seeking behavior from other users prior to Cyber Me creation** (“Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better”).

The relationship between the time spent creating and adjusting digital identity and the search for information prior to this process underscores the importance of preparation and a strategic approach in shaping digital identity. The theoretical framework of this research highlights that customization of digital identity enables users to establish a more structured and

controlled digital representation, which, in turn, facilitates social interaction within the digital environment (Wu et al., 2023).

The obtained results suggest that preliminary information-seeking behavior before creating and adjusting digital identity is primarily driven by efficiency-related motivations. This process is associated with an effort to minimize errors, thereby reducing the need for subsequent modifications, as well as a desire to align with social expectations. These findings align with the argument that digital identity customization is influenced by the need for adherence to social norms (Adjei et al., 2020) and with the notion that emotional attachment to one's digital representation fosters more active social engagement (Dechant et al., 2021).

Notably, searching for information prior to digital identity creation can be regarded as a form of preliminary social interaction: even before actively engaging in a digital community, users structure their digital identity in anticipation of social expectations. This finding supports the perspective that digital identity customization not only shapes self-representation but also establishes a foundation for future social engagement (Teng, 2021).

However, an additional aspect to consider is the potential loss of individuality. The inclination to avoid mistakes and conform to group expectations may lead to a standardization of digital identities, potentially limiting opportunities for unique self-expression. This observation extends the existing theoretical framework by identifying the possible negative consequences of excessive reliance on social expectations during the customization of digital identity.

The additional findings showed that among those participants of the research who did not spend a lot of time to create and adjust their Cyber Me there are more persons who did not look for/ask for information on how to improve their Cyber Me before its creation. In contrast, among those participants of the research who spent a lot of time to create and adjust their Cyber Me there are more persons who looked for/ask for information on how to improve their Cyber Me before its creation. Among those participants of the research who did not look for/ask for information on how to improve their Cyber Me before its creation there are more persons who did not spend a lot of time to create and adjust their Cyber Me. In contrast, among those participants of the research who looked for/ask for information on how to improve their Cyber Me before its creation there are more persons who spent a lot of time to create and adjust their Cyber Me.

The additional findings reinforce the primary result, demonstrating that the level of engagement in creating and adjusting digital identity is contingent upon the motivation to conform to social norms. Among individuals who invested significant time in customizing and controlling their digital identity, a greater proportion actively sought information on how to refine their digital representation. Conversely, those who allocated minimal time to this process were more likely to forgo information-seeking behaviors. This pattern suggests that motivation to align with socially established norms directly influences the extent of engagement in digital identity creation and adjustment. A higher motivation to meet societal expectations corresponds to a more structured and intentional approach to customization, whereas lower motivation is associated with reduced efforts to align the digital identity creation process with external standards.

(2) There is no association between **time spent on creating and adjusting digital identity** (“I spent a lot of time to create and adjust my Cyber Me”) and **the significance users place on social interaction** (“It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”).

The obtained results indicate that there is no significant association between the time spent creating and adjusting digital identity and the significance users place on social interaction within the digital environment. This finding suggests that at the stage of creating and adjusting digital identity, users primarily focus on internal structuring and refinement, while the social evaluation of its characteristics becomes relevant only when digital identity is actively engaged in social interaction.

A possible explanation for this outcome is that during the initial customization and control phase, users may anticipate potential social expectations but do not yet receive actual social feedback. As a result, while social norms may influence the initial stage of digital identity construction, the actual significance of social perception emerges only when users actively interact with others in the digital environment. At this stage, digital identity transitions from being an individually constructed representation to a socially interpreted one.

The additional findings showed that both among participants of the research who did not spend a lot of time to create and adjust their Cyber Me and participants of the research who spent a lot of time there are more persons for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment. In its turn both among respondents for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment and respondents for whom it is important there is no difference in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and those who did.

These additional findings clarify that social validation becomes relevant only when digital identity is actively used for social interaction, rather than during its initial customization and control. This distinction highlights that while users may anticipate social norms prior to engagement, the actual significance of social perception is contingent on the interactive context in which digital identity is utilized.

(3) There is no association between **time spent on creating and adjusting digital identity** (“I spent a lot of time to create and adjust my Cyber Me”) and **ongoing communication with other users** (“I actively communicate with other users”).

The obtained results indicate that there is no significant association between the time spent creating and adjusting digital identity and the extent of ongoing communication with other users. This finding suggests that active communication within the digital environment is not solely dependent on the time invested in customization and control of one’s digital identity but rather shaped by additional factors, such as the frequency and diversity of topics discussed.

A possible explanation for this outcome is that during the process of creating and adjusting digital identity, users primarily focus on interacting with their digital representation, refining its characteristics, and ensuring its alignment with their intended self-representation. This phase prioritizes internal modifications over external engagement, which may lead to a temporary reduction in social interaction with others.

The additional findings showed that both among participants of the research who did not spend a lot of time to create and adjust their Cyber Me and among participants of the research who spent a lot of time there are more persons who actively communicate with other users. In its turn both among those respondents who do not communicate actively with other users and respondents who communicate actively there is no difference in the number of persons who did not spend a lot of time to create and adjust their Cyber Me and those who did.

These additional findings support the notion that the extent of active communication within the digital environment is influenced by broader behavioral patterns, rather than by the degree of involvement in creating and adjusting digital identity. This suggests that while

customization and control may shape how users present themselves in digital interactions, the overall frequency and intensity of social engagement are more likely determined by individual communication tendencies and interaction styles, rather than by the specific process of digital identity formation.

(4) There is no statistically significant association between **ongoing adjustments to digital identity** (“I continue to adjust my Cyber Me from time to time”) and **information-seeking behavior from other users prior to Cyber Me creation** (“Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better”).

The obtained results indicate that there is no statistically significant association between ongoing adjustments to digital identity and information-seeking behavior prior to its initial creation. This finding suggests that prior information-gathering processes do not serve as determinants in the subsequent modification and refinement of digital identity over time.

A possible explanation for this outcome is that the transformation of digital identity is not solely dependent on previously acquired information, but rather shaped by continuous interaction within the digital environment and the evolving self-representation of the user. While information-seeking behavior prior to creating and adjusting digital identity may influence its initial formation, ongoing modifications appear to be driven by more immediate factors, such as changes in personal preferences, technological affordances, or social dynamics within the digital environment.

The additional findings showed that participants of the research who do not continue to adjust Cyber Me from time to time there are statistically significantly more persons who did not look for/ask for information on how to improve their Cyber Me before its creation. In contrast, among respondents who continue to adjust their Cyber Me from time to time there is no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and persons who looked for/ask for this information. In its turn both among respondents who did not look for/ask for information on how to improve their Cyber Me before its creation and respondents who looked for/ask for this information there are more persons who continue to adjust their Cyber Me from time to time.

These additional findings suggest that the process of digital identity transformation extends beyond initial social adaptation and normative alignment. Notably, even users who did not initially seek to conform to social expectations continue to engage in digital identity refinement, indicating that social experience is not the sole determining factor in digital identity transformation. Instead, the evolution of digital identity may be influenced by individual engagement patterns, technological affordances, and emerging self-representation needs within the digital environment.

(5) There is a positive association between **ongoing adjustments to digital identity** (“I continue to adjust my Cyber Me from time to time”) and **the significance users place on social interaction** (“It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”).

This indicates that users tend to modify their digital identities in response to perceived or actual reactions from other users. If the social feedback received does not align with their expectations, users are likely to adjust specific characteristics of their digital representation to enhance how they are perceived or to better integrate into the desired social context.

Similarly, it was found that digital identity customization facilitates deeper and more meaningful social interactions, as users continuously refine their digital representations to align with the expectations of their social circles (Peña et al., 2021). This behavior supports the notion

that customization serves as a social mechanism, enabling users to project a more favorable or socially accepted version of themselves within digital environments.

The findings also align with research indicating that users perceive their digital identity as a social tool, adjusting it to enhance their acceptance and participation in digital communities. These adjustments often reflect ongoing negotiations of social status within digital environments (Triberti et al., 2017). Additionally, users tend to modify their digital identities to influence how others perceive them, further reinforcing the role of digital identity customization in managing social impressions (Wu et al., 2023).

The present research's findings are consistent with broader research that highlights digital identity customization as a key mechanism for managing social interaction, ensuring that users' digital representations align with their social needs and expectations.

The additional findings showed that among participants of the research who do not continue to adjust their Cyber Me from time to time there is no difference in the number of those persons for whom it is not important how other users perceive their Cyber Me's characteristics in the digital environment and respondents for whom it is important. However, among those participants of the research who continue to adjust their Cyber Me from time to time there are more persons for whom it is important how other users perceive the characteristics of their Cyber Me in the digital environment. In its turn among participants of the research for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment there is no difference in the number of persons who do not continue to adjust their Cyber Me from time to time and respondents who continue to adjust. However, among those participants of the research for whom it is important how other users perceive the characteristics of their Cyber Me there are more people who continue to adjust their Cyber Me from time to time.

These additional findings further reinforce the perspective that social perception becomes an increasingly relevant factor in digital identity transformation over time, potentially influencing users who previously did not consider it significant. These findings highlight the dynamic nature of digital identity transformation, where social interaction emerges as a progressively influential factor as users engage in continuous adjustments and refinements. Rather than being a determinant in the initial stages, social validation gains significance as users further integrates their digital representation into the digital environment.

(6) There is a positive association between **ongoing adjustments to digital identity** (“I continue to adjust my Cyber Me from time to time”) and **ongoing communication with other users** (“I actively communicate with other users”).

The obtained results indicate a positive association between ongoing adjustments to digital identity and ongoing communication with other users. This suggests that active communication provides immediate feedback on a user's digital representation, allowing for continuous modifications based on direct interaction. Unlike passive observation, the dynamic nature of social engagement ensures that users receive real-time responses, facilitating the continuous transformation of their digital identity.

Similarly, it was found that digital identity customization supports ongoing social interaction, as users frequently modify their digital representations to adapt to feedback from other users. The process of adjusting digital identity in response to social feedback fosters a more personalized and engaging experience, which in turn enhances social connections (Triberti et al., 2017; Peña et al., 2021). Studies also confirm that the ability to modify digital identities based on real-time interactions helps maintain a consistent social presence, enabling users to align their digital identity with their desired social role (Bozkurt & Tu, 2016).

However, while earlier studies highlighted the role of customization in fostering deeper communication (Wu et al., 2023), this research further expands the understanding by specifically linking the frequency of digital identity adjustments with the intensity of active communication. The feedback established through frequent interactions, as observed in this research, highlights a nuanced aspect of digital identity management that has not been extensively explored in previous research, making it a unique contribution to the field.

The additional findings showed that among participants of the research who do not continue to adjust their Cyber Me from time to time there is no difference in the number of persons who do not actively communicate with other users and persons who communicate actively. In contrast, among participants of the research who continue to adjust their Cyber Me from time to time there are more people who actively communicate with other users. In its turn among participants of the research who do not communicate actively with other users there is no difference in the number of persons who do not continue to adjust their Cyber Me from time to time and persons who continue to adjust. In contrast, among participants of the research who actively communicate with other users there are more persons who continue to adjust Cyber Me from time to time.

These additional findings reinforce the perspective that active communication serves as both a stimulus and a context for digital identity transformation. This suggests that while digital identity customization may initially be a personal or strategic process, sustained engagement in communication contributes to its ongoing transformation. These findings highlight the reciprocal nature of digital identity transformation and social interaction, suggesting that communication within the digital environment is not only shaped by digital identity but also acts as a catalyst for its continuous transformation.

(7) There is a positive association between **use of platform capabilities to control digital identity** (“I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it”) and **information-seeking behavior from other users prior to Cyber Me creation** (“Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better”).

This suggests that users actively seek guidance and learn from the experiences of others to optimize their control over digital identity, both in terms of customization and protection from external influences.

This aligns with findings that emphasize the importance of social learning in digital identity creation. Users frequently rely on shared knowledge from others to navigate complex digital environments and improve their control over digital representations (Adjei et al., 2020). The process of gathering information from experienced users not only refines digital identity customization but also provides critical strategies for managing social interactions within the platform. Similarly, it has been shown that users who actively engage with community knowledge are better equipped to maintain control over their digital identity, ensuring that it aligns with their social and personal objectives (Dechant et al., 2021).

While earlier studies have pointed to the significance of social learning in digital identity management (He et al., 2016), this research specifically underscores the proactive behavior of users in seeking out guidance before fully engaging with the platform. This step, often occurring before digital identity is even created, adds a novel perspective on how users anticipate and prepare for interactions, utilizing shared knowledge to maximize the effectiveness of their digital identity from the outset.

The additional findings showed that among participants of the research who do not use all opportunities of the platform (limitations), there are statistically significantly more people

who did not look for/ ask for information on how to improve their Cyber Me before its creation. But among participants of the research who use all opportunities of the platform (limitations) there is no difference in the number of persons who did not look for/ ask for information on how to improve their Cyber Me before its creation and persons who looked for/asked for such information. In its turn both among respondents who did not look for/ask for information on how to improve their Cyber Me before its creation and respondents who looked for/ask for this information there are more persons who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact.

These additional findings suggest that the selection of a digital platform and its available functionalities is a priority for users in achieving their intended goals. In this context, digital identity serves as a means rather than an end, facilitating the user's strategic objectives within the digital environment. The results emphasize that users do not passively accept platform limitations, but rather actively evaluate and leverage available tools to ensure effective customization, security, and control over their digital representation. This reinforces the role of platform affordances not only as a key determinant in digital identity management but also as a mechanism for protecting digital identity from external influence and unauthorized interference.

(8) There is no association between **use of platform capabilities to control digital identity** (“I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it”) and **the significance users place on social interaction** (“It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”).

The obtained results indicate that there is no significant association between the use of platform capabilities to control digital identity and the significance users place on social interaction within the digital environment. This suggests that when users actively engage in controlling and regulating their digital identity, their primary focus remains on managing functionality, security, and stability, rather than on how others perceive its characteristics.

A possible explanation for this outcome is that during the process of controlling digital identity through platform limitations, users prioritize internal structuring, security configurations, and risk mitigation strategies, which may temporarily reduce the relevance of external social validation. Since digital identity control involves not only regulating self-representation but also minimizing external influence and preventing unauthorized access, the perception of individual characteristics by others becomes a secondary factor in user behavior.

The additional findings showed that both among participants of the research who do not use all opportunities of the platform (limitations) and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact there are more people for whom it is important how others perceive the characteristics of their Cyber Me in the digital environment. In its turn among participants of the research for whom it is not important how other users perceive characteristics of their Cyber Me in the digital environment there is no difference in the number of persons who do not use all opportunities of the platform (limitations) and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact. In contrast, among participants of the research for whom it is important how other users perceive characteristics of their Cyber Me in the digital environment there are more people who use all opportunities of the platform (limitations).

These additional findings suggest that social perception may serve as an initial motivating factor in the decision to regulate digital identity, but as users become more engaged in active control and security measures, its relevance diminishes. Specifically, at an earlier

stage, users may consider external evaluations when deciding how to manage their digital identity, prompting them to adopt a more structured approach to customization and control. However, once the regulation process becomes the primary focus, external feedback loses its decisive role, as the emphasis shifts toward ensuring security, stability, and autonomy over digital representation.

This highlights the dynamic nature of digital identity engagement, where the significance of social perception evolves depending on the phase of digital identity formation. While it may be influential during the initial stage, in the later phase of ongoing control and adjustment, protection from external influence and ensuring digital autonomy take precedence.

(9) There is a positive association between **use of platform capabilities to control digital identity** (“I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it”) and **ongoing communication with other users** (“I actively communicate with other users”).

This indicates that while social interaction is the primary driver, improvements in digital identity control and security occur as a secondary, unintended effect. Through ongoing communication with other users, individuals indirectly enhance their ability to manage and protect their digital identity as part of their broader engagement in digital environments.

This aligns with previous research suggesting that digital identity management is often shaped by continuous interaction, where users engage with others primarily for social purposes, but also gain insights that help them improve their identity control strategies (Triberti et al., 2017). Active communication provides users with opportunities to refine their digital identity management in real time, responding to feedback and observations within the social context (Dechant et al., 2021). This ongoing exchange of information allows users to increase the efficiency of digital identity management, without explicitly intending to do so.

Furthermore, it has been shown that while users initially customize their digital identities with the intent of enhancing personal or social expression, continued interaction with others leads to a deeper understanding of how to protect and control those identities (Bozkurt & Tu, 2016). This suggests that the process of communication itself becomes the primary mechanism, while improvements in digital identity control are secondary effects that emerge over time, as users refine their strategies in response to the digital environment.

Prior studies (Wu et al., 2023) have largely focused on the direct relationship between customization and control efforts. However, this research highlights that social interaction serves as a key component in the ongoing development of digital identity management, offering users opportunities to enhance their control practices as an unintended outcome of their communication efforts.

The additional findings showed that both among participants of the research who do not use all opportunities of the platform (limitations) and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and other users' impact there are more people who actively communicate with other users. In its turn among participants of the research who do not all opportunities of the platform (limitations) there is no difference in the number of persons who do not use all opportunities of the platform (limitations) and person who use all opportunities of the platform (limitations). In contrast among participants of the research who all opportunities of the platform (limitations) there more persons who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it.

These additional findings indicate that the most active users – those who both communicate frequently and fully utilize platform capabilities – are also those who take the

most comprehensive approach to managing their digital identity. This suggests that digital identity control is not an isolated practice, but an adaptive process that evolves through continuous interaction and exposure to new digital dynamics.

H2: There is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment.

In order to test the second hypothesis, which states that there is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment, Cramer's V test, a χ^2 test were employed.

The analysis aimed to assess whether an association exists between 1) four types of selective self-representation, and 2) three indicators of social interaction.

Four types of selective self-representation are:

1. **Precise copy of self** (encoding strategy – Substitution): “My Cyber Me is a precise copy of myself”.
2. **Improved copy of self** (encoding strategy – Augmentation): “My Cyber Me is an improved copy of myself”.
3. **Modified version of self** (encoding strategy – Modification): “My Cyber Me is a modified version of myself”.
4. **Alternative version of self** (encoding strategy – Redefinition): “My Cyber Me is an alternative version of myself”.

Three indicators of social interaction are:

1. **Information-seeking behavior from other users prior to Cyber Me creation:** “Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better”.
2. **The significance users place on social interaction:** “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”.
3. **Ongoing communication with other users:** “I actively communicate with other users”.

The obtained results are presented below.

The results of the assessment of the association between types of selective self-representation and social interaction aimed to search for information related to the creation of Cyber Me

Firstly, it was explored whether there is the association between the choice of one of four types of selective self-representation and social interaction aimed to search for information related to the creation of Cyber Me. It was assessed whether there is the association between frequencies of responses to the statement “My Cyber Me, it is:” and frequencies of responses to the statement “Prior to the creation of my Cyber Me, I looked for/asked other users for some information how to do it better”. The frequencies of responses to these two statements are presented in Table 27.

Table 27
Association between types of selective self-representation and information-seeking behavior prior to Cyber Me creation

	Prior to the creation of my Cyber Me, I looked for/asked other users for some information how to do it better	Total

		no	yes	
My Cyber Me, it is:	a precise copy of myself	39	28	67
	an improved copy of myself	30	36	66
	a modified version of myself	24	20	44
	an alternative version of myself	30	20	50
Total		123	104	227

Using Cramer's V test, it was found that there is no association between the choice of one of four types of selective self-representation and social interaction aimed to search for information related to the creation of Cyber Me (Cramer's $V = .13$, $p = .37$).

Secondly, social interaction aimed to search for information related to the creation of Cyber Me, was explored in groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 27 among 67 respondents whose Cyber Me is a precise copy of self, 39 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while 28 respondents did. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there is no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did ($\chi^2(1) = 1.81$, $p = .18$).

Among 66 respondents whose Cyber Me is an improved copy of self, 30 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while 36 respondents did. It was found that in the group of respondents whose Cyber Me is an improved copy of self, there is also no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did ($\chi^2(1) = .55$, $p = .46$).

Among 44 respondents whose Cyber Me is a modified version of self, 24 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while 20 respondents did. It was found that in the group of respondents whose Cyber Me is an improved version of self, there is no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did ($\chi^2(1) = .36$, $p = .55$).

Among 50 respondents whose Cyber Me is an alternative version of self, 30 respondents did not look for/ask for information on how to improve their Cyber Me before its creation, while 20 respondents did. It was found that in the group of respondents whose Cyber Me is an alternative version of self, there is no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did ($\chi^2(1) = 2.00$, $p = .17$).

Thirdly, it was checked whether there are differences in the number of respondents with different types of selective self-representation in the group of those persons who did not look

for/ask for information on how to improve their Cyber Me before its creation and in the group of respondents who did. A χ^2 test was employed.

As shown in Table 27 among 123 respondents who did not look for/ask for information on how to improve their Cyber Me before its creation 39 respondents choose self-representation in the digital environment as a precise copy of self, 30 respondents – as an improved copy of self, 24 respondents – as a modified version of self, and 30 respondents – as an alternative version of self. It was found that there is no difference in the number of respondents with different types of selective self-representation in the group of respondents who did not look for/ask for information on how to improve their Cyber Me before its creation ($\chi^2(3) = 3.73$, $p = .29$).

In its turn among 104 respondents who looked for/asked for information on how to improve their Cyber Me before its creation 28 respondents choose self-representation in the digital environment as a precise copy of self, 36 respondents – as an improved copy of self, 20 respondents – as a modified version of self, and 20 respondents – as an alternative version of self. It was found that there is also no difference in the number of respondents with different types of selective self-representation in the group of respondents who looked for/asked for information on how to improve their Cyber Me before its creation ($\chi^2(3) = 6.77$, $p = .08$).

The results of the assessment of the association between types of selective self-representation and the significance users place on social interaction

Firstly, it was explored whether there is the association between the choice of one of four types of selective self-representation and the significance users place on social interaction. It was assessed whether there is the association between frequencies of responses to the statement “My Cyber Me, it is:” and frequencies of responses to the statement “It is important for me how other users perceive characteristics of my Cyber Me in the digital environment”. The frequencies of responses to these two statements are presented in Table 28.

Table 28

Association between types of selective self-representation and the importance of user perception of Cyber Me characteristics

		It is important for me how other users perceive characteristics of my Cyber Me in the digital environment		Total
		no	yes	
My Cyber Me, it is:	a precise copy of myself	11	56	67
	an improved copy of myself	9	57	66
	a modified version of myself	5	39	44
	an alternative version of myself	20	30	50
Total		45	182	227

Using Cramer’s V test, it was found that there is a statistically significant association between the choice of one of four types of selective self-representation and the significance users place on social interaction (Cramer’s V = .27, $p = .001$). As shown in Table 28 the following tendency is observed: those respondents who chose the encoding strategy

“Information enhancement” (substitution and augmentation) and create self-representation of digital identity as a copy of self (precise or improved), more often reported that it is important for them how other users perceive characteristics of Cyber Me in the digital environment comparing with the respondents who chose the encoding strategy “Information transformation” (modification and redefinition) and create self-representation of digital identity as a modified or an alternative version of self, more often reported that it is not important for them.

Secondly, the significance users place on social interaction was explored in groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 28 among 67 respondents whose Cyber Me is a precise copy of self, for 11 respondents it is not important how other users perceive their characteristics of Cyber Me, while for 56 persons it is important. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there are statistically significantly more persons for whom it is important how other users perceive characteristics of their Cyber Me ($\chi^2(1) = 30.22, p = .000$).

Among 66 respondents whose Cyber Me is an improved copy of self, for 9 respondents it is not important how other users perceive their characteristics of Cyber Me, while for 57 persons it is important. It was found that in the group of respondents whose Cyber Me is an improved copy of self, there are statistically significantly more persons for whom it is important how other users perceive characteristics of their Cyber Me ($\chi^2(1) = 34.91, p = .000$).

Among 44 respondents whose Cyber Me is a modified version of self, for 5 respondents it is not important how other users perceive their characteristics of Cyber Me, while for 39 persons it is important. It was found that in the group of respondents whose Cyber Me is a modified version of self, there are statistically significantly more persons for whom it is important how other users perceive characteristics of their Cyber Me ($\chi^2(1) = 26.27, p = .000$).

Among 50 respondents whose Cyber Me is an alternative version of self, for 25 respondents it is not important how other users perceive their characteristics of Cyber Me, while for 30 persons it is important. It was found that in the group of respondents whose Cyber Me is an alternative version of self, there is no a statistically significant difference in the number of persons for whom it is not important how other users perceive characteristics of their Cyber Me and persons for whom it is important ($\chi^2(1) = 2.00, p = .16$).

Thirdly, it was checked whether there are differences in the number of respondents with different types of selective self-representation in the group of those persons for whom it is not important how other users perceive characteristics of their Cyber Me and in the group of persons for whom it is important. A χ^2 test was employed.

As shown in Table 28 among 45 respondents for whom it is not important how other users perceive characteristics of their Cyber Me 11 respondents choose self-representation in the digital environment as a precise copy of self, 9 respondents – as an improved copy of self, 5 respondents – as a modified version of self, and 25 respondents – as an alternative version of self. It was found that in the group of respondents for whom it is not important how other users perceive characteristics of their Cyber Me there are statistically significant differences in the number of respondents with different types of selective self-representation ($\chi^2(3) = 10.73, p = .013$). There are more persons who chose the encoding strategy “Information transformation” (modification and redefinition) and create self-representation of digital identity as a transformed version of self.

In its turn among 182 respondents for whom it is not important how other users perceive characteristics of their Cyber Me 56 respondents choose self-representation in the digital environment as a precise copy of self, 57 respondents – as an improved copy of self, 39 respondents – as a modified version of self, and 30 respondents – as an alternative version of self. It was found that in the group of respondents for whom it is important how other users perceive characteristics of their Cyber Me there are statistically significant differences in the number of respondents with different types of selective self-representation ($\chi^2(3) = 11.54, p = .009$). There are more persons which self-representation in the digital environment is a copy of self (precise or improved).

The results of the assessment of the association between types of selective self-representation and ongoing communication with other users

Firstly, it was explored whether there is the association between the choice of one of four types of selective self-representation and ongoing communication with other users. It was assessed whether there is the association between frequencies of responses to the statement “My Cyber Me, it is:” and frequencies of responses to the statement “I actively communicate with other users”. The frequencies of responses to these two statements are presented in Table 29.

Table 29

Association between types of selective self-representation and active communication with other users

		I actively communicate with other users		Total
		no	yes	
My Cyber Me, it is:	a precise copy of myself	18	49	67
	an improved copy of myself	7	59	66
	a modified version of myself	5	39	44
	an alternative version of myself	12	38	50
Total		42	185	227

Using Cramer’s V test, it was found that there is a statistically significant association between the choice of one of four types of selective self-representation and ongoing communication with other users (Cramer’s $V = .19, p = .04$). As shown in Table 29 the following tendency is observed: respondents who chose either the encoding strategy “Augmentation” and create self-representation of digital identity as an improved copy of self, or the encoding strategy “Modification” and create self-representation of digital identity as a modified version of self, more often reported that they actively communicate with other users, comparing with respondents who chose either the encoding strategy “Substitution” and create self-representation of digital identity as a precise copy of self, or the encoding strategy “Redefinition” and create self-representation of digital identity as an alternative version of self.

Secondly, ongoing communication with other users was explored in groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 29 among 67 respondents whose Cyber Me is a precise copy of self, 18 respondents do not actively communicate with other users, while 49 communicate actively. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there are statistically significantly more persons who communicate actively with other users ($\chi^2(1) = 14.34, p = .000$).

Among 66 respondents whose Cyber Me is an improved copy of self, 7 respondents do not actively communicate with other users, while 59 communicate actively. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there are statistically significantly more persons who communicate actively with other users ($\chi^2(1) = 40.97, p = .000$).

Among 44 respondents whose Cyber Me is a modified version of self, 5 respondents do not actively communicate with other users, while 39 communicate actively. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there are statistically significantly more persons who communicate actively with other users ($\chi^2(1) = 26.27, p = .000$).

Among 50 respondents whose Cyber Me is an alternative version of self, 12 respondents do not actively communicate with other users, while 38 communicate actively. It was found that in the group of respondents whose Cyber Me is a precise copy of self, there are statistically significantly more persons who communicate actively with other users ($\chi^2(1) = 13.52, p = .000$).

Thirdly, it was checked whether there are differences in the number of respondents with different types of selective self-representation in the group of those persons who do not communicate actively with other users and in the group of persons who communicate actively.

As shown in Table 29 among 42 respondents who do not communicate actively with other users 18 respondents choose self-representation in the digital environment as a precise copy of self, 7 respondents – as an improved copy of self, 5 respondents – as a modified version of self, and 12 respondents – as an alternative version of self. It was found that there are statistically significant differences in the number of respondents with different types of selective self-representation in the group of respondents who do not communicate actively with other users ($\chi^2(3) = 9.62, p = .02$). There are more respondents which self-representation in the digital environment is either a precise copy of self, or an alternative version of self.

In its turn among 185 respondents who communicate actively with other users 49 respondents choose self-representation in the digital environment as a precise copy of self, 59 respondents – as an improved copy of self, 39 respondents – as a modified version of self, and 38 respondents – as an alternative version of self. It was found that there is no difference in the number of respondents with different types of selective self-representation in the group of respondents who communicate actively with other users ($\chi^2(3) = 6.29, p = .10$).

Regarding the second hypothesis, which posits that there is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment, the following findings were made:

(1) There is no association between the choice of one of the four types of selective self-representation (a precise copy of self, an improved copy of self, a modified version of self, and an alternative version of self) and social interaction aimed to search for information related to the creation of Cyber Me.

In all groups of respondents regardless of the type of selective self-representation there is no difference in the number of persons who did not look for/ask for information on how to improve their Cyber Me before its creation and those who did.

In the group of those persons who did not look for/ask for information on how to improve their Cyber Me before its creation and in the group of respondents who did, there is no difference in the number of respondents with different types of selective self-representation.

Thus, these findings allow to conclude that there is no an association between types of selective self-representation of one's digital identity and the user's social interaction aimed to search for information related to the creation of Cyber Me.

Based on the findings obtained for the first hypothesis and these results, it can be concluded that searching for or requesting information from other users on how to create a better digital identity plays a significant role primarily in the processes of digital identity creation and behavioral control within a specific digital environment. However, the choice of the type of selective self-representation (precise copy, improved copy, modified version, or alternative version of self) does not depend on whether users sought information prior to creating their digital identity.

This suggests that the decision regarding self-representation is not a spontaneous reaction influenced by external recommendations but rather a deliberate choice shaped by broader personal motivations and pre-existing identity preferences. Users likely enter digital environments with a predetermined self-representation strategy, which may later influence their interactions but is not formed based on initial informational input from others.

Although previous studies have emphasized the role of information-seeking behaviors in digital identity construction and control mechanisms (Triberti et al., 2017; Dechant et al., 2021), they have not explicitly addressed the lack of association between information-seeking and self-representation type. This finding constitutes a novel insight emerging from the current research, suggesting that digital self-representation is a deeply personal and identity-driven process rather than a direct result of informational influences.

These results align with the idea that users approach digital environments with pre-existing identity preferences, which shape how they present themselves online. The findings also indicate that while users may seek guidance on optimizing their presence within a specific digital platform, the fundamental decision of how they self-represent transcends platform-specific factors and is instead influenced by deeper, intrinsic motivations.

(2) There is an association between the choice of one of four types of selective self-representation and the significance users place on social interaction.

In the groups of respondents whose Cyber Me is either a precise or an improved copy of self, as well as a modified version of self, there are more persons for whom it is important how other users perceive characteristics of their Cyber Me. However, in the group of respondents whose Cyber Me is an alternative version of self, there is no a difference in the number of persons for whom it is not important how other users perceive characteristics of their Cyber Me and persons for whom it is important.

In the group of respondents for whom it is not important how other users perceive characteristics of their Cyber Me there are more persons who chose the encoding strategy "Information transformation" (modification and redefinition) and create self-representation of digital identity as a transformed version of self. In contrast, in the group of respondents for whom it is important how other users perceive characteristics of their Cyber Me there are more persons which self-representation in the digital environment is a copy of self (precise or improved).

The observed association between the type of selective self-representation and the significance users place on social interaction suggests that self-representation choices are linked to users' underlying communication goals. Users who prioritize meaningful and trust-based social interactions tend to construct a digital identity that closely reflects their real-world characteristics. This alignment allows for more authentic interactions, facilitating mutual validation, social acceptance, and emotional reciprocity in the digital environment (Peña et al.,

2021). The need for accurate social feedback and recognition from others appears to be a key motivation for users who adopt a precise copy or an improved copy of self as their selective self-representation. These findings are consistent with previous research indicating that selective self-representation fosters more authentic exchanges and can reduce social barriers, ultimately strengthening interpersonal bonds in digital interactions (Nagy & Koles, 2014).

In contrast, users who create a transformed version of self (through modification or redefinition) are less concerned with how others perceive their digital identity. This suggests that for these users, digital social interaction is less about validation or deep interpersonal connections and more about exploration, experimentation, or self-protection (Gorini et al., 2011). The ability to maintain distance and reduce personal vulnerability in digital interactions may explain why these users place lower significance on how others interpret their digital identity. Prior studies have suggested that individuals who engage in selective self-representation for exploratory purposes often prioritize identity flexibility over social validation, as they seek to test new aspects of their personality in a relatively controlled digital environment (Yee et al., 2011).

The findings highlight a potential risk: if a user misinterprets the level of intimacy in a digital interaction, there is an increased likelihood that personally shared information might be misused. While a strong alignment between digital identity and the real self fosters trust and openness, it also makes users more susceptible to social risks if the expected reciprocity and security in communication are not met. This aligns with existing research showing that perceived social closeness in digital environments can lower users' vigilance, making them more prone to oversharing and potential privacy breaches (Dechant et al., 2021). Understanding the implicit dynamics of social interaction in digital environments is therefore critical, as the distinction between perceived closeness and actual social trust may not always align.

(3) There is an association between the choice of one of four types of selective self-representation and ongoing communication with other users. Those respondents who chose either the encoding strategy "Augmentation" and create self-representation of digital identity as an improved copy of self, or the encoding strategy "Modification" and create self-representation of digital identity as a modified version of self, more often reported that they actively communicate with other users, comparing with respondents who chose either the encoding strategy "Substitution" and create self-representation of digital identity as a precise copy of self, or the encoding strategy "Redefinition" and create self-representation of digital identity as an alternative version of self.

In all groups of respondents regardless of the type of selective self-representation there are more persons who communicate actively with other users.

In the group of persons who do not communicate actively with other users there are more respondents which self-representation in the digital environment is either a precise copy of self, or an alternative version of self. However, there is no difference in the number of respondents with different types of selective self-representation in the group of respondents who communicate actively with other users

The observed pattern suggests that users who modify or enhance their digital identity (improved copy or modified version of self) are more likely to engage in ongoing communication with others, whereas those who maintain a precise copy or an alternative version of self tend to communicate less actively.

This relationship can be explained by the underlying social motivations that drive user engagement in digital environments. One of the key norms in digital spaces is the ability to attract attention and elicit reactions from others. Users who seek broader engagement may feel

a stronger need to align their self-representation with social expectations, strategically modifying their digital identity to enhance their perceived appeal. This aligns with previous research suggesting that self-presentation strategies in digital environments are often adapted to meet evolving social demands, which, in turn, reinforces engagement and interaction (Peña et al., 2021).

The findings suggest that as the number of social interactions increases, so does the pressure to conform to socially desirable traits, leading users to refine or modify their digital identity. This aligns with the Proteus effect (Yee, 2014), which describes how users internalize and integrate elements of their digital identity into their offline self-concept. The more users interact in digital environments, the greater the likelihood that they will adopt and project characteristics that enhance their visibility and popularity, reinforcing their engagement in the digital space.

Additionally, these results further support the idea that digital identity choices are not only a means of self-representation but also a response to social expectations. As users increase their social engagement, the pressure to conform to widely accepted digital identity standards may become a driving force in their choice to modify or improve their self-representation. This dynamic suggests that digital interaction is not only shaped by user preferences but also by implicit social norms that regulate how self-representation evolves in response to social validation and feedback (Bozkurt & Tu, 2016).

While the decision to actively communicate with others may stem from intrinsic motivations, the need for visibility and engagement can reinforce a cycle in which users increasingly modify or enhance their digital identity to maintain social relevance. This finding highlights the dual role of self-representation: it serves both as a reflection of personal identity and as a tool for increasing digital social capital.

H3: There is an association between the process of using digital identity (customization and control) and types of selective self-representation in digital environments

To test the third hypothesis, which states that there is an association between the process of using digital identity (customization and control) and types of selective self-representation in digital environments, Cramer's V test, a χ^2 test were employed.

The analysis aimed to assess whether an association exists between 1) three indicators related to the process of use of digital identity, and 2) four types of selective self-representation.

Three indicators related to the process of use of digital identity are:

1. **Time spent on creating and adjusting digital identity:** "I spent a lot of time to create and adjust my Cyber Me".
2. **Ongoing adjustments to digital identity:** "I continue to adjust my Cyber Me from time to time".
3. **Use of platform capabilities to control digital identity:** "I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it".

Four types of selective self-representation are:

1. **Precise copy of self:** "My Cyber Me is a precise copy of myself" (**encoding strategy "Substitution"**).
2. **Improved copy of self:** "My Cyber Me is an improved copy of myself" (**encoding strategy "Augmentation"**).

3. **Modified version of self:** “My Cyber Me is a modified version of myself” (**encoding strategy “Modification”**).
4. **Alternative version of self:** “My Cyber Me is an alternative version of myself” (**encoding strategy “Redefinition”**).

The results of the analysis are presented below.

The results of the assessment of the association between the time spent on creating and adjusting digital identity and types of selective self-representation

Firstly, it was explored whether there is the association between the time spent on creating and adjusting digital identity and the choice of one of four types of selective self-representation. It was assessed whether there is the association between frequencies of responses to the statement “I spent a lot of time to create and adjust my Cyber Me” and frequencies of responses to the statement. “My Cyber Me, it is:” The frequencies of responses to these two statements are presented in Table 30.

Table 30

Association between the time spent on creating and adjusting digital identity and types of selective self-representation

		My Cyber Me, it is:				Total
		a precise copy of myself	an improved copy of myself	a modified version of myself	an alternative version of myself	
I spent a lot of time to create and adjust my Cyber Me	no	48	30	16	28	122
	yes	19	36	28	22	105
Total		67	66	44	50	227

The analysis revealed a statistically significant association between the time spent on adjusting digital identity and the choice of one of four types of selective self-representation (Cramer’s $V = .27$, $p = .001$). As shown in Table 30 the following tendency is observed: those respondents who did not spend a lot of time to create and adjust Cyber Me, more often chose the encoding strategy “Information enhancement”, namely “Substitution” and create self-representation of digital identity as a precise copy of self, comparing with any other strategy. In its turn those respondents who spent a lot of time to create and adjust Cyber Me, more often choose either the encoding strategy “Information enhancement”, namely “Augmentation” and create self-representation of digital identity as an improved copy of self, or the encoding strategy “Information transformation”, namely, “Modification” and create self-representation of digital identity as a modified version of self.

Secondly, the choice of one of four types of selective self-representation was explored in the group of respondents who did not spend a lot of time to create and adjust Cyber Me and in the group of respondents who spent a lot of time, using χ^2 test.

As shown in Table 30 among 122 respondents who did not spend a lot of time to create and adjust Cyber Me 48 respondents create a precise copy of self, 30 respondents – an improved copy, 16 respondents – a modified version of self, and 28 respondents – an alternative version of self. It was found that in this group there are statistically significant differences in the number

of persons with different types of selective self-representation ($\chi^2(3) = 17.19, p = .001$). In the group of respondents who did not spend a lot of time to create and adjust Cyber Me there are more persons whose self-representation in the digital environment is either a copy of self (precise or improved), or an alternative version of self. A minority of respondents in this group choose a modified version of self.

In contrast, as shown in Table 30 among 105 respondents who spent a lot of time to create and adjust Cyber Me 19 respondents create a precise copy of self, 36 respondents – an improved copy, 28 respondents – a modified version of self, and 22 respondents – an alternative version of self. However, it was found that there is no statistically significant difference in the number of respondents with different types of selective self-representation in the group of respondents who spent a lot of time to create and adjust Cyber Me ($\chi^2(3) = 6.43, p = .09$).

Thirdly, it was checked whether there are differences in the time spent on creating and adjusting digital identity in the groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 30 among 67 respondents whose Cyber Me is a precise copy of self, 48 respondents did not spend a lot of time to create and adjust Cyber Me, while only 19 respondents spend a lot of time. There are statistically significantly more persons who did not spend a lot of time to create and adjust Cyber Me in the group of respondents whose Cyber Me is a precise copy of self ($\chi^2(1) = 12.55, p = .000$).

Among 66 respondents whose Cyber Me is an improved copy of self, 30 respondents did not spend a lot of time to create and adjust Cyber Me, while 36 respondents spend a lot of time. It was found that in the group of respondents whose Cyber Me is an improved version of self, there is no statistically significant difference in the number of persons who did not spend a lot of time to create and adjust Cyber Me and persons who spent a lot of time ($\chi^2(1) = .55, p = .46$).

Among 44 respondents whose Cyber Me is a modified version of self, 16 respondents did not spend a lot of time to create and adjust Cyber Me, while 28 respondents spend a lot of time. It was found that in the group of respondents whose Cyber Me is a modified version of self, there is no statistically significant difference in the number of persons who did not spend a lot of time to create and adjust Cyber Me and persons who spent a lot of time ($\chi^2(1) = 3.27, p = .07$).

Among 50 respondents whose Cyber Me is an alternative version of self, 28 respondents did not spend a lot of time to create and adjust Cyber Me, while 22 respondents spend a lot of time. It was found that in the group of respondents whose Cyber Me is an alternative version of self, there is no statistically significant difference in the number of persons who did not spend a lot of time to create and adjust Cyber Me and persons who spent a lot of time ($\chi^2(1) = .72, p = .40$).

The results of the assessment of the association between ongoing adjustments to digital identity and types of selective self-representation

Firstly, it was explored whether there is the association between ongoing adjustments to digital identity and the choice of one of four types of selective self-representation. It was assessed whether there is the association between frequencies of responses to the statement “I continue to adjust my Cyber Me from time to time” and frequencies of responses to the

statement. “My Cyber Me, it is:” The frequencies of responses to these two statements are presented in Table 31.

Table 31

Association between ongoing adjustments to digital identity and types of selective self-representation

		My Cyber Me, it is:				Total
		a precise copy of myself	an improved copy of myself	a modified version of myself	an alternative version of myself	
I continue to adjust my Cyber Me from time to time	no	13	7	7	15	42
	yes	54	59	37	35	185
Total		67	66	44	50	227

The analysis revealed that there is no a statistically significant association between ongoing adjustments to digital identity and the choice of one of four types of selective self-representation (Cramer’s $V = .18, p = .06$).

Secondly, the choice of one of four types of selective self-representation was explored in the group of respondents who do not continue to adjust Cyber Me from time to time and in the group of respondents who continue to adjust Cyber Me, using χ^2 test.

As shown in Table 31 among 42 respondents who do not continue to adjust Cyber Me from time to time, 13 respondents create a precise copy of self, 7 respondents – an improved copy, 7 respondents – a modified version of self, and 15 respondents – an alternative version of self. It was found that there is no statistically significant difference in the number of respondents with different types of selective self-representation in the group of respondents who do not continue to adjust Cyber Me from time to time ($\chi^2(3) = 4.86, p = .18$).

In its turn among 185 respondents who continue to adjust Cyber Me from time to time, 54 respondents create a precise copy of self, 59 respondents – an improved copy, 37 respondents – a modified version of self, and 35 respondents – an alternative version of self. It was found that in this group there are statistically significant differences in the number of persons with different types of selective self-representation ($\chi^2(3) = 9.40, p = .02$). In the group of respondents who continue to adjust Cyber Me from time to time there are more persons which self-representation in the digital environment is a copy of self (precise or improved).

Thirdly, it was checked whether there are differences in ongoing adjustments to digital identity in the groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 31 among 67 respondents whose Cyber Me is a precise copy of self, 13 respondents do not continue to adjust Cyber Me from time to time, while 54 respondents continue to adjust. There are statistically significantly more persons who continue to adjust Cyber Me from time to time ($\chi^2(1) = 25.09, p = .000$).

Among 66 respondents whose Cyber Me is an improved copy of self, 7 respondents do not continue to adjust Cyber Me from time to time, while 59 respondents continue to adjust.

There are statistically significantly more persons who continue to adjust Cyber Me from time to time ($\chi^2(1) = 40.97, p = .000$).

Among 44 respondents whose Cyber Me is a modified version of self, 7 respondents do not continue to adjust Cyber Me from time to time, while 37 respondents continue to adjust. There are statistically significantly more persons who continue to adjust Cyber Me from time to time ($\chi^2(1) = 20.46, p = .000$).

Among 50 respondents whose Cyber Me is an alternative version of self, 15 respondents do not continue to adjust Cyber Me from time to time, while 35 respondents continue to adjust. There are statistically significantly more persons who continue to adjust Cyber Me from time to time ($\chi^2(1) = 8.00, p = .005$).

The results of the assessment of the association between use of platform capabilities to control digital identity and types of selective self-representation

Firstly, it was explored whether there is the association between use of platform capabilities to control digital identity and the choice of one of four types of selective self-representation. It was assessed whether there is the association between frequencies of responses to the statement “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it” and frequencies of responses to the statement. “My Cyber Me, it is:” The frequencies of responses to these two statements are presented in Table 32.

Table 32

Association between digital identity control and types of selective self-representation

		My Cyber Me, it is:				Total
		a precise copy of myself	an improved copy of myself	a modified version of myself	an alternative version of myself	
I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	no	23	15	9	15	62
	yes	44	51	35	35	165
Total		67	66	44	50	227

The analysis revealed that there is no a statistically significant association between use of platform capabilities to control digital identity and the choice of one of four types of selective self-representation (Cramer’s $V = .17, p = .31$).

Secondly, the choice of one of four types of selective self-representation was explored in the group of respondents who do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it and in the group of respondents who use all opportunities of the platform (limitations), using χ^2 test.

As shown in Table 32 among 62 respondents who do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, 23 respondents create a precise copy of self, 15 respondents – an improved copy, 9 respondents – a modified version of self, and 15 respondents – an alternative version of self. It was found that there is no statistically significant difference in the number of respondents with different types of selective self-representation in the group of respondents who do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it ($\chi^2(3) = 6.39, p = .09$).

In its turn among 165 respondents who use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, 44 respondents create a precise copy of self, 51 respondents – an improved copy, 35 respondents – a modified version of self, and 35 respondents – an alternative version of self. It was found that there is no statistically significant difference in the number of respondents with different types of selective self-representation in the group of respondents who use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it ($\chi^2(3) = 4.38, p = .22$).

Thirdly, it was checked whether there are differences in use of platform capabilities to control digital identity in the groups of respondents with a certain type of selective self-representation separately, using χ^2 test. There were four groups: (1) respondents whose Cyber Me is a precise copy of self, (2) respondents whose Cyber Me is an improved copy of self, (3) respondents whose Cyber Me is a modified version of self, (4) respondents whose Cyber Me is an alternative version of self.

As shown in Table 32 among 67 respondents whose Cyber Me is a precise copy of self, 23 respondents do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, while 44 respondents use of platform capabilities to control digital identity. There are statistically significantly more persons who use all opportunities of the platform (limitations) ($\chi^2(1) = 6.58, p = .01$).

Among 66 respondents whose Cyber Me is an improved copy of self, 15 respondents do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, while 51 respondents use of platform capabilities to control digital identity. There are statistically significantly more persons who use all opportunities of the platform (limitations) ($\chi^2(1) = 19.64, p = .000$).

Among 44 respondents whose Cyber Me is a modified version of self, 9 respondents do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, while 35 respondents use of platform capabilities to control digital identity. There are statistically significantly more persons who use all opportunities of the platform (limitations) ($\chi^2(1) = 15.36, p = .000$).

Among 50 respondents whose Cyber Me is an alternative version of self, 15 respondents do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, while 35 respondents use of platform capabilities to control digital identity. There are statistically significantly more persons who use all opportunities of the platform (limitations) ($\chi^2(1) = 8.00, p = .005$).

Regarding the third hypothesis, which posits that there is an association between the process of using digital identity (customization and control) and types of selective self-representation in digital environments, the following findings were made.

(1) There is an association between the time spent on adjusting digital identity and the choice of one of four types of selective self-representation.

In the group of respondents who did not spend a lot of time to create and adjust Cyber Me there are more persons which self-representation in the digital environment is a copy of self (precise or improved). In its turn in the group of respondents who spent a lot of time to create and adjust Cyber Me, there is no difference in the number of respondents with different types of selective self-representation in the digital environment.

In the group of respondents whose Cyber Me is a precise copy of self, there are more persons who did not spend a lot of time to create and adjust Cyber Me. In the groups of respondents with all other types of selective self-representation (an improved copy of self, as well as a modified or alternative version of self) there is no difference in the number of persons who did not spend a lot of time to create and adjust Cyber Me and persons who spent a lot of time.

The speed of encoding personal characteristics and transferring them into the digital environment depends on the user's digital skills and familiarity with their self-concept. The results indicate that the primary distinction lies in the encoding and transfer of original characteristics of oneself, which requires less time. Individuals whose selective self-representation is a precise or improved copy of self tend to spend less time creating and adjusting their digital identity, as they replicate known characteristics without substantial modification. This direct transfer minimizes the need for additional cognitive processing before encoding into the digital environment.

In contrast, users who engage in more extensive customization efforts – whether by enhancing, modifying, or redefining aspects of their digital identity – do not exhibit a uniform pattern regarding time investment. This suggests that the encoding of a transformed digital identity may be influenced by additional factors such as identity exploration, experimentation, or adaptation to social contexts. The process of deciding which characteristics to modify or emphasize likely demands greater cognitive and creative effort, extending the time required for digital identity customization.

These findings align with research suggesting that users who engage in selective self-representation through identity transformation approach digital identity as a fluid and evolving construct (Yee et al., 2011; Ratan & Hasler, 2009). Conversely, users who transfer their original characteristics into the digital environment without modification follow a more immediate and efficient encoding process, as their representation requires minimal pre-adjustment.

Furthermore, this research highlights that time investment in digital identity creation does not universally indicate engagement or commitment. While prior research has linked digital identity customization to greater social adaptability (Peña et al., 2021), these findings suggest that unaltered self-representation does not necessitate prolonged adjustments. Instead, it follows a more straightforward encoding pathway, emphasizing direct identity transfer rather than iterative modification.

(2) There is no statistically significant association between ongoing adjustments to digital identity and the choice of one of four types of selective self-representation.

In the group of respondents who do not continue to adjust Cyber Me from time to time there is no difference in the number of respondents with different types of selective self-representation. However, in the group of respondents who continue to adjust Cyber Me from time to time there are more persons which self-representation in the digital environment is a copy of self (precise or improved).

In all groups of respondents regardless of the type of selective self-representation there more persons who continue to adjust Cyber Me from time to time.

These findings confirm the results from the second hypothesis, reinforcing the idea that regardless of a user's initial vision for their digital identity and selective self-representation strategy, external social influences necessitate ongoing adjustments over time. The digital environment fosters an implicit expectation of continuous self-development, extending beyond skill enhancement to include evolving digital self-presentation.

The results indicate that ongoing adjustments to digital identity occur across all types of selective self-representation. However, among those who actively refine their digital identity over time, there is a higher proportion of users whose self-representation is a precise or improved copy of self. This suggests that even users who initially intend to maintain an unaltered or slightly enhanced version of their real-world self are still compelled to make modifications. Rather than being driven by a desire for transformation, these adjustments may result from the need to align with changing social norms, technological developments, and platform-specific expectations.

The absence of a statistically significant association between selective self-representation type and ongoing digital identity adjustments implies that external motivators, rather than internal identity preferences, primarily influence continuous modifications. Prior studies have emphasized the role of digital social norms in shaping self-representation behaviors, particularly regarding the expectation that users consistently refine their online presence to maintain relevance (Peña et al., 2021; Yee, 2014). The present findings extend these insights by demonstrating that digital identity is not a static construct but rather a socially responsive entity shaped by ongoing digital interactions.

Additionally, these findings reinforce the perspective that digital identity serves as an adaptive mechanism within digital environments. While users initially define their digital identity based on personal choices, long-term maintenance is subject to social validation processes and the evolving nature of digital interactions. This highlights the dual role of digital identity – both as a form of self-expression and as a construct influenced by external social expectations.

(3) There is no statistically significant association between use of platform capabilities to control digital identity and the choice of one of four types of selective self-representation.

In both groups of respondents who do not use all opportunities of the platform (limitations) in order to control the actions of Cyber Me as well as the impact which other users may have on it, and who use platform capabilities to control digital identity there is no difference in the number of respondents with different types of selective self-representation.

In all groups of respondents regardless of the type of selective self-representation there more persons who respondents use of platform capabilities to control digital identity.

These findings reinforce the conclusions established in the first hypothesis, emphasizing that the selection of a type of selective self-representation precedes the choice of a specific digital environment where the user aims to achieve their goals. Since self-representation strategies are formed before users actively engage with platform capabilities, digital identity control mechanisms do not show a statistically significant association with types of selective self-representation.

The results indicate that across all respondent groups – whether they use platform capabilities to regulate the actions of their digital identity or not – there is no difference in the distribution of selective self-representation types. This suggests that platform control tools serve a functional role rather than an identity-related one, primarily associated with risk

management, privacy concerns, and interaction regulation rather than with the strategic formation of self-representation.

Furthermore, the findings suggest that platform control tools are considered at the initial stage of digital identity creation when users make decisions about security and privacy settings within a specific digital environment. Previous research has highlighted that digital identity management is prioritized differently at various stages – initially focusing on structural and regulatory aspects, whereas later adjustments are more socially driven (Triberti et al., 2017; Dechant et al., 2021). This aligns with the present results by demonstrating that digital identity control is a pragmatic function rather than an extension of self-representation strategies.

Additionally, these findings confirm that customization and control serve distinct psychological functions within digital identity management. While customization is closely linked to self-expression and social interaction, the use of platform capabilities for digital identity regulation is shaped by external factors – platform-specific features, privacy settings, and user safety concerns. Consequently, the absence of a statistically significant association suggests that managing digital identity restrictions is not directly related to selective self-representation but rather represents a necessary adaptation to the structural limitations of digital platforms.

H4: The process of using digital identity (customization and control) increases the level of immersion

To test H4, which posits that the process of using digital identity (customization and control) increases the level of immersion, two measures of digital identity use were applied: 1) “I continue to adjust my digital identity from time to time – yes/no” (a measure of customization). 2) “I use all opportunities of the platform (limitations) to control the actions of my digital identity as well as the impact other users may have on it – yes/no” (a measure of control).

The Extended Game Immersion Questionnaire (E-GIQ) was used to assess three stages of immersion: engagement, engrossment, and total immersion. The E-GIQ was adapted to capture immersion experiences among online users beyond gaming contexts.

If the process of using digital identity (customization and control) increases the level of immersion then there should be differences in the level of immersion between respondents who continue to adjust their Cyber Me from time to time and those who do not, and respondents who use all opportunities of the platform (limitations) to control their Cyber Me and those who do not.

First, it was examined whether there were differences in the three stages of immersion – engagement, engrossment, and total immersion – based on each measure of digital identity use separately. This included customization (“I continue to adjust my digital identity from time to time – yes/no”) and control (“I use all opportunities of the platform (limitations) to control the actions of my digital identity and the impact other users may have on it – yes/no”).

The level of immersion was then compared between:

1. respondents who continue to adjust their Cyber Me from time to time and those who do not, and
2. respondents who use all opportunities of the platform (limitations) to control their Cyber Me and those who do not.

Sub-hypothesis H4a: Customization of digital identity (adjusting its characteristics) increases the level of immersion

At the first stage of data processing, descriptive statistics were calculated, and it was examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 33.

Table 33

Descriptive statistics and the results of the examination of normal distribution for levels of immersion in a group of respondents who continue to adjust their Cyber Me from time to time ($N_1 = 185$) and those who do not ($N_2 = 42$)

I continue to adjust my Cyber Me from time to time	Stage of immersion	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
No	Engagement	18.62	19.50	20.00	3.74	-.28	-.51	16.00	21.00	.14	.03
	Engrossment	17.74	18.00	17.00	5.41	-.51	-.19	14.75	22.25	.09	.20
	Total immersion	23.98	22.50	16.00	8.27	.05	1.04	17.00	31.50	.10	.20
Yes	Engagement	20.21	20.00	21.00	2.97	-.28	-.46	18.00	22.00	.08	.005
	Engrossment	17.36	18.00	18.00	4.97	.10	-.40	14.00	21.00	.08	.009
	Total immersion	25.79	27.00	32.00	7.76	-.29	-.83	20.00	32.00	.10	.000

As the dependent variable 'engagement' is not normally distributed in the group of respondents who do not continue to adjust their Cyber Me from time to time, and all dependent variables (levels of immersion for each stage of immersion) are not normally distributed in the group of respondents who continue to adjust their Cyber Me from time to time, the Mann-Whitney U test was used to examine whether there are differences in levels of immersion between respondents who continue to adjust their Cyber Me from time to time and those who do not. The results are presented in Table 34.

Table 34

Differences in levels of immersion between respondents who continue to adjust their Cyber Me from time to time and those who do not

Stage of immersion	I continue to adjust my Cyber Me from time to time	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Engagement	No	91.58	2943.50	-2.46	.014
	Yes	119.09			
Engrossment	No	120.42	3615.50	-.70	.48
	Yes	112.54			
Total immersion	No	102.67	3409.00	-1.24	.22
	Yes	116.57			

As shown in Table 34, there is a statistically significant difference in the level of engagement – the first stage of immersion. Respondents who continue to adjust their Cyber Me from time to time exhibit a higher level of engagement compared to those who do not ($z = -2.46$, $p < .05$).

Sub-hypothesis H4b: Control over digital identity interactions within the digital environment increases the level of immersion

At the first stage of data processing, descriptive statistics were calculated, and it was examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 35.

Table 35

Descriptive statistics and results of the normality assumption check for levels of immersion in respondents who use all platform opportunities (limitations) to control the actions of their Cyber (N₁ = 165) Me and those who do not (N₂ = 62)

I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	Stage of immersion	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q</i> ₁	<i>Q</i> ₃	Test Statistic	<i>p</i>
No	Engagement	18.53	18.00	18.00	3.13	-.06	.05	16.00	21.00	.08	.20
	Engrossment	16.16	17.00	14.00	5.15	-.22	-.55	12.75	20.00	.10	.20
	Total immersion	21.81	21.00	16.00	8.31	.27	-.77	15.75	29.00	.10	.20
Yes	Engagement	20.44	21.00	20.00	3.05	-.53	-.06	19.00	23.00	.11	.000
	Engrossment	17.91	18.00	18.00	4.94	.08	-.47	14.00	22.00	.07	.03
	Total immersion	26.83	28.00	32.00	7.26	-.34	-.83	21.00	32.00	.10	.000

As in the group of respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact which other users may have on it, to check whether there are differences in levels of immersion between respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and those who do not, the Mann-Whitney U test was used. The results are presented in Table 36.

Table 36

Differences in levels of immersion between respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact which other users may have on it, and those who do not

Stage of immersion	I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Engagement	No	84.66	3296.00	-4.15	.000
	Yes	125.02			
Engrossment	No	99.56	4219.50	-2.04	.04
	Yes	119.43			
Total immersion	No	84.97	3315.00	-4.09	.000
	Yes	124.91			

As seen from Table 36, there are statistically significant differences in the levels of engagement, engrossment, and total immersion. Respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact which other users may have on it, compared to those respondents who do not, have a higher level of engagement ($z = -4.15, p = .000$), a higher level of engrossment ($z = -2.04, p < .05$), and a higher level of total immersion ($z = -4.09, p = .000$).

Additionally, it was examined whether there are differences in the three stages of immersion – engagement, engrossment, and total immersion – depending on the combination of two measures of the ability to use digital identity, i.e., the ability to customize digital identity (“I continue to adjust my Cyber Me from time to time – yes/no”) and the ability to control digital identity (“I use all opportunities of the platform (limitations) to control the actions of my Cyber Me as well as the impact other users may have on it – yes/no”). The level of immersion was compared across four groups of respondents:

1. **Group 1** - respondents who continue to adjust their Cyber Me from time to time and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;
2. **Group 2** - respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;
3. **Group 3** - respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;
4. **Group 4** - respondents who neither continue to adjust their Cyber Me from time to time nor use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it.

At the first stage of data processing, descriptive statistics were calculated, and it was examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 37.

Table 37

Descriptive statistics and results of the normality test for immersion levels in groups of respondents based on the combination of customization and control of digital identity interactions within the digital environment

Group	Stage of immersion	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
Group 1 (<i>N₁</i> = 142) Customization and control of DI	Engagement	20.63	21.00	20.00	2.87	-.49	-.02	19.00	23.00	.10	.003
	Engrossment	17.78	18.00	18.00	4.99	.15	-.42	14.00	22.00	.08	.04
	Total immersion	26.79	28.00	32.00	7.14	-.32	-.85	21.00	32.00	.10	.001
Group 2 (<i>N₂</i> = 43) Customization of DI, no control	Engagement	18.81	18.00	18.00	2.90	.40	-.35	17.00	21.00	.13	.09
	Engrossment	15.98	17.00	14.00	4.71	-.15	-.72	12.00	20.00	.11	.20
	Total immersion	22.51	22.00	18.00	8.84	.14	-.94	15.00	30.00	.11	.19
Group 3	Engagement	19.22	20.00	20.00	3.81	-.26	-.77	16.00	22.00	.15	.20

(N ₃ = 23)											
No customization, control of DI	Engrossment	18.70	19.00	23.00	4.65	-.35	-.52	16.00	23.00	.13	.20
	Total immersion	27.09	29.00	35.00	8.11	-.46	-.72	21.00	35.00	.15	.19
Group 4 (N ₄ = 19)											
	Engagement	17.89	18.00	20.00	3.62	-.45	-.13	16.00	20.00	.14	.20
No customization, no control of DI	Engrossment	16.58	17.00	6.00	6.14	-.39	-.46	13.00	22.00	.12	.20
	Total immersion	20.21	19.00	16.00	6.92	.48	-.12	16.00	25.00	.10	.20

As in Group 1, the dependent variables (levels of immersion for each stage of immersion) are not normally distributed, so the Kruskal-Wallis H test was used to compare the four groups and check for differences in the levels of immersion. The results indicated statistically significant differences in the level of engagement ($\chi^2(3) = 20.55, p = .000$) and in the level of total immersion ($\chi^2(3) = 18.06, p = .000$). No statistically significant differences were found in the level of engrossment ($\chi^2(3) = 5.40, p = .15$).

Respectively, it was examined between which groups statistically significant differences in the level of engagement and total immersion exist. Each group was compared with all other groups. Since the dependent variables (the level of engagement and the level of total immersion) are not normally distributed in Group 1, comparisons between Group 1 and all other groups were conducted using the Mann-Whitney U test. The results are presented in Table 38.

Table 38

Differences in levels of engagement and total immersion between Group 1 and all other groups of respondents

Stage of immersion	Group	Mean rank	U	z	p
Engagement	Group 1 (N ₁ = 142)	100.95	1924.50	-3.69	.000
	Group 2 (N ₂ = 43)	66.76			
Total immersion	Group 1 (N ₁ = 142)	99.24	2166.50	-2.89	.004
	Group 2 (N ₂ = 43)	72.38			
Engagement	Group 1 (N ₁ = 142)	85.44	1286.00	-1.64	.10
	Group 3 (N ₃ = 23)	67.91			
Total immersion	Group 1 (N ₁ = 142)	82.44	1554.00	-.37	.71
	Group 3 (N ₃ = 23)	86.43			
Engagement	Group 1 (N ₁ = 142)	85.22	750.00	-3.16	.002
	Group 4 (N ₄ = 19)	49.47			
Total immersion	Group 1 (N ₁ = 142)	85.58	699.00	-3.41	.001
	Group 4 (N ₄ = 19)	46.79			

As seen in Table 38, there are statistically significant differences in the levels of engagement and total immersion between Group 1 and Group 2, as well as between Group 1 and Group 4. Specifically:

- The level of engagement is statistically significantly higher in Group 1 (respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) compared to Group 2 (respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -3.69, p = .000$).

- The level of total immersion is statistically significantly higher in Group 1 compared to Group 2 ($z = -2.89, p < .01$).
- The level of engagement is statistically significantly higher in Group 1 compared to Group 4 (respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -3.16, p < .01$).
- The level of total immersion is statistically significantly higher in Group 1 compared to Group 4 ($z = -3.41, p = .001$).

As the dependent variables (the level of engagement and total immersion) are normally distributed in Group 2, Group 3, and Group 4, these three groups were compared using Student's *t*-test. The results are presented in Table 39.

Table 39

Differences in levels of engagement and total immersion between Group 2, Group 3, and Group 4

Stage of immersion	Group	<i>M</i>	<i>SD</i>	Levene's Test for Equality of Variance		<i>t</i> -test for Equality of Means		
				<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>
Engagement	Group 2 ($N_2 = 43$)	18.81	2.90	2.31	.13	-.48	64	.63
	Group 3 ($N_3 = 23$)	19.22	3.81					
Total immersion	Group 2 ($N_2 = 43$)	22.51	8.84	.20	.66	-2.06	64	.04
	Group 3 ($N_3 = 23$)	27.09	8.11					
Engagement	Group 2 ($N_2 = 43$)	18.81	2.90	1.13	.29	1.07	60	.29
	Group 4 ($N_4 = 19$)	17.89	3.62					
Total immersion	Group 2 ($N_2 = 43$)	8.84	8.84	2.79	.10	1.01	60	.32
	Group 4 ($N_4 = 19$)	20.21	6.92					
Engagement	Group 3 ($N_3 = 23$)	19.22	3.81	.09	.77	1.15	40	.26
	Group 4 ($N_4 = 19$)	17.89	3.62					
Total immersion	Group 3 ($N_3 = 23$)	27.09	8.11	1.54	.22	2.92	40	.006
	Group 4 ($N_4 = 19$)	20.21	6.92					

As seen in Table 39, there are statistically significant differences in the levels of engagement and total immersion between Group 2 and Group 3, as well as between Group 3 and Group 4. Specifically:

- The level of total immersion is statistically significantly higher in Group 3 (respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) compared to Group 2 (respondents who continue to

adjust their Cyber Me from time to time but do not use all opportunities of the platform to control the actions of their Cyber Me) ($t(64) = -2.06, p < .05$).

- The level of total immersion is statistically significantly higher in Group 3 compared to Group 4 (respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me) ($t(40) = 2.92, p < .01$).

This continues to suggest that the ability to control digital identity actions, even without frequent customization, plays a key role in achieving higher levels of immersion in digital environments.

Regarding the fourth hypothesis, which posits that the ability of using digital identity (customization and control) increases the level of immersion, it is possible to conclude the following:

- (1) Respondents who continue to adjust their Cyber Me from time to time have a higher level of engagement compared to those who do not continue to adjust their Cyber Me from time to time.

By continuing to make changes to their digital representation, users ensure that their digital identity aligns more closely with the requirements and expectations of the specific digital environment. This alignment increases the level **of fusion with the digital environment itself**, enhancing the user's sense of immersion. This finding corresponds with previous studies that highlight how digital identity adjustments allow users to better adapt to the dynamics of their environment, thus improving their sense of presence and engagement (Teng, 2010; Bailenson et al., 2003). However, our research offers a more nuanced understanding by emphasizing the role of continual adjustments in reinforcing the relationship between the user's identity and the digital environment, rather than just focusing on the static attributes of digital identity.

- (2) Respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact that other users may have on it, have higher levels of engagement, engrossment, and total immersion compared with those who do not use these opportunities.

In this context, the user's ability to control both their own digital identity and its interactions within the digital environment plays a pivotal role in enhancing the overall immersion experience. By maximizing the control features provided by the platform, users **increase the efficiency** of their interaction with the digital environment's elements, which in turn deepens their experience. This finding aligns with previous research (Teng, 2010; Witmer & Singer, 1998) that suggests that a higher degree of control over one's digital representation and actions amplifies the user's cognitive absorption and flow within digital spaces.

Our research, however, expands on these earlier findings by emphasizing that the sense of total immersion is not just a byproduct of controlling one's digital identity but also of managing how other users interact with it. This insight suggests that user immersion is a complex interplay between self-control and the control of social dynamics, which has not been fully explored in prior studies. This provides new avenues for understanding how both internal and external factors within digital environments contribute to the immersive experience.

- (3) The level of engagement and the level of total immersion are higher in the group of respondents who continue to adjust their Cyber Me from time to time and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as

well as the impact other users may have on it, compared with respondents who continue to adjust their Cyber Me but do not use all platform control opportunities.

This result highlights the importance of balancing both customization (**internal development**) and control (**external expression** of digital identity) to achieve higher levels of immersion. The process of continually transforming one's digital identity allows users to align their representation with the evolving dynamics of the digital environment. Simultaneously, exerting control over how their digital identity interacts with the environment and how others may impact it strengthens their sense of immersion.

This finding confirms earlier studies (Teng, 2010; Bailenson et al., 2003) that emphasize the role of customization in enhancing immersion. However, our research extends this by showing that the full immersive experience depends not only on internal adjustments but also on the external regulation of interactions through control. The dual processes of internal development and external control create a holistic digital experience that deepens the fusion between the user and the digital environment. Achieving a balance between these elements is critical for optimizing immersion, revealing a nuanced understanding of how users engage with digital spaces in a more comprehensive manner than previously suggested.

- (4) The level of engagement and the level of total immersion are higher in the group of respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it, compared with respondents who neither continue to adjust their Cyber Me nor use all platform control opportunities.

This result underscores the critical role of active interaction in shaping immersion within digital environments. The mere **presence** in a digital environment **does not suffice to achieve full immersion**; rather, it is the ability to actively manipulate one's digital identity that enhances the immersive experience. Without the capacity to adjust and control their digital self-representation, users are left with a more passive interaction with the digital environment, which limits their level of immersion.

This finding adds nuance to previous research (Bailenson et al., 2003), which highlighted the significance of customization and control in enhancing immersion. While earlier studies confirmed that users' ability to manipulate their digital identities increases immersion, this research highlights that the absence of such capabilities results in reduced levels of engagement and total immersion. The digital environment, by itself, offers only a limited experience, but the capacity to continuously refine and regulate one's digital identity allows users to reach deeper levels of immersion. This suggests that passive presence in digital environments without the capacity for active digital identity engagement diminishes the immersive potential of those environments.

- (5) The level of total immersion is higher in the group of respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact which other users may have on it, compared with respondents who continue to adjust their Cyber Me but do not use all opportunities of the platform for control.

At the level of immersion - Total immersion, this result suggests that the **external expression** and control of digital identity **outweighs the importance** of continuous internal adjustments. While earlier phases of immersion, such as engagement, may benefit from ongoing modifications to the digital self, full immersion appears to rely more heavily on the ability to control interactions with the environment. In other words, the capacity to manage how the

digital identity functions within the digital environment and how it interacts with others plays a more decisive role in achieving deeper immersion than the continuous fine-tuning of the digital identity's internal aspects.

This contrasts with findings from earlier stages of immersion, where both internal development (customization) and external control contributed to immersion (Teng, 2010). At the level of total immersion, however, the external management of identity's behavior becomes paramount. This reinforces the idea that for users to achieve a fully immersive experience, they must focus on how their digital identity interacts with the digital environment, suggesting that controlling external aspects of digital identity is more critical for sustained and intense immersion.

- (6) At the level of "total immersion", this result indicates that the continuous use of control mechanisms is crucial for maintaining and enhancing immersion. Even without ongoing adjustments to the digital identity, the act of exercising control over how the digital identity functions and interacts with others in the environment becomes vital to sustain immersion.

At the level of immersion - Total immersion, this result indicates that the continuous use of **control mechanisms is crucial** for maintaining and enhancing immersion. Even without ongoing adjustments to the digital identity, the act of exercising control over how the digital identity functions and interacts with others in the environment becomes vital to sustain immersion.

This suggests that without the regular use of control, immersion could either diminish or stagnate, indicating that active management of one's digital identity, even in its external expression, is necessary to keep users deeply involved in the digital environment. This aligns with theories emphasizing the importance of interaction management and user autonomy in fostering deeper immersion, where control over digital identity's behavior maintains and reinforces the immersive experience (Csikszentmihalyi, 1990). Hence, neglecting control, even if the digital identity is no longer being actively customized, risks reducing the user's overall immersive experience.

H5: Social interaction increases the level of immersion.

To test H5, which posits that social interaction increases the level of immersion, three measures of social interaction were applied:

- 1) "Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better – yes/no" (a measure of information-seeking behavior from other users prior to Cyber Me creation);
- 2) "It is important for me how other users perceive characteristics of my Cyber Me in the digital environment – yes/no" (a measure of the significance users place on social interaction);
- 3) "I actively communicate with other users – yes/no" (a measure of ongoing communication with other users).

The Extended Game Immersion Questionnaire (E-GIQ) was used to assess three stages of immersion: Engagement, Engrossment, and Total Immersion. This extended version was adapted for online users to ensure broader applicability beyond gaming contexts.

If social interaction increases the level of immersion then there should be differences in the level of immersion between respondents depending on social interaction aimed to search

for information related to the creation of Cyber Me, the significance users place on social interaction, and ongoing communication with other users.

To test H5, differences in the level of immersion were assessed depending on individual indicators of social interaction. The obtained results of the analysis are presented below.

The results of the assessment of differences in the level of immersion depending on individual indicators of social interaction

It was examined whether there were differences in the three stages of immersion - engagement, engrossment, and total immersion - based on each measure of social interaction separately.

The level of immersion depending on social interaction aimed to search for information related to the creation of Cyber Me

In order to assess whether there are differences in the level of immersion depending on social interaction aimed to search for information related to the creation of Cyber Me, the level of immersion was compared between respondents who looked for/asked for information on how to improve their Cyber Me before its creation, and those who did not.

At the first stage of data processing, descriptive statistics were calculated for groups of respondents who looked for/asked for information on how to improve their Cyber Me before its creation, and those respondents who did not. It was also examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed, using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 40.

Table 40

Descriptive statistics and the results of the examination of normal distribution for levels of immersion in a group of respondents who looked for/ask for information on how to improve their Cyber Me before its creation ($N_1 = 104$) and in a group of respondents who did not look for/ask for such information ($N_2 = 123$)

Prior to the creation of my Cyber Me, I looked for/asked for some information how to do it better	Stage of immersion	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
No	Engagement	19.35	19.00	19.00	3.15	-.33	-.06	18.00	21.00	.11	.002
	Engrossment	16.11	16.00	12.00	5.15	.12	-.43	12.00	20.00	.08	.048
	Total immersion	23.34	22.00	16.00	8.09	.16	-.98	16.00	30.00	.09	.023
Yes	Engagement	20.59	21.00	21.00	3.10	-.50	-.31	19.00	23.00	.12	.001
	Engrossment	18.99	18.00	24.00	4.47	.05	-.38	15.00	23.00	.10	.017
	Total immersion	27.96	29.00	32.00	6.84	-.65	-.01	23.00	32.75	.11	.004

As all dependent variables (levels of immersion for each stage of immersion) are not normally distributed in the groups of respondents who looked for/asked for information on how to improve their Cyber Me before its creation, and those who did not, the Mann-Whitney U test was used to examine whether there are differences in levels of immersion between respondents who looked for/asked for information on how to improve their Cyber Me before its creation, and those who did not. The results are presented in Table 41.

Table 41

Differences in levels of immersion between respondents who looked for/asked for information on how to improve their Cyber Me before its creation, and those who did not

Stage of immersion	Prior to the creation of my Cyber Me, I looked for/asked for some information how to do it better	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Engagement	No	101.89	4907.00	-3.04	.002
	Yes	128.32			
Engrossment	No	97.20	4329.00	-4.20	.000
	Yes	133.88			
Total immersion	No	96.34	4223.50	-4.41	.000
	Yes	134.89			

As shown in Table 41, there are statistically significant differences in the levels of engagement, engrossment, and total immersion depending on social interaction aimed to search for information related to the creation of Cyber Me. Respondents who looked for/asked for information on how to improve their Cyber Me before its creation, exhibit a higher level of engagement compared to those who did not ($z = -3.04$, $p < .01$), a higher level of engrossment compared to those who did not ($z = -4.20$, $p = .000$), and a higher level of total immersion compared to those who did not ($z = -4.41$, $p = .000$).

The level of immersion depending on the significance users place on social interaction

In order to assess whether there are differences in the level of immersion depending on the significance users place on social interaction, the level of immersion was compared between respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, and for whom it is not important.

At the first stage of data processing, descriptive statistics were calculated for groups of respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, and for whom it is not important, and it was examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed, using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 42.

Table 42

Descriptive statistics and the results of the examination of normal distribution for levels of immersion in a group of respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment ($N_1 = 182$) and in a group of respondents for whom it is not important ($N_2 = 45$)

It is important for me how other users perceive characteristics of my Cyber Me in the digital environment	Stage of immersion	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q</i> ₁	<i>Q</i> ₃	Test Statistic	<i>p</i>
No	Engagement	18.53	18.00	16.00	3.05	.21	-.53	16.00	20.50	.13	.08
	Engrossment	17.80	17.00	14.00	5.30	-.05	-.39	14.00	23.00	.12	.09
	Total immersion	24.47	25.00	16.00	9.14	-.02	-1.17	16.00	35.00	.14	.02
Yes	Engagement	20.26	20.00	20.00	3.13	-.55	.15	19.00	22.00	.11	.000
	Engrossment	17.34	18.00	18.00	4.99	-.02	-.38	14.00	21.00	.07	.05

As the dependent variable 'total immersion' is not normally distributed in the group of respondents for whom it is not important how other users perceive characteristics of Cyber Me, and all dependent variables (levels of immersion for each stage of immersion) are not normally distributed in the group of respondents for whom it is important, the Mann-Whitney U test was used to examine whether there are differences in levels of immersion between respondents for whom it is important how other users perceive characteristics of Cyber Me, and for whom it is not important. The results are presented in Table 43.

Table 43

Differences in levels of immersion between respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment and for whom it is not important

Stage of immersion	It is important for me how other users perceive characteristics of my Cyber Me in the digital environment	Mean rank	U	z	p
Engagement	No	83.47	2721.00	-3.50	.000
	Yes	121.55			
Engrossment	No	118.21	3905.50	-.48	.63
	Yes	112.96			
Total immersion	No	107.00	3780.00	-.80	.42
	Yes	115.73			

As shown in Table 43, there is a statistically significant difference in the level of engagement, depending on the significance users place on social interaction. Respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, exhibit a higher level of engagement compared to those for whom it is not important ($z = -3.50$, $p = .000$). There are no differences in levels of engrossment ($z = -.48$, $p > .05$), and total immersion ($z = -.80$, $p > .05$) between respondents for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, and for whom it is not important.

The level of immersion depending on ongoing communication with other users

In order to assess whether there are differences in the level of immersion depending on ongoing communication with other users, the level of immersion was compared between respondents who actively communicate with other users, and who do not actively communicate.

At the first stage of data processing, descriptive statistics were calculated for groups of respondents who actively communicate with other users, and who do not actively communicate, and it was examined whether the dependent variables (levels of immersion for each stage of immersion) are normally distributed, using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 44.

Table 44

Descriptive statistics and the results of the examination of normal distribution for levels of immersion in a group of respondents who actively communicate with other users ($N_1 = 185$) and in a group of respondents who do not actively communicate ($N_2 = 42$)

I actively communicate	Stage of immersion	Descriptive statistics	Kolmogorov-Smirnov test
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with other users		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
No	Engagement	18.07	18.00	18.00	3.13	-.30	.07	16.00	20.25	.11	.20
	Engrossment	17.60	18.00	17.00	5.22	-.32	-.10	14.00	22.00	.07	.20
	Total immersion	22.48	22.00	22.00	7.30	-.06	-.71	17.50	29.00	.08	.20
Yes	Engagement	20.34	20.00	20.00	3.05	-.41	-.30	19.00	23.00	.11	.000
	Engrossment	17.39	18.00	18.00	5.02	.05	-.43	14.00	21.00	.07	.019
	Total immersion	26.14	27.00	32.00	7.86	-.30	-.90	20.00	32.00	.11	.000

As in one of the compared groups, namely, in the group of respondents who actively communicate with other users all dependent variables (levels of immersion for each stage of immersion) are not normally distributed, the Mann-Whitney U test was used to examine whether there are differences in levels of immersion between respondents who actively communicate with other users and in a group of respondents who do not actively communicate. The results are presented in Table 45.

Table 45

Differences in levels of immersion between respondents who actively communicate with other users and who do not actively communicate

Stage of immersion	I actively communicate with other users	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Engagement	No	76.77	2321.50	-4.09	.000
	Yes	122.45			
Engrossment	No	117.85	3723.50	-.42	.67
	Yes	113.13			
Total immersion	No	88.73	2823.50	-2.77	.006
	Yes	119.74			

As shown in Table 45, there is a statistically significant difference in the level of engagement, depending on ongoing communication with other users. Respondents who actively communicate with other users, exhibit a higher level of engagement compared to those who do not actively communicate ($z = -4.09$, $p = .000$). There is also a statistically significant difference in the level of total immersion, depending ongoing communication with other users. Respondents who actively communicate with other users, exhibit a higher level of total immersion compared to those who do not actively communicate ($z = -2.77$, $p < .001$). However, there are no differences in the levels of engrossment between respondents who actively communicate with other users and who do not actively communicate ($z = -.42$, $p > .05$).

Regarding the fifth hypothesis, which posits that social interaction increases the level of immersion, the following findings were made.

(1) There are differences in the levels of engagement, engrossment, and total immersion depending on social interaction aimed to search for information related to the creation of Cyber Me. Participants of the research who looked for/asked for information on how to improve their Cyber Me before its creation, exhibit higher levels of engagement, engrossment, and total immersion compared to those who did not look for/ask for such information.

This finding supports the theoretical perspective that immersion is shaped by both cognitive and behavioral engagement with digital environments. Prior research has demonstrated that social interaction fosters a sense of presence and belonging, which are essential components of immersion, as users experience increased realism and authenticity in digital space. Studies suggest that when users actively seek information before digital identity

creation, they develop stronger expectations regarding their self-representation and interactions, which contributes to a higher level of sustained immersion (Gonzales, 2008).

Additionally, social feedback mechanisms play a key role in reinforcing the user's psychological involvement, leading to greater engagement with the digital environment. The presence of social cues and interactive experiences enhances immersion, making digital interactions more compelling and engaging (Bailenson et al., 2003). The current findings align with this perspective, as users who proactively optimize their digital identity before engaging with the digital environment are more likely to experience a deeper and more structured immersion process.

These results correspond with findings from Hypothesis 1, which demonstrated that digital identity customization is associated with social interaction patterns. The relationship between information-seeking behavior and immersion suggests that users who actively explore ways to enhance their self-representation expect a higher level of engagement and enjoyment, reinforcing a stronger psychological connection to the digital environment.

(2) There is a difference in the level of engagement, depending on the significance users place on social interaction. Participants of the research for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, exhibit a higher level of engagement compared to those for whom it is not important. However, there are no differences in levels of engrossment and total immersion between participants of the research for whom it is important how other users perceive characteristics of Cyber Me in the digital environment, and for whom it is not important.

The second result reveals that users who place high importance on how others perceive their Cyber Me exhibit a higher level of engagement compared to those for whom social interaction plays a less significant role. However, this influence does not extend to engrossment and total immersion.

Theoretical models of digital self-representation suggest that social interaction serves as an external regulatory factor in early immersion stages. At the engagement level, users rely on external feedback to evaluate their self-representation, shaping their initial expectations and interactions within the digital environment (Teng, 2010). Since engagement represents the lowest level of immersion, where users remain partially aware of their physical surroundings, the significance placed on social interaction may serve as an entry mechanism into deeper immersion.

However, once immersion deepens, the role of external validation diminishes, as the user's focus shifts from external perception to direct interaction with the digital environment. Prior studies suggest that as users transition from engagement to engrossment, their experience becomes increasingly shaped by internalized interaction dynamics rather than social cues (Bailenson et al., 2003).

These results align with Hypothesis 2, which found that users who prioritize social interaction tend to construct selective self-representations that closely reflect their real self. The findings for Hypothesis 5 extend this by showing that social validation is an important factor in early immersion but does not dictate the transition to higher immersion levels. This suggests that users enter the digital environment with a need for external confirmation, but as immersion deepens, their experience becomes increasingly driven by direct interaction with the digital environment itself.

(3) There are differences in the levels of engagement and total immersion, depending on ongoing communication with other users. Respondents who actively communicate with other users, exhibit higher levels of engagement and total immersion compared to those who

do not actively communicate. However, there are no differences in the levels of engrossment between respondents who actively communicate with other users and who do not actively communicate.

This pattern suggests that social interaction plays distinct roles at different stages of immersion. At the engagement level, social interaction provides a learning mechanism, where users rely on social cues and feedback to navigate the digital environment. However, at the engrossment level, immersion becomes more experience-driven, reducing the influence of external factors such as social validation (Teng, 2010). Finally, at the total immersion level, social interaction is no longer perceived as an external influence but instead becomes an integrated part of the digital experience.

The absence of a significant relationship between engrossment and social interaction supports the idea that this stage functions as a transitional phase, where users move from socially guided engagement to deep psychological absorption in the digital world. This is consistent with findings from Hypothesis 3, which demonstrated that ongoing digital identity adjustments occur independently of selective self-representation type, implying that external influences such as social interaction become less relevant as immersion deepens.

The results support theoretical perspectives on identity fusion within digital environments, which suggest that total immersion occurs when users perceive social interaction as an inherent element of the digital world rather than an external factor (Gonzales, 2008). This aligns with prior research on self-representation and digital identity regulation, which highlights that at engagement, social presence helps users establish themselves in digital environments, whereas at total immersion, it is seamlessly embedded into the digital experience.

H6: Increasing personalization (using original characteristics) of digital identity increases the level of immersion

As a measure of personalization (using original characteristics) of digital identity the type of selective self-representation was used. As it was already shown earlier, there are four types of selective self-representation in digital environments: (1) precise copy of self, (2) improved copy of self, (3) modified version of self, and (4) alternative version of self. Those persons, who choose self-representation as a precise copy of self, use original characteristics of their real identity. Thus, they demonstrate a higher level of increasing personalization of digital identity comparing with those people who use an improved copy of self, or even modified and alternative versions of self.

The level of immersion was measured using the Extended Game Immersion Questionnaire (E-GIQ), which includes three subscales: Engagement, Engrossment, and Total Immersion.

Respectively, in accordance with the sixth hypothesis, differences in the level of immersion were expected among individuals with different types of selective self-representation, with those whose self-representation in the digital environment is a precise copy of self-exhibiting the highest levels of Engagement, Engrossment, and Total Immersion.

Thus, to test the sixth hypothesis, which states that increasing personalization (using original characteristics) of digital identity increases the level of immersion, differences in the E-GIQ results were analyzed among individuals with different types of selective self-representation of digital identity.

The results showed that 67 respondents have self-representation in digital environments as a precise copy of self, 66 respondents – as an improved version of self, 44 respondents – as a modified version of self, and 50 respondents – as an alternative version of self.

A multivariate analysis of variance (MANOVA) was conducted to assess if there were differences between four groups of respondents with different types of selective self-representation on a linear combination of level of engagement, level of engrossment, and level of total immersion. [The assumptions of independence of observations and homogeneity of variance/covariance were checked and met. Box's test shows that there are no significant differences between the covariance matrices across four group of respondents with different types of selective self-representation ($F(18, 137062.96) = .99, p > .05$). There are no statistically significant differences of variances for each dependent variable for all groups (dependent variable 'engagement' ($F(3, 223) = .38, p > .05$), dependent variable 'engrossment' ($F(3, 223) = 1.17, p > .05$), and dependent variable 'total immersion' ($F(3, 223) = 2.50, p > .05$). Bivariate scatterplots were checked for multivariate normality.]

A significant difference was found, Wilks' $\Lambda = .853, F(221, 538) = 4.02, p = .000$, multivariate $\eta^2 = .05$. Descriptive statistics for scales of the E-GIQ as a function of type of selective self-representation in the digital environment, and effects of the type of selective self-representation on the E-GIQ scores are displayed in Table 46.

Table 46

Descriptive statistics for scales of the E-GIQ as a function of type of selective self-representation in the digital environment, and effects of the type of selective self-representation on the E-GIQ scores

Scales of the E-GIQ	Type of selective self-representation								$F(3,223)$	η^2
	Precise copy of self		Improved copy of self		Modified version of self		Alternative version of self			
	M	SD	M	SD	M	SD	M	SD		
Engagement	19.16	3.18	20.39	3.27	20.80	2.79	19.52	3.18	3.28*	.04
Engrossment	15.18	4.65	18.61	4.23	19.23	5.11	17.32	5.48	8.22***	.10
Total Immersion	22.60	8.25	27.08	6.53	28.91	6.87	24.12	8.29	7.84***	.10

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Follow-up univariate ANOVAs indicated that there were statistically significant differences between respondents with different types of selective self-representation in the digital environment in the level of engagement ($F(3, 223) = 3.28, p < .05$), in the level of engrossment ($F(3, 223) = 8.22, p < .001$), and in the level total immersion ($F(3, 223) = 7.84, p < .001$).

Post hoc tests using Tukey HSD were then performed for pairwise comparisons. It was found that respondents with self-representation as a precise copy of self, had statistically significantly lower scores:

- for Engagement than respondents with self-representation as a modified version of self ($p < .05$),
- for Engrossment than respondents with self-representation as an improved copy of self ($p < .001$), and respondents with self-representation as a modified version of self ($p < .001$),
- for Total Immersion than respondents with self-representation as an improved copy of self ($p < .01$), and respondents with self-representation as a modified version of self ($p < .001$).

Regarding the sixth hypothesis, which posits that increasing personalization (using original characteristics) of digital identity increases the level of immersion, the following findings were made.

Participants of the research with self-representation as a precise copy of self in the digital environment have a lower level of engagement than respondents with self-representation as a modified version of self, as well as lower levels of engrossment and total immersion than respondents with self-representation as an improved copy and as a modified version of self. These findings allow to conclude that increasing personalization (using original characteristics) of digital identity decreases the level of immersion.

This result challenges theoretical perspectives suggesting that a stronger resemblance between digital identity and its material counterpart enhances immersion. While prior research has emphasized that personalization strengthens authenticity and psychological connection to the digital environment (Teng, 2010), the current findings suggest that precise self-representation may impose material-world constraints, limiting flexibility in digital interactions. This aligns with theories indicating that users modify their digital identity to optimize interaction rather than merely for aesthetic reasons (Waltemate et al., 2018).

Digital environments allow users to interact with elements of the digital environment in ways unrestricted by material-world constraints. The findings suggest that users who create a precise copy of themselves may inadvertently transfer these constraints into the digital environment, restricting their ability to engage dynamically. In contrast, those who modify or augment their digital representation enhance their adaptability, ensuring that their self-representation aligns with the interaction affordances of the digital environment. This supports the notion that immersion is shaped not only by realism but also by the extent to which self-representation facilitates engagement (Bailenson et al., 2003).

Another key factor in immersion in the digital environment is the ability to reshape and redefine one's experience beyond predefined structures. Users who modify their digital identity engage in exploratory and imaginative processes, fostering deeper immersion by stepping beyond material-world constraints. This process activates creative cognitive mechanisms, increasing perceived realism and authenticity of digital interactions. Research suggests that digital identity functions not only as a representation of self but also as a tool for navigating and reshaping digital experiences (Teng, 2010).

By facilitating exploratory and experimental engagement, modification and augmentation of digital identity enhance both cognitive absorption and emotional involvement, contributing to higher engrossment and total immersion. These findings support prior research indicating that users who adjust their self-representation strategically report deeper immersion than those maintaining an exact digital replica of themselves (Waltemate et al., 2018).

These results suggest that immersion is not merely dependent on identity realism but is instead shaped by the flexibility and adaptability of digital self-representation. While precise self-representation may reinforce identity continuity, it can limit immersive potential by maintaining constraints from the material world. In contrast, modifying or augmenting digital identity fosters a more dynamic and engaging digital experience, enhancing interaction, creativity, and psychological absorption. These findings highlight that immersion is a socially and psychologically mediated process, where identity transformation – rather than strict realism – facilitates deeper engagement in the digital environment.

H7: The duration of interaction with digital identity will be positively associated with the level of immersion.

In order to test the seventh hypothesis, which states that the duration of interaction with digital identity will be positively associated with the level of immersion, correlation analysis was performed.

The analysis aimed to assess whether an association exists between the duration of interaction (measured in hours per week spent online) and the level of immersion, as measured by the Extended Game Immersion Questionnaire (E-GIQ), specifically across the three subscales: Engagement, Engrossment, and Total Immersion.

At the first stage of data processing, descriptive statistics were calculated for duration of interaction (hours per week users spend online) and the level of immersion (engagement, engrossment, and total immersion), and it was examined whether the variables are normally distributed, using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 47.

Table 47

Descriptive statistics and the results of the examination of normal distribution for duration of interaction (hours per week users spend online) and the level of immersion (E-GIQ) in the whole sample of respondents (N = 227)

Variable	Descriptive statistics								Kolmogorov-Smirnov test	
	<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
Duration of interaction	37.96	35.00	40.00	19.52	1.16	2.10	22.00	49.00	.12	.000
Level of immersion (E-GIQ)										
Engagement	19.92	20.00	20.00	3.18	-.39	-.24	18.00	22.00	.10	.000
Engrossment	17.43	18.00	18.00	5.05	-.02	-.40	14.00	21.00	.06	.025
Total immersion	25.46	27.00	32.00	7.87	-.23	-.91	19.00	32.00	.10	.000

As all variables are not normally distributed, Spearman's rank correlation coefficient was used to examine whether there are correlations between duration of interaction and Engagement, Engrossment, and Total immersion.

It was found that there is no statistically significant correlation between duration of interaction and Engagement ($r_s = .04$, $p > .05$). However, there is a statistically significant positive correlation between duration of interaction and Engrossment ($r_s = .14$, $p < .05$) and a statistically significant positive correlation between duration of interaction and Total immersion ($r_s = .37$, $p < .001$).

Regarding the seventh hypothesis, which posits that the duration of interaction with digital identity will be positively associated with the level of immersion, the following findings were made.

(1) Duration of interaction with digital identity is not related to the level of engagement.

(2) Duration of interaction with digital identity is positively associated with the level of engrossment. Those participants of the research, who spend more time online, have a higher level of engrossment, but those people who spend less time online, have a lower level of engrossment.

(3) Duration of interaction with digital identity is positively associated with the level of total immersion. Those participants of the research, who spend more time online, have a higher level of total immersion, but those people who spend less time online, have a lower level of total immersion.

These results indicate that immersion influences how users perceive and experience interaction with elements of the digital environment, rather than the mere duration of interaction being a determinant of immersion.

A possible explanation for this pattern lies in the transformation of time perception as users progress through different stages of immersion. Theories on immersion and Flow Theory

(Nakamura & Csikszentmihalyi, 2014) suggest that individuals in a deep immersive state experience distorted time perception, where chronological time (seconds, minutes, hours) becomes less relevant, and subjective time – governed by cognitive and emotional absorption – takes precedence. This phenomenon suggests that immersion itself transforms the user's temporal experience, making prolonged interaction with digital identity a byproduct rather than a cause of immersion.

Moreover, immersion is directly linked to the perception of interaction with elements of the digital environment rather than to the passage of time itself. As users become more immersed, their perception of time shifts from being measured in chronological units to being assessed in subjective terms, such as task completion, goal achievement, or meaningful engagement within the digital space. This transformation in time perception criteria explains why users in deeper states of immersion may not consciously regulate the duration of their digital interactions but instead navigate digital environments based on their experiential flow and interaction cycles.

At the engagement stage, users remain aware of external time constraints and regulate their interaction with the digital environment accordingly. Since engagement is characterized by intentional and controlled interaction with elements of the digital environment, users at this stage are more likely to disengage when external responsibilities or distractions arise. The absence of a relationship between time spent online and engagement suggests that users at this level do not yet experience a cognitive or emotional shift that would alter their perception of time.

At the engrossment stage, users begin to experience emotional absorption in the digital environment, shifting their focus from external reality to the digital space. A key psychological factor distinguishing engrossment from engagement is attentional narrowing, where external stimuli lose significance, and users allocate more cognitive resources to digital interactions (Teng, 2010). This process is accompanied by a reduced awareness of chronological time, making users more likely to prolong their interaction with digital identity without consciously regulating their time spent online. As a result, the more time users spend interacting through their digital identity, the stronger their engrossment becomes, reinforcing a feedback loop of prolonged immersion. At this stage, users begin to evaluate time not in chronological units but in terms of perceived progress or task completion within the digital experience.

At the total immersion stage, the user's experience is characterized by deep psychological involvement, where the digital world becomes the primary frame of reference. Users in this state may experience a complete shift from chronological time to subjective time perception, where interaction is structured around achievement-based or experience-driven time markers rather than clock time. This shift can be explained by the fusion of self and digital identity, where users no longer track time externally but instead perceive its passage through the depth and significance of their digital experiences. In total immersion, users become fully absorbed in the digital experience, experiencing time distortion as a natural consequence of their deep involvement.

These results suggest that immersion is not simply a function of time spent online but rather a psychological transformation in how time is perceived. While engagement remains tethered to external reality, engrossment marks the point where subjective time perception starts overriding chronological time constraints. In total immersion, users evaluate time in the digital environment based on interaction significance, goal completion, and experience intensity, rather than through traditional temporal units. This supports the idea that immersion is not

passively induced by prolonged interaction but is instead an active cognitive and emotional state that reshapes temporal perception and user experience in digital environments.

H8: The process of using digital identity (customization and control) increases the level of self-presence

To test H8, which posits that the process of using digital identity (customization and control) increases the level of self-presence, two measures of digital identity use were applied:

1) “I continue to adjust my Cyber Me from time to time – yes/no” (a measure of ongoing adjustments to digital identity – customization).

2) “I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it – yes/no (a measure of use of platform capabilities to control digital identity – control).

The Cross-Media Self-Presence Questionnaire (CM-SPQ) (Dombrovskis, Ļevina, Ruža, 2024) was used to assess the level of self-presence (body-level, emotion-level, and identity-level self-presence).

If the process of using digital identity (customization and control) increases the level of self-presence then there should be differences in the levels of self-presence (body-level, emotion-level, and identity-level self-presence) depending on individual indicators of the process of using digital identity (customization and control) and on the combination of these two indicators. Thus, the analysis aimed to assess whether there are differences in the levels of self-presence (body-level, emotion-level, and identity-level self-presence) depending on individual indicators of the process of using digital identity (customization and control) and on the combination of these two indicators. The obtained results of the analysis are presented below.

The results of the assessment of differences in the level of self-presence depending on individual indicators of the process of using digital identity

Firstly, it was examined whether there were differences in three levels of self-presence – body-level, emotion-level, and identity-level - based on each measure of the process of using digital identity separately. This included customization of DI (“I continue to adjust my Cyber Me from time to time – yes/no”) and control of DI (“I use all opportunities of the platform (limitations) to control the actions of my Cyber Me and the impact other users may have on it – yes/no”).

The levels of self-presence were then compared between:

- 1) respondents who continue to adjust their Cyber Me from time to time and those who do not, and
- 2) respondents who use all opportunities of the platform (limitations) to control their Cyber Me and those who do not.

Sub-hypothesis H8a: The process of customization of digital identity increases the level of self-presence

As shown earlier, 185 respondents continue to adjust their Cyber Me from time to time, while 42 respondents do not continue to adjust.

Self-presence is a multidimensional construct, which includes body-level, emotion level, and identity level self-presence. Nevertheless, in order to compare the level of self-presence in two groups of respondents, namely, of those who continue to adjust their Cyber Me from time to time, and those who do not continue to adjust, application of multivariate analysis

of variance is not appropriate as the size of the subgroups of respondents differs, and the assumption of homogeneity of variance/covariance is violated [Box's test shows that there are significant differences between the covariance matrices across two subgroup of respondents ($F(6, 31775.04) = 3.30, p < .05$), and the assumption of homogeneity of variances is violated for 'identity-level self-presence' ($F(1, 225) = 7.43, p < .01$)]. Therefore, the analysis aimed to assess whether there are differences in the body-level, emotion-level, and identity-level of self-presence separately.

Firstly, descriptive statistics were calculated, and it was examined whether the dependent variables (body-level, emotion-level, and identity-level self-presence) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 48.

Table 48

Descriptive statistics and the results of the examination of normal distribution for levels of self-presence in a group of respondents who continue to adjust their Cyber Me from time to time ($N_1 = 185$) and those who do not ($N_2 = 42$)

I continue to adjust my Cyber Me from time to time	Level of self-presence	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
No	Body-level	10.81	9.00	5.00	5.19	.55	-1.04	6.00	15.25	.18	.001
	Emotion-level	9.40	10.00	10.00	3.14	-.25	-.40	7.00	11.25	.10	.200
	Identity-level	16.40	17.00	20.00	5.78	-.29	-.77	12.00	20.25	.10	.200
Yes	Body-level	12.98	13.00	5.00	5.59	.33	-.93	8.00	17.00	.11	.000
	Emotion-level	9.45	10.00	9.00	3.02	-.13	-.73	7.00	12.00	.10	.000
	Identity-level	18.02	19.00	20.00	4.47	-.87	.59	15.00	20.50	.15	.000

As the dependent variable 'body-level self-presence' is not normally distributed in the group of respondents who do not continue to adjust their Cyber Me from time to time, and all dependent variables ('body-level', 'emotion-level', and 'identity-level' self-presence) are not normally distributed in the group of respondents who continue to adjust their Cyber Me from time to time, the Mann-Whitney U test was used to examine whether there are differences in levels of self-presence between respondents who continue to adjust their Cyber Me from time to time and those who do not. The results are presented in Table 49.

Table 49

Differences in levels of self-presence between respondents who continue to adjust their Cyber Me from time to time and those who do not

Level of self-presence	I continue to adjust my Cyber Me from time to time	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Body-level	No	92.65	2988.50	-2.34	.02
	Yes	118.85			
Emotion-level	No	113.88	3880.00	-.01	.99
	Yes	114.03			
Identity-level	No	98.98	3254.00	-1.65	.10
	Yes	117.41			

As shown in Table 49, there is a statistically significant difference in body-level self-presence. Respondents who continue to adjust their Cyber Me from time to time exhibit a higher

body-level of self-presence compared to those who do not ($z = -2.34, p < .05$). There are no significant differences in emotion-level self-presence ($z = -.01, p > .05$) and identity-level self-presence ($z = -1.65, p > .05$).

Sub-hypothesis H8b: The process of control of digital identity increases the level of self-presence

As shown earlier, 165 respondents use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact, which other users may have on it, while 62 respondents do not use all opportunities of the platform (limitations).

Self-presence is a multidimensional construct, which includes body-level, emotion level, and identity level self-presence. Nevertheless, in order to compare the level of self-presence in two groups of respondents, namely, of those who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact, which other users may have on it, and those who do not, application of multivariate analysis of variance is not appropriate as the size of the subgroups of respondents differs, and the assumption of homogeneity of variance/covariance is violated [Box's test shows that there are significant differences between the covariance matrices across two subgroup of respondents ($F(6, 84447.09) = 3.29, p < .01$), and the assumption of homogeneity of variances is violated for 'identity-level self-presence ($F(1, 225) = 10.12, p < .01$)]. Therefore, the analysis aimed to assess whether there are differences in the body-level, emotion-level, and identity-level of self-presence separately.

Firstly, descriptive statistics were calculated, and it was examined whether the dependent variables (body-level, emotion-level, and identity-level self-presence) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 50.

Table 50

Descriptive statistics and the results of the examination of normal distribution for levels of self-presence in a group of respondents who use all platform opportunities (limitations) to control the actions of their Cyber (N₁ = 165) Me and those who do not (N₂ = 62)

I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	Level of self-presence	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
No	Body-level	10.08	8.00	5.00	5.17	1.11	.61	6.00	13.25	.19	.000
	Emotion-level	8.61	9.00	6.00	3.21	.17	-.79	6.00	11.00	.15	.002
	Identity-level	16.35	17.50	20.00	5.71	-.48	-.57	12.00	20.00	.11	.044
Yes	Body-level	13.52	13.00	20.00	5.44	.18	-1.02	9.00	18/00	.10	.001
	Emotion-level	9.75	10.00	12.00	2.92	-.24	-.52	8.00	12.00	.11	.000
	Identity-level	18.23	19.00	20.00	4.27	-.75	.35	15.00	21.00	.15	.000

As all dependent variables ('body-level', 'emotion-level', and 'identity-level' self-presence) are not normally distributed in the groups of respondents who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact, which other users may have on it, and those who do not, the Mann-Whitney U test was used to examine whether there are differences in levels of self-presence between these two groups of respondents. The results are presented in Table 51.

Table 51

Differences in levels of self-presence between respondents who use all platform opportunities (limitations) to control the actions of their Cyber Me and those who do not

Level of self-presence	I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it	Mean rank	<i>U</i>	<i>z</i>	<i>p</i>
Body-level	No	82.52	3163.50	-4.44	.000
	Yes	125.83			
Emotion-level	No	96.40	4024.00	-2.49	.013
	Yes	120.61			
Identity-level	No	98.85	4176.00	-2.14	.032
	Yes	119.69			

As shown in Table 51, there is a statistically significant difference in body-level, emotion-level, and identity-level self-presence. Respondents who use all platform opportunities (limitations) to control the actions of their Cyber Me, exhibit a higher body-level of self-presence compared to those who do not ($z = -4.44$, $p < .001$), a higher emotion-level of self-presence compared to those who do not ($z = -2.49$, $p < .05$), and a higher identity-level of self-presence compared to those who do not ($z = -2.14$, $p < .05$).

The results of the assessment of differences in the level of self-presence depending on the combination of indicators (customization and control) of the process of using digital identity

It was examined whether there are differences in the levels of self-presence – body-level, emotion-level, and identity-level – depending on the combination of two measures of the process of using digital identity, i.e., customization of digital identity (“I continue to adjust my Cyber Me from time to time – yes/no”) and control of digital identity (“I use all opportunities of the platform (limitations) to control the actions of my Cyber Me as well as the impact other users may have on it – yes/no”). The level of self-presence was compared across four groups of respondents:

1. **Group 1** ($N_1 = 142$) - respondents who continue to adjust their Cyber Me from time to time and who use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;
2. **Group 2** ($N_2 = 43$) - respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;
3. **Group 3** ($N_3 = 23$) - respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it;

4. **Group 4** ($N_4 = 19$) - respondents who neither continue to adjust their Cyber Me from time to time nor use all opportunities of the platform (limitations) to control the actions of their Cyber Me and the impact other users may have on it.

As shown earlier, self-presence is a multidimensional construct, which includes body-level, emotion level, and identity level self-presence. Nevertheless, in order to compare the level of self-presence in four groups described above, application of multivariate analysis of variance is not appropriate as the size of the subgroups of respondents differs, and the assumption of homogeneity of variance/covariance is violated [Box's test shows that there are significant differences between the covariance matrices across four subgroups of respondents ($F(18, 18573.43) = 1.96, p < .01$), and the assumption of homogeneity of variances is violated for 'identity-level self-presence' ($F(3, 223) = 4.72, p < .01$)]. Therefore, the analysis aimed to assess whether there are differences in the body-level, emotion-level, and identity-level of self-presence separately.

Firstly, descriptive statistics were calculated, and it was examined whether the dependent variables (body-level, emotion-level, and identity-level self-presence) are normally distributed for each group using the one-sample Kolmogorov-Smirnov test. The results are presented in Table 52.

Table 52

Descriptive statistics and results of the check of the assumption of normal distribution for levels of self-presence in groups of respondents based on the combination of two indicators (customization and control) of the process of using digital identity

Group	Level of self-presence	Descriptive statistics								Kolmogorov-Smirnov test	
		<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
Group 1 ($N_1 = 142$) Customization and control of DI	Body-level	13.65	13.00	20.00	5.45	.19	-.97	9.00	18.00	.10	.003
	Emotion-level	9.73	10.00	12.00	2.93	-.25	-.55	8.00	12.00	.11	.000
	Identity-level	18.39	20.00	20.00	4.12	-.86	.70	15.00	21.00	.17	.000
Group 2 ($N_2 = 43$) Customization of DI, no control	Body-level	10.77	9.00	5.00	5.55	.99	.22	6.00	16.00	.18	.001
	Emotion-level	8.51	9.00	6.00	3.17	.33	-.75	6.00	11.00	.16	.009
	Identity-level	16.81	18.00	20.00	5.34	-.63	-.09	14.00	20.00	.12	.103
Group 3 ($N_3 = 23$) No customization, control of DI	Body-level	12.70	12.00	8.00	5.44	.12	-1.48	8.00	18.00	.14	.200
	Emotion-level	9.87	10.00	10.00	2.94	-.22	-.11	8.00	12.00	.09	.200
	Identity-level	17.30	18.00	25.00	5.09	-.21	-.65	13.00	21.00	.09	.200
Group 4 ($N_4 = 19$) No customization, no control of DI	Body-level	8.53	7.00	5.00	3.89	.94	-.40	5.00	12.00	.24	.006
	Emotion-level	8.84	9.00	11.00	3.35	-.17	-.59	6.00	11.00	.12	.200
	Identity-level	15.32	16.00	20.00	6.49	-.15	-1.10	11.00	20.00	.14	.200

As shown in Table 52, in Group 1, the dependent variables (body-level, emotion-level, and identity-level self-presence) are not normally distributed. In Group 2, the dependent variables (body-level and emotion-level self-presence) are not normally distributed. In Group 4, the dependent variable 'body-level self-presence' is not normally distributed. Therefore, the Kruskal-Wallis H test was used to compare the four groups and check for differences in the levels of self-presence. The results indicated statistically significant differences in body-level

self-presence ($\chi^2(3) = 22.47, p < .001$). No statistically significant differences were found in emotion-level self-presence ($\chi^2(3) = 6.50, p > .05$) and in identity-level self-presence ($\chi^2(3) = 6.22, p > .05$).

Additionally, it was examined between which groups statistically significant differences in body-level self-presence exist. Each group was compared with all other groups. Since a dependent variable (body-level self-presence) is not normally distributed in Group 1, Group 2, and Group 4, comparisons between all groups were conducted using the Mann-Whitney U test. The results are presented in Table 53.

Table 53

Differences in body-level self-presence between groups of respondents with different combination of of two indicators (customization and control) of the process of using digital identity

Group	Mean rank	U	z	p
Group 1 ($N_1 = 142$)	99.91	2027.00	-3.20	.001
Group 2 ($N_2 = 43$)	70.19			
Group 1 ($N_1 = 142$)	84.14	1471.50	-.76	.446
Group 3 ($N_3 = 23$)	75.98			
Group 1 ($N_1 = 142$)	86.28	599.00	-3.94	.000
Group 4 ($N_4 = 19$)	41.53			
Group 2 ($N_2 = 43$)	30.80	378.50	-1.57	.117
Group 3 ($N_3 = 23$)	38.54			
Group 2 ($N_2 = 43$)	33.85	307.50	-1.55	.120
Group 4 ($N_4 = 19$)	26.18			
Group 3 ($N_3 = 23$)	26.04	114.00	-2.66	.008
Group 4 ($N_4 = 19$)	16.00			

As seen in Table 53, there are statistically significant differences in body-level self-presence between Group 1 and Group 2 and between Group 1 and Group 4 as well as between Group 3 and Group 4. Specifically:

- The body-level of self-presence is statistically significantly higher in Group 1 (respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) compared to Group 2 (respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -3.20, p < .001$).
- The body-level of self-presence is statistically significantly higher in Group 1 (respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) compared to Group 4 (respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -3.94, p < .001$).
- The body-level of self-presence is statistically significantly higher in Group 3 (respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) compared to Group 4 (respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -2.66, p < .01$).

There are no difference in body-level self-presence between Group 1 and Group 3, between Group 2 and Group 3 as well as between Group 2 and Group 4. Specifically:

- There is no difference in body-level self-presence between Group 1 (respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) and Group 3 (respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform to control the actions of their Cyber Me) ($z = -.76, p > .05$).
- There is no difference in body-level self-presence between Group 2 (respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) and Group 3 (respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform to control the actions of their Cyber Me) ($z = -1.57, p > .05$).
- There is no difference in body-level self-presence between Group 2 (respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me, as well as the impact other users may have on it) and Group 4 (respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me) ($z = -1.55, p > .05$).

Regarding the eighth hypothesis, which posits that the process of using digital identity (customization and control) increases the level of self-presence, the following findings were made.

(1) Regarding the sub-hypothesis H8a, according to which the process of customization of digital identity increases the level of self-presence, it was found that participants of the research who continue to adjust their Cyber Me from time to time, exhibit a higher body-level of self-presence compared to those who do not. There are no significant differences in emotion-level and identity-level self-presence between the groups of respondents who continue to adjust their Cyber Me from time to time and who do not continue

This result supports the notion that body-level self-presence serves as the fundamental and dominant dimension of digital self-representation. Since customization primarily influences the visual and structural aspects of digital identity, it is logical that its most pronounced effect is observed at the bodily level rather than on emotional or identity-based dimensions.

Previous research (Gonçalves et al., 2022; Zhao et al., 2023) suggests that modifying digital self-representation enhances the sense of embodiment by increasing the perceived alignment between digital identity and the user's real-world bodily awareness. However, the current findings indicate that while customization strengthens body-level self-presence, it does not necessarily translate into a deeper emotional or identity-based connection with the digital environment. This suggests that self-presence is a multi-layered construct, in which body-level adaptation does not automatically lead to full psychological integration or identity fusion.

In contrast to prior studies that emphasized emotional resonance and identity reinforcement through customization (Jin, 2011; Li et al., 2022), the findings suggest that users may prioritize customization as a functional or aesthetic adaptation rather than as a means of reinforcing emotional attachment or identity continuity. This highlights a potential distinction between the visual-personification effects of customization and the deeper psychological mechanisms underlying self-presence in the digital environment.

(2) Regarding the sub-hypothesis H8b, according to which the process of control of digital identity increases the level of self-presence, it was found that participants of the research who use all platform opportunities (limitations) to control the actions of their Cyber Me, exhibit higher body-level, emotion-level, and identity-level of self-presence compared to those who do not.

This result reinforces the idea that control over digital identity functions as a key psychological mechanism that strengthens self-presence across multiple dimensions. The significant increase in body-level, emotion-level, and identity-level self-presence among those who actively regulate their digital identity's interactions suggests that control extends beyond immediate interaction management, influencing deeper psychological engagement with digital self-representation.

This aligns with prior research (Jin, 2011; Rainey & Jones, 2019), which suggests that self-presence is reinforced when users perceive their digital identity as an extension of their autonomy. Control mechanisms allow users to establish a sense of predictability and coherence in their digital experiences, making their presence in the digital environment feel more stable and psychologically meaningful.

Moreover, security considerations play a fundamental role in this process. Studies by Wu et al. (2023) and Wang & Zeng (2021) indicate that users who exert control over their digital identity are more likely to perceive it as a protected and stable extension of themselves. This perception strengthens the continuity of identity across digital interactions, reinforcing the psychological connection between the user and their digital identity.

The observed pattern also highlights a key difference between customization and control: while customization primarily influences body-level self-presence by modifying external characteristics, control facilitates self-presence at a more comprehensive level, including emotional and identity-based dimensions. This suggests that while users engage with their digital identity visually through customization, psychological embodiment is more strongly reinforced through consistent interaction management and control over external influences.

(3.1) There is significant differences in body-level self-presence depending on the combination of indicators (customization and control) of the process of using digital identity.

This result reinforces the notion that body-level self-presence serves as the foundational component of digital self-representation, with perceived bodily characteristics playing a central role in the user's psychological connection to their digital identity. The observed differences suggest that the way users engage in customization and control of their digital identity directly influences their experience of digital embodiment.

These findings are consistent with prior research (Gonçalves et al., 2022; Zhao, Wang & Wang, 2023), which highlights that body-tracking and visual self-representation are primary determinants of self-presence in immersive digital environments. In particular, the interaction between customization and control appears to shape how users perceive their digital body in relation to their material self.

Additionally, this result supports the argument that modifying and regulating digital identity enhances the user's ability to align digital self-representation with bodily awareness, thereby reinforcing self-presence. This aligns with the work of Li, Ratan & Lwin (2022), who found that higher levels of avatar customization and interaction control contribute to a stronger sense of embodiment.

At the same time, this finding highlights an important distinction: while customization shapes how the digital identity visually represents the user, control defines how it interacts

within the digital environment. The interaction between these two elements suggests that body-level self-presence is not just a product of appearance but is also shaped by behavioral and interactional consistency. This confirms that embodiment in digital environments is not merely a function of visual similarity but also of the user's capacity to regulate and maintain coherence in their digital interactions.

Participants of the research who continue to adjust their Cyber Me from time to time and use all opportunities of the platform to control the actions of their Cyber Me exhibit a higher body-level of self-presence compared to those who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform to control the actions of their Cyber Me, as well as to those who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me.

This result highlights that the combination of customization and control plays a crucial role in reinforcing body-level self-presence. Users experience a stronger sense of embodiment when they actively shape and regulate their digital identity's interactions rather than relying solely on one of these mechanisms.

The finding is consistent with research emphasizing that bodily awareness in digital environments is not solely determined by visual customization but is significantly strengthened when users can control how their digital identity moves and interacts within the environment (Gonçalves et al., 2022; Zhao, Wang & Wang, 2023). Control ensures that users maintain continuity in their digital representation, which reinforces the perception of their digital identity as an extension of the self.

From a theoretical perspective, this supports the notion that self-presence is fundamentally tied to the user's ability to maintain coherence between their digital self-representation and their sense of control over it (Rainey & Jones, 2019). When control mechanisms are present, users experience a heightened sense of bodily ownership, which aligns with embodiment theoris proposed in virtual self-representation studies (Li, Ratan & Lwin, 2022).

This result reinforces the idea that body-level self-presence serves as the primary dimension through which digital self-representation manifests, as it is the most immediate and perceptually salient aspect of digital identity. While customization personalizes the appearance of digital identity, control ensures consistency in its behavior and interaction with the digital environment, thereby making the self-representation more integrated and natural for the user.

Participants of the research who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform (limitations) to control the actions of their Cyber Me, exhibit a higher body-level of self-presence compared to those who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me.

This result highlights that control over digital identity interactions within the digital environment plays a more significant role in shaping body-level self-presence than continuous customization. The ability to regulate digital identity actions enhances the perception of self-presence by reinforcing the user's sense of autonomy within the digital environment.

When users exert control over their digital identity's interactions, they establish a stronger psychological connection to their digital representation, even without frequent modifications. This suggests that body-level self-presence is not solely dependent on visual or structural alignment with the user's expectations but is heavily influenced by the degree of control over its functionality and interactions.

Furthermore, this finding indicates that control can compensate for the lack of customization – users who actively manage their digital identity’s interactions experience a heightened sense of embodiment, even if they do not continuously modify its characteristics. This reinforces the idea that self-presence is not merely a product of self-representation accuracy but also of interaction management within the digital environment.

There is no difference in body-level self-presence between respondents who continue to adjust their Cyber Me from time to time and use all opportunities of the platform (limitations) to control the actions of their Cyber Me, and respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform to control the actions of their Cyber Me).

This finding suggests that control over digital identity interactions serves as the primary mechanism influencing body-level self-presence, while customization plays a secondary role in shaping this dimension of self-presence.

The absence of a significant difference indicates that users who exert control over their digital identity experience a stable and heightened sense of embodiment, regardless of whether they actively modify its characteristics. In other words, the ability to regulate how digital identity interacts within the digital environment establishes a sufficient foundation for body-level self-presence, making continuous customization non-essential for achieving this effect.

This result also reinforces the idea that body-level self-presence is primarily sustained by interaction dynamics rather than visual modifications alone. Users who maintain control over digital identity actions likely perceive their digital identity as a functional extension of themselves, prioritizing autonomy over aesthetic alignment.

While customization may refine self-representation, control solidifies self-presence, ensuring a consistent psychological connection to the digital environment, independent of how frequently users adjust their digital identity’s characteristics.

There is no difference in body-level self-presence between respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and respondents who do not continue to adjust their Cyber Me from time to time but use all opportunities of the platform to control the actions of their Cyber Me, as well as respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me.

This result suggests that neither customization alone nor passive control (without active modification) is sufficient to elevate body-level self-presence. In other words, users who engage in only one aspect of digital identity use – either customization or control – do not experience a distinct advantage in body-level self-presence over those who do neither.

A possible explanation is that body-level self-presence is not solely influenced by either modifying digital identity characteristics or passively maintaining control, but rather by an integrated approach where both processes are combined. Simply adjusting visual or structural aspects of digital identity without regulating its interactions within the digital environment does not establish a strong enough psychological connection to the digital self-representation. Conversely, merely controlling interactions without engaging in customization does not create an embodied sense of presence comparable to users who fully engage in both processes.

This finding reinforces the notion that body-level self-presence is shaped by the interaction between self-representation and behavioral regulation – neither component alone is sufficient to significantly impact the perception of embodiment. Users need both customization

(to personalize their self-representation) and control (to regulate its interactions) to maximize body-level self-presence.

If digital identity is to be perceived as an embodied extension of the self, it must be both actively shaped and strategically controlled, rather than passively maintained or modified in isolation.

There is no difference between respondents who continue to adjust their Cyber Me from time to time but do not use all opportunities of the platform (limitations) to control the actions of their Cyber Me and respondents who do not continue to adjust their Cyber Me from time to time and do not use all opportunities of the platform to control the actions of their Cyber Me.

This finding suggests that customization alone, without the element of control, does not contribute significantly to body-level self-presence. In other words, merely adjusting digital identity characteristics without regulating its interactions does not create a stronger sense of embodiment compared to complete disengagement from both processes.

One possible explanation is that body-level self-presence is not just a function of visual or structural customization but also of the ability to exert control over digital identity's interactions. Without control, modifications to digital identity remain superficial – they may refine appearance but do not deepen the user's embodied connection to it.

This result aligns with previous findings that control plays a more decisive role in self-presence than customization alone. Users who fail to regulate how their digital identity interacts within the digital environment may perceive it as a separate entity rather than an extension of themselves. Consequently, if customization is not reinforced by active control, the digital identity remains a detached representation rather than an embodied presence.

This suggests that while customization can enhance the expressive aspect of digital identity, it does not necessarily strengthen the perception of embodiment unless accompanied by control mechanisms that reinforce the user's sense of control within the digital environment.

(3.2) There is no differences in emotion-level and identity-level self-presence depending on the combination of indicators (customization and control) of the process of using digital identity.

This finding indicates that neither customization nor control – or their combination – significantly influences the deeper, subjective layers of self-presence associated with emotions and identity perception. While body-level self-presence is directly shaped by visual and interactive aspects of digital identity, the emotional and identity dimensions appear to remain stable regardless of modifications to digital identity characteristics or interactions.

A possible explanation is that emotion-level and identity-level self-presence are influenced by more complex psychological and social factors that extend beyond direct digital identity adjustments. While customization allows users to refine how their digital identity is presented and control provides autonomy over interactions, these mechanisms do not appear to alter the intrinsic sense of self or emotional attachment to the digital environment.

This finding is consistent with previous research emphasizing that identity and emotional self-presence develop through sustained engagement, meaningful social interactions, and narrative immersion rather than through immediate structural modifications to digital identity. The distinction between externally adjustable aspects of digital identity (such as customization and control) and deeply ingrained psychological experiences suggests that more dynamic and long-term influences shape self-perception and emotional engagement in digital environments.

While customization and control contribute to immersion and embodiment, they do not necessarily reshape how users emotionally or cognitively integrate digital identity into their

broader self-concept. This suggests that for meaningful transformations in emotion-level and identity-level self-presence, additional contextual factors, such as long-term interaction patterns, social validation, and engagement with digital narratives, may be required.

H9: Increased personalization (using original characteristics) increases the level of self-presence.

As a measure of personalization (using original characteristics) of digital identity the type of selective self-representation was used. As it was already shown earlier, there are four types of selective self-representation in digital environments: (1) precise copy of self, (2) improved copy of self, (3) modified version of self, and (4) alternative version of self. Those persons, who choose self-representation as a precise copy of self, use original characteristics of their real identity. Thus, they demonstrate a higher level of increasing personalization of digital identity comparing with those people who use an improved copy of self, or even modified and alternative versions of self.

The Cross-Media Self-Presence Questionnaire (CM-SPQ) (Dombrovskis, Ļevina, Ruža, 2024) was used to assess the level of self-presence (body-level, emotion-level, and identity-level self-presence).

Respectively, in accordance with the ninth hypothesis, differences in the level of self-presence were expected among individuals with different types of selective self-representation, with those whose self-representation in the digital environment is a precise copy of self exhibiting the highest body-level, emotion-level, and identity-level self-presence.

Thus, to test the ninth hypothesis, which states that increased personalization (using original characteristics) of digital identity increases the level of self-presence, differences in CM-SPQ results were analyzed among individuals with different types of selective self-representation of digital identity.

The results showed that 67 respondents have self-representation in digital environments as a precise copy of self, 66 respondents – as an improved version of self, 44 respondents – as a modified version of self, and 50 respondents – as an alternative version of self.

A multivariate analysis of variance (MANOVA) was conducted to assess if there were differences between four groups of respondents with different types of selective self-representation on a linear combination of body-level, emotion-level, and identity-level self-presence. The assumption of independence of observations was met. The assumption of homogeneity of covariances across groups was checked and met (Box's test shows that there are no significant differences between the covariance matrices across four group of respondents with different types of selective self-representation ($F(18, 137062.96) = 1.51, p > .05$). There are no statistically significant differences of variances for *body-level self-presence* ($F(3, 223) = .28, p > .05$), however the assumption of homogeneity of variances was violated for *emotion-level self-presence* ($F(3, 223) = 2.84, p < .05$) and for *identity-level self-presence* ($F(3, 223) = 5.59, p < .05$). Given that the Box test was not significant and groups of respondents are of nearly equal size, we conducted the analysis, using appropriate follow-up test. Bivariate scatterplots were checked for multivariate normality.

A significant difference was found, Wilks' $\Lambda = .75, F(221, 538) = 7.65, p = .000$, multivariate $\eta^2 = .09$. Descriptive statistics for scales of the CM-SPQ as a function of type of selective self-representation in the digital environment, and effects of the type of selective self-representation on the CM-SPQ scores are displayed in Table 54.

Table 54

Descriptive statistics for scales of the CM-SPQ as a function of type of selective self-representation in the digital environment, and effects of the type of selective self-representation on the CM-SPQ scores

Scales of the CM-SPQ	Type of selective self-representation								<i>F</i> (3,223)	η^2
	Precise copy of self		Improved copy of self		Modified version of self		Alternative version of self			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Body-level	10.69	5.39	13.02	5.16	15.68	5.28	11.82	5.48	8.30***	.10
Emotion-level	8.09	3.39	10.08	2.60	10.77	2.49	9.24	2.83	9.18***	.11
Identity-level	18.21	4.94	18.73	3.39	18.52	4.45	15.04	5.45	7.50***	.09
<i>Note.</i> * $p < .05$, ** $p < .01$, *** $p < .001$.										

Follow-up univariate ANOVAs indicated that there were statistically significant differences between respondents with different types of selective self-representation in the digital environment in body-level self-presentation ($F(3, 223) = 8.30, p < .001$), in emotion-level self-presentation ($F(3, 223) = 9.18, p < .001$), and in identity-level self-presentation ($F(3, 223) = 7.50, p < .001$).

Post hoc tests using Games-Howell were then performed for pairwise comparisons. It was found that:

- for Body-level self-presence respondents with self-representation as a modified version of self had statistically significantly higher scores than respondents with self-representation as a precise copy of self ($p < .05$), as an improved copy of self ($p < .05$), and as an alternative version of self ($p < .05$);
- for Emotion-level self-presence respondents with self-representation as a precise copy of self had statistically significantly lower scores than respondents with self-representation as an improved copy of self ($p < .05$) and as a modified version of self ($p < .05$); also, respondents with self-representation as an alternative version of self had statistically significantly lower scores than respondents with self-representation as a modified version of self ($p < .05$);
- for Identity-level self-representation respondents with self-representation as an alternative version of self had statistically significantly lower scores than respondents with self-representation as a precise copy of self ($p < .05$), as an improved copy of self ($p < .05$), and as a modified version of self ($p < .05$).

Regarding the ninth hypothesis, which posits that increased personalization (using original characteristics) increases the level of self-presence, the following findings were made.

(1) Body-level self-presence: participants with self-representation as a modified version of self have a higher level of self-presence than respondents with self-representation as a precise and improved copy of self and as an alternative version of self.

(2) Emotion-level self-presence: participants with self-representation as an improved copy of self have a higher level of self-presence than respondents with self-representation as a precise copy of self. In its turn, participants of the research with self-representation as a modified version of self have a higher level of self-presence than respondents with self-representation as a precise copy of self and as an alternative version of self.

(3) Identity-level self-presence: participants of the research with self-representation as a precise and improved copy of self and as a modified version of self have a higher level of self-presence than respondents with self-representation as an alternative version of self.

These findings allow to conclude that increasing personalization (using original characteristics) of digital identity increases only identity-level self-presence, and decreases body-level and emotion-level self-presence.

These findings indicate that self-presence in digital environments is shaped not by objective similarity to the real self, but by how users encode and transform their subjective self-image into digital representation. Every individual carries a subjective self-image, which consists of personally significant characteristics – traits they consciously or unconsciously perceive as defining their identity. This subjective self-image may not always align with the objective self-image, which is how others perceive and describe an individual based on observable traits. In digital environments, users engage in self-representation by selectively encoding and modifying aspects of their subjective self-image, which, in turn, influences their experience of self-presence.

At the body-level, self-presence is highest when users create a modified version of themselves rather than an exact or improved copy. This supports previous findings that self-created digital representations heighten self-presence when they reflect personally meaningful characteristics rather than an objective likeness (Rahill & Sebrechts, 2021). Since subjective self-image dictates which characteristics feel most “real” to the user, digital identity does not need to mirror the physical self exactly – it needs to align with how the user perceives and relates to their own body.

At the emotion-level, self-presence is strongest when users create improved or modified versions of themselves. This suggests that emotional connection to digital identity arises not simply from its accuracy, but from the process of transformation itself. When users refine and enhance their self-representation, they invest psychological resources in making their digital identity more reflective of their ideal or desired self. As previously suggested in research on the Proteus effect, engagement with a digital identity over time can lead to behavioral and cognitive adaptation (Yee & Bailenson, 2007). Our findings extend this idea by emphasizing that emotional attachment strengthens through personalization, particularly when digital identity aligns with the user’s aspirations. However, when users adopt an entirely alternative version of themselves – one initially detached from their existing self-image – the emotional bond weakens, as the digital identity is not immediately perceived as an extension of the self.

At the identity-level, self-presence is highest when digital representation is a precise, improved, or modified version of the self but decreases in alternative self-representation. However, this does not necessarily mean that an alternative version remains permanently disconnected from self-identity. Digital environments allow users to express versions of their self-concept that may not be visible in offline contexts (Bargh, McKenna & Fitzsimons, 2002). Our findings suggest that this extends beyond simple expression – alternative digital identities can, under certain conditions, reshape the user’s core identity through prolonged interaction. Initially, an alternative version aligns more closely with the desired self – a representation of what the user aspires to be rather than what they currently are. However, prolonged engagement and psychological adaptation can lead to integration of these characteristics into the user’s self-concept, shifting identity-level self-presence as the alternative version reshapes aspects of the core identity from the outside.

These findings challenge the assumption that self-presence is strongest when digital identity closely mirrors the physical self. Instead, self-presence emerges through selective encoding and transformation of the subjective self-image into digital representation. Users do not merely replicate themselves; they construct digital identities that emphasize personally significant traits, reinforcing their psychological connection to the digital environment. This

aligns with previous research, which suggested that digital identity enables the expression of characteristics that might otherwise remain unexpressed in offline environments (Talamo & Ligorio, 2001). Our findings build on this by demonstrating that self-presence is strongest when digital representation reflects these personally significant characteristics, rather than an exact replication of the physical self.

Additionally, alternative versions of digital identity should not be viewed as entirely separate from self-identity, as under certain conditions, they may gradually transform the user's core identity through psychological assimilation. This supports and extends the Proteus effect, indicating that long-term interaction with a digital identity – especially one that initially feels distinct – can eventually lead to a fusion between digital self-representation and real-world identity (Yee & Bailenson, 2007).

H10. Self-presence is positively associated with the presence of communication participants.

To test H10, which posits that the presence of communication participants and self-presence will be positively associated, ongoing communication with other users as an indicator of the presence of communication participants was used. Respectively, the following measure “I actively communicate with other users – yes/no” (a measure of ongoing communication with other users) was applied.

The Cross-Media Self-Presence Questionnaire (CM-SPQ) (Dombrovskis, Ľevina, Ruža, 2024) was used to assess the level of self-presence (body-level, emotion-level, and identity-level self-presence).

There were 42 respondents who do not actively communicate with other users and 185 respondents who actively communicate with other users.

Descriptive statistics and the results of the examination of normal distribution for CM-SPQ in the whole sample of respondents are presented in Table 55.

Table 55
Descriptive statistics and the results of the examination of normal distribution for the level of self-presence (CM-SPQ) in the whole sample of respondents (N = 227)

Variable	Descriptive statistics								Kolmogorov-Smirnov test	
	<i>M</i>	<i>Me</i>	<i>Mo</i>	<i>SD</i>	<i>A</i>	<i>E</i>	<i>Q₁</i>	<i>Q₃</i>	Test Statistic	<i>p</i>
Level of self-presence (CM-SPQ)										
Body-level	12.58	12.00	5.00	5.57	.37	-.93	8.00	17.00	.11	.000
Emotion-level	9.44	10.00	9.00	3.04	-.15	-.68	7.00	12.00	.09	.000
Identity-level	17.72	19.00	20.00	4.77	-.76	.19	15.00	20.00	.14	.000

As all variables are not normally distributed, Spearman’s rank correlation coefficient was used to examine whether there are correlations between the presence of communication participants (ongoing communication with other users) and the level of self-presence (body-level, emotion-level, and identity-level self-presence).

It was found that there is a statistically significant positive correlation between ongoing communication with other users and body-level self-presence ($r_s = .25, p < .001$), emotion-level self-presence ($r_s = .19, p < .01$), and identity-level self-presence ($r_s = .15, p < .05$).

Regarding the tenth hypothesis, which posits that the presence of communication participants and self-presence will be positively associated, the following findings were made.

There is a positive association between ongoing communication with other users and the level of self-presence (body-level, emotion-level, and identity-level self-presence). It means that those participants of the research, who actively communicate with other users, have a higher level of self-presence (body-level, emotion-level, and identity-level self-presence), but those people who do not actively communicate with other users, have a lower level of self-presence (body-level, emotion-level, and identity-level self-presence).

This suggests that interpersonal interaction within the digital environment performs not only a communicative but also a psychologically significant function. Digital identity, in this context, serves as more than a representational structure – it becomes a channel through which users experience their embodied presence, express emotional states, and affirm their identity within the digital environment. The more active the presence of other communication participants, the more personally meaningful and psychologically integrated the user's digital self-representation becomes. Digital self-representation becomes more “alive” in the user's perception through continuous feedback loops, which reinforce its relevance and emotional resonance.

This supports previous findings that highlight how the presence of others reinforces subjective experiences of presence. When users perceive that their actions and expressions are seen and responded to, their digital identity is no longer experienced as external or symbolic but begins to function as an extension of the self, reflecting their psychological and emotional engagement with the digital environment (Biocca, 1997; Carr & Hayes, 2015).

The result is also consistent with the concept of identity-level self-presence, where the psychological relevance of digital identity increases through meaningful social contact. The presence of communication participants strengthens the perception of being recognized and emotionally connected in the digital environment (Ratan, 2012).

These findings suggest that digital identity, when activated through interaction with others, contributes to a fusion process in which the boundaries between physical and digital self become less distinct. As the user's digital self-representation acquires emotional and cognitive salience, self-presence becomes a multi-level experience shaped by interpersonal dynamics (Talamo & Ligorio, 2001).

H11. The duration of interaction with digital identity will be positively associated with the level of self-presence.

In order to test the eleventh hypothesis, which states that the duration of interaction with digital identity will be positively associated with the level of self-presence, correlation analysis was performed.

The analysis aimed to assess whether an association exists between the duration of interaction (measured in hours per week spent online) and the level of self-presence, as measured by the Cross-Media Self-Presence Questionnaire (CM-SPQ), specifically across the three subscales: Body-level self-presence, Emotion-level self-presence, and Identity-level self-presence.

Descriptive statistics and the results of the examination of normal distribution for duration of interaction (hours per week users spend online) in the whole sample of respondents are presented in Table 47, and for CM-SPQ – in Table 55 respectively.

As all variables are not normally distributed, Spearman's rank correlation coefficient was used to examine whether there are correlations between duration of interaction and body-level, emotion-level, and identity-level self-presence.

It was found that there is a statistically significant positive correlation between duration of interaction and body-level self-presence ($r_s = .34, p < .001$), emotion-level self-presence ($r_s = .29, p < .001$), and identity-level self-presence ($r_s = .19, p < .01$).

Regarding the eleventh hypothesis, which posits that the duration of interaction with digital identity will be positively associated with the level of self-presence, the following findings were made.

There is a positive association between the duration of interaction with digital identity and the level of self-presence (body-level, emotion-level, and identity-level self-presence). It means that those participants of the research, who spend more time online, have a higher level of self-presence (body-level, emotion-level, and identity-level self-presence), but those people who spend less time online, have a lower level of self-presence (body-level, emotion-level, and identity-level self-presence).

Time spent online alone does not automatically enhance self-presence. Instead, the key psychological mechanism appears to be the user's systematic engagement with their digital self-representation.

This interpretation is consistent with earlier research indicating that prolonged interaction within digital environments can strengthen the experience of presence (Skadberg & Kimmel, 2004), particularly when users reach a state of psychological absorption described in flow theory (Csikszentmihalyi, 1990). As users remain engaged in meaningful digital activity, the digital environment becomes more than a space of presence – it becomes a medium for experiencing the self. In this context, self-presence emerges as a psychological state in which digital self-representations are perceived as real and subjectively integrated into identity (Lee, 2004).

Activities such as publishing content, expressing oneself through visual or textual forms, and participating in digital communication through one's digital identity contribute to the embodied, emotional, and identity-level experience of self-presence. These behaviors reinforce the psychological salience of digital self-representation and facilitate a gradual fusion between the user's subjective self and their digital identity.

Duration of interaction functions as a necessary condition, but not as a sufficient cause of heightened self-presence. The increase in self-presence is shaped by active behavioral engagement with digital identity, confirming the importance of self-representational practices and user-driven interaction in the development of psychological presence within the digital environment.

H12: Self-presence is positively associated with immersion.

In order to test the twelfth hypothesis, which states that self-presence is positively associated with immersion, correlation analysis was performed.

The analysis aimed to assess whether an association exists between the level of self-presence, as measured by the Cross-Media Self-Presence Questionnaire (CM-SPQ), specifically across the three subscales: Body-level self-presence, Emotion-level self-presence, and Identity-level self-presence, and the level of immersion, as measured by the Extended Game Immersion Questionnaire (E-GIQ), specifically across the three subscales: Engagement, Engrossment, and Total Immersion.

Descriptive statistics and the results of the examination of normal distribution for CM-SPQ in the whole sample of respondents are presented in Table 55, and for E-GIQ – in Table 47, respectively.

As all variables are not normally distributed, Spearman's rank correlation coefficient was used to examine whether there are correlations between body-level, emotion-level, and identity-level self-presence and engagements, engrossment, and total immersion.

It was found that there are statistically significant positive correlations between body-level self-presence and engagement ($r_s = .27, p < .001$), engrossment ($r_s = .34, p < .001$), and total immersion ($r_s = .66, p < .001$).

There are statistically significant positive correlations between emotion-level self-presence and engagement ($r_s = .41, p < .001$), engrossment ($r_s = .30, p < .001$), and total immersion ($r_s = .65, p < .001$).

There are also statistically significant positive correlations between identity-level self-presence and engagement ($r_s = .22, p = .001$) and total immersion ($r_s = .38, p < .001$). However, there is no statistically significant correlation between identity-level self-presence and engrossment ($r_s = .38, p > .05$).

Regarding the twelfth hypothesis, which states that self-presence is positively associated with immersion the following findings were made.

(1) There is a positive association between body-level self-presence and engagement, engrossment, and total immersion. It means that those participants of the research, who have a higher levels of engagement, engrossment, and total immersion, have a higher level of body-level of self-presence, but those people who have lower levels of engagement, engrossment, and total immersion, have a lower level of body-level self-presence.

(2) There is a positive association between emotion-level self-presence and engagement, engrossment, and total immersion. It means that those participants of the research, who have a higher levels of engagement, engrossment, and total immersion, have a higher level of emotion-level of self-presence, but those people who have lower levels of engagement, engrossment, and total immersion, have a lower level of emotion-level self-presence.

(3) There is a positive association between identity-level self-presence and engagement and total immersion. It means that those participants of the research, who have a higher levels of engagement and total immersion, have a higher level of identity-level of self-presence, but those people who have lower levels of engagement and total immersion, have a lower level of identity-level self-presence. It was found that identity-level self-presence is not associated with engrossment.

These findings confirm that self-presence is positively associated with immersion, although this relationship varies across its three dimensions. The consistent association between body-level self-presence and all stages of immersion supports the notion that bodily experience serves as the initial channel through which interaction with the digital environment becomes psychologically meaningful. As established in earlier theoretical models, bodily engagement is the most immediate and perceptually salient foundation of presence and remains stable across increasing levels of immersion.

Emotion-level self-presence also demonstrated a continuous association with all three stages of immersion. This reinforces previous findings that emotional resonance does not emerge as a reaction to specific outcomes but is rooted in the ongoing expressive engagement with one's digital self-representation. Earlier research on the Proteus effect emphasized that psychological attachment to digital identity intensifies through personalization and sustained interaction, which in turn fosters emotional investment (Yee & Bailenson, 2007). The current findings extend this by showing that emotional integration accompanies the embodiment of digital identity across all phases of immersion, functioning as a stabilizing affective layer of self-presence.

A more nuanced pattern emerged in relation to identity-level self-presence. The presence of a positive association with engagement and total immersion – but not with engrossment – suggests that identity-related processes follow a discontinuous trajectory. At the engagement stage, users actively apply identity-relevant traits in shaping their digital self-representation, seeking coherence between their subjective self-image and digital actions. However, at the engrossment level, this intentional influence appears to recede, giving way to more automatic, emotionally and sensorily driven interaction. This pattern reflects the interruption of conscious identity encoding during the middle stage of immersion, when focus narrows and self-reflection decreases. Such transitional disengagement aligns with models of cognitive absorption that describe a loss of self-awareness in favor of sustained experiential flow.

Importantly, identity-level self-presence re-emerges at the level of total immersion, where the dynamics of influence reverse. At this depth of digital engagement, the digital self-representation begins to exert psychological influence on the user, introducing new characteristics that can be gradually incorporated into the user’s identity structure. This supports and extends the Proteus effect by suggesting that digital self-representations, when experienced as psychologically real and repeatedly enacted, can lead to behavioral and cognitive adaptation (Yee & Bailenson, 2007). Additionally, it aligns with prior findings that indicate long-term engagement with digital environments allows users to internalize characteristics of their digital identity (Bargh, McKenna & Fitzsimons, 2002).

These findings highlight that body-level and emotion-level self-presence follow a continuous path through all stages of immersion, while identity-level self-presence follows a break–reconnect dynamic, becoming psychologically active only during initial engagement and then again during full immersion. This underscores the idea that fusion between digital self-representation and personal identity occurs only under conditions of full psychological absorption. The findings also refine previous interpretations of self-presence by demonstrating that each dimension follows a distinct trajectory and responds differently to immersion depth.

Overview of the components involved in digital identity formation

To consolidate the findings of all tested hypotheses, the following configuration table summarizes the relationships between key psychological constructs involved in digital identity formation. Each hypothesis is presented alongside its confirmation status and the specific association examined between dimensions of digital identity, self-presence, immersion, and digital interaction. This structured overview allows for a clearer understanding of how individual indicators function across different stages of digital identity development and reveals which mechanisms contribute to the fusion between digital self-representation and the user’s personal identity (see Table 56).

Table 56

Configuration of measured components across theoretical constructs associated with digital identity

Hypothesis and status	Confirmed association	Not confirmed association	Digital identity relevance
H1 – Confirmed Use of digital identity → Social interaction	Time spent on digital identity creation → Information-seeking behavior	Time spent on digital identity creation → Importance of others' perception	Digital identity creation is influenced by preparatory social input but not initially by the desire for validation.

	Ongoing digital identity adjustment → Importance of others' perception	Time spent on digital identity creation → Ongoing communication	Continued adjustment reflects the user's responsiveness to how others perceive their digital self. Communication patterns do not stem from creation effort.
	Ongoing digital identity adjustment → Ongoing communication	Ongoing digital identity adjustment → Information-seeking behavior	Feedback during interaction fosters dynamic self-representation. Adjustments are shaped by contextual, not preparatory, factors.
	Platform-based control of digital identity → Information-seeking behavior	Platform-based control of digital identity → Importance of others' perception	Users who engage in digital identity control tend to prepare carefully but may prioritize safety over visibility.
	Platform-based control of digital identity → Ongoing communication	—	Interaction encourages users to learn and use control tools, supporting active digital identity management.
H2 – Partially confirmed Type of self-representation → Social interaction	Precise / Improved copy of self → Importance of others' perception	All types → Information-seeking behavior	Digital identities that closely reflect the real self are linked with higher concern for others' perceptions, transformed versions (modified/alternative) reduce that concern.
	Improved / Modified version of self → Ongoing communication	Precise / Alternative version of self → Ongoing communication	Users with enhanced or adapted self-representation engage in more active communication, possibly to test or validate identity. Those with stable or escapist forms communicate less.
	—	All types → Information-seeking prior to creation	The type of self-representation is not shaped by prior advice-seeking, rather, it reflects internal identity strategies, confirming that users arrive with predefined self-representation plans.
H3 – Partially confirmed Use of digital identity → Type of self-representation	Time spent on creation → Improved / Modified version of self	Time spent on creation → Precise / Alternative version of self	Users who invested more time tended to encode a transformed digital identity (improved or modified), indicating active personalization and identity exploration.
	—	Ongoing adjustment → All types	The frequency of adjusting one's digital identity is common across all types, identity updates are socially driven and not dependent on the type of self-representation.
	—	Control features → All types	Use of control tools does not vary across self-representation types, confirming that regulation

			is a functional aspect rather than a representational one
H4 – Partially confirmed Customization & control → Immersion	Ongoing adjustment → Engagement	Ongoing adjustment → Engrossment / Total immersion	Regular customization helps align digital identity with platform expectations, supporting initial immersion, but not sufficient for deeper stages.
	Control features → All immersion stages	–	Ability to regulate digital identity and user interaction enhances immersion as a whole. Control fosters cognitive absorption and user-environment fusion.
	Customization + Control → Higher engagement and total immersion (vs. customization only / no use)	–	Combining internal adjustment with external regulation creates optimal conditions for immersion through expressive alignment and interaction control.
	Control without customization → Higher total immersion (vs. customization without control)	–	External control is more decisive for full immersion than identity refinement, emphasizing its structural and protective role.
H5 – Partially confirmed Social interaction → Immersion	Information-seeking prior to creation → All immersion stages	–	Seeking input from others before digital identity creation enhances engagement, emotional involvement, and overall immersion. Social preparation contributes to deeper interaction with the digital environment.
	Importance of others' perception → Engagement	Importance of others' perception → Engrossment / Total immersion	Social validation plays a role in initial immersion but becomes less relevant as immersion deepens.
	Ongoing communication with other users → Engagement / Total immersion	Ongoing communication with other users → Engrossment	Active communication supports sustained presence and experiential depth, though engrossment develops independently of social contact.
H6 – Not confirmed Personalization (original traits) → Immersion	–	Precise copy of self → All immersion stages	Higher resemblance to one's real self (precise copy of self) limits adaptability, reducing emotional involvement and psychological engagement in the digital environment.
	Improved copy of self → Engrossment / Total immersion	–	Enhancing selected traits supports emotional connection and richer immersive experience.
	Modified version of self → Engagement /	–	Transforming digital identity facilitates creative interaction

	Engrossment / Total immersion		and deeper psychological presence.
H7 – Partially confirmed Duration of interaction → Immersion	Duration of interaction → Engrossment	Duration of interaction → Engagement	Time spent online correlates with emotional involvement and full psychological absorption in the digital environment but does not influence the initial engagement stage. This suggests that immersion transforms users' perception of time, with deeper stages reflecting subjective flow over chronological duration. Extended interaction contributes to a sense of full presence only when users move beyond awareness of external time and become embedded in goal-driven digital experiences. Engagement remains bound to physical-world awareness and is unaffected by overall duration.
	Duration of interaction → Total immersion	–	
H8 – Partially confirmed Customization & control → Self-presence	Customization → Body-level self-presence	Customization → Emotion-level / Identity-level self-presence	Customization influences bodily self-perception but does not trigger deeper psychological identification.
	Control → All levels of self-presence	–	Control reinforces embodiment, emotional connection, and identity integration with digital identity.
	Customization + Control → Higher body-level self-presence (vs. customization only / no use)	–	Active regulation and personalization strengthen physical alignment with digital self.
	Control without customization → Higher body-level self-presence (vs. no control / no use)	–	Perceived control alone is sufficient to enhance bodily awareness in the digital environment.
	Customization without control → No significant effect on body-level self-presence	–	Aesthetic personalization alone does not enhance embodiment without interaction control.
	–	Customization + Control → No effect on emotion-level / identity-level self-presence	Emotional and identity self-presence require sustained and meaningful digital interaction beyond visual/structural modifications.

H9 – Partially confirmed Personalization (original traits) → Self-presence	Precise copy of self → Identity-level self-presence	Precise copy of self → Body-level self-presence	Although participants with a precise copy showed higher identity-level self-presence, their body-level self-presence remained significantly lower than those using modified versions. This suggests that identity alignment may occur without embodied engagement. An improved copy allows for emotional personalization, increasing emotional resonance with digital identity. Precise copies, by contrast, may feel static or less expressive. Modified versions integrate aspirational traits, creating both identity and emotional resonance. Alternative versions remain psychologically distant unless prolonged interaction leads to fusion.
	Improved copy of self → Identity-level self-presence	Precise copy of self → Emotion-level self-presence	
	Modified version of self → Identity-level self-presence	Alternative version of self → Emotion-level self-presence	
H10 – Confirmed Communication with others → Self-presence	Ongoing communication → Body-level self-presence	—	Communication activates bodily self-perception in the digital environment, making the digital self-representation feel more embodied and psychologically real.
	Ongoing communication → Emotion-level self-presence	—	Emotional resonance is enhanced through interpersonal feedback, reinforcing the user's felt presence and emotional expression via digital identity.
	Ongoing communication → Identity-level self-presence	—	Digital identity becomes integrated into the user's self-concept through recognition and meaningful social exchange, deepening identity-level self-presence.
H11 – Confirmed Duration of interaction → Self-presence	Duration of interaction → Body-level self-presence	—	Repeated interaction increases bodily integration of digital self-representation, reinforcing the perception of embodiment in the digital environment.
	Duration of interaction → Emotion-level self-presence	—	Sustained engagement fosters emotional investment in digital identity, intensifying affective resonance and psychological involvement.
	Duration of interaction → Identity-level self-presence	—	Long-term use contributes to the assimilation of digital identity into the user's self-concept,

			strengthening identity continuity and integration.
H12 – Confirmed			
Self-presence → Immersion	Body-level self-presence → Engagement	–	Bodily experience serves as the perceptual anchor in digital environments, enabling psychological absorption from the initial stage of immersion.
	Body-level self-presence → Engrossment	–	As bodily self-representation becomes active, emotional and attentional focus narrows, sustaining deeper involvement in the digital environment.
	Body-level self-presence → Total immersion	–	Full embodiment leads to a stable perception of digital identity as a lived experience, contributing to sustained immersion.
	Emotion-level self-presence → Engagement	–	Emotional connection to digital identity intensifies affective resonance from the beginning of the interaction, enhancing user investment.
	Emotion-level self-presence → Engrossment	–	As immersion deepens, emotional integration maintains continuity of self-representation and psychological presence.
	Emotion-level self-presence → Total immersion	–	Emotional involvement solidifies fusion between user and digital representation at the highest immersion stage.
	Identity-level self-presence → Engagement	–	Users apply identity-relevant traits when shaping their self-representation, seeking coherence between subjective self-image and digital actions.
	Identity-level self-presence → Total immersion	Identity-level self-presence → Engrossment	Identity-level presence reappears at total immersion, where digital identity begins influencing the self, leading to long-term cognitive and behavioral adaptation (Proteus effect).

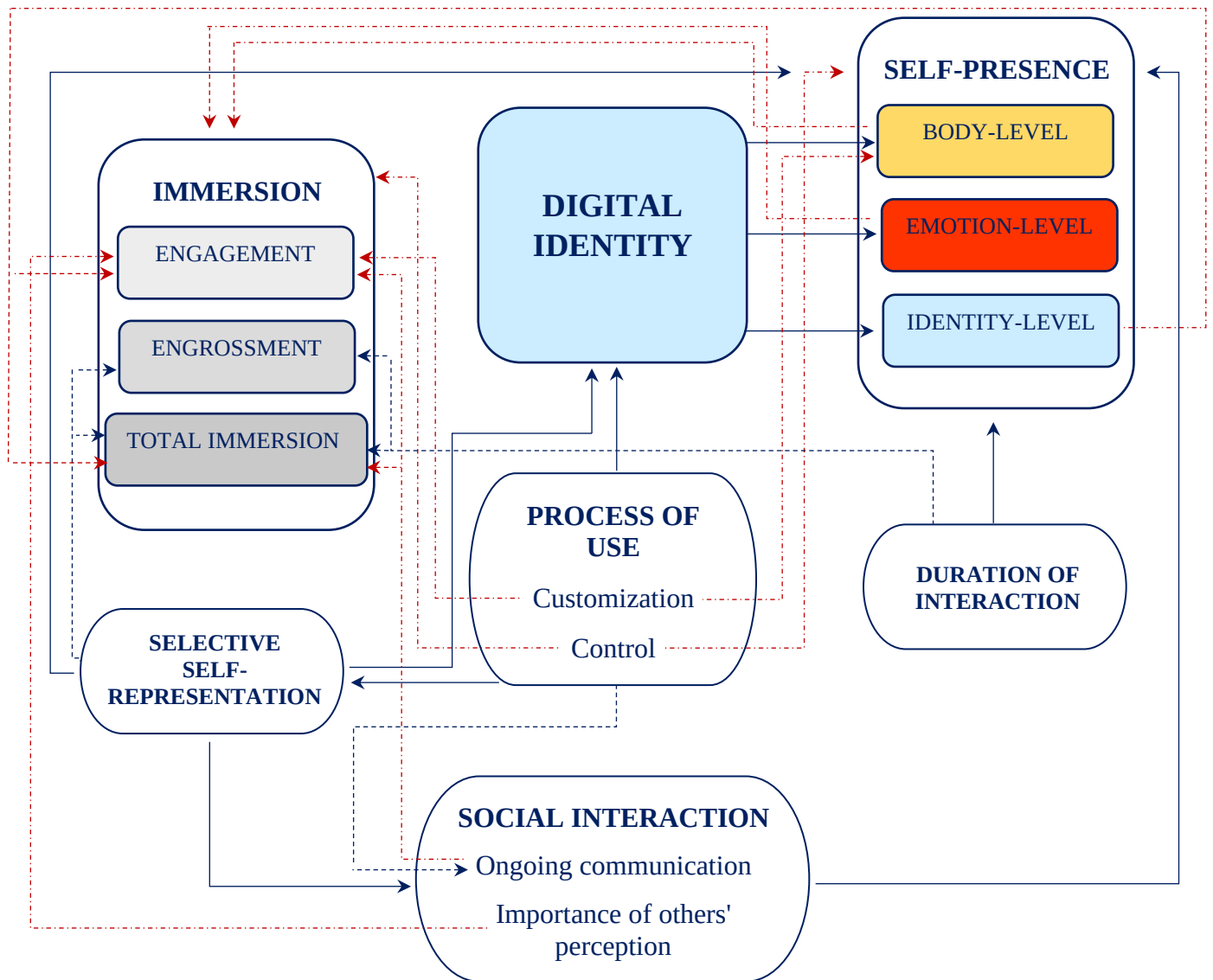


Figure 7. Theoretical configuration model of digital identity

The theoretical configuration model presented above integrates the empirical results of the research into a coherent structure of relationships between key psychological constructs related to digital identity. This model reflects a multidimensional, dynamic, and psychologically adaptive framework, demonstrating how user behaviors, digital self-representation strategies, and contextual variables collectively influence the user's experience of self and interaction within the digital environment.

At the foundation of the model lies the process of using digital identity, operationalized through customization and control. As shown in **H1**, this process is significantly associated with social interaction in the digital environment, particularly when users engage in continuous adjustment and exercise platform-based control. However, preparatory behaviors such as time spent on digital identity creation were not associated with later social interaction indicators. The connection between digital identity use and selective self-representation was also supported in **H3**, indicating that users who invested more time and effort in managing their digital identity tended to adopt improved or modified versions of self, reflecting active identity exploration. These findings highlight that digital identity use is not a passive behavior but a strategic process closely tied to users' goals for interaction and self-expression.

The direct impact of customization and control on immersion and self-presence was explored in **H4** and **H8**. In **H4a**, it was shown that customization alone, while effective in promoting engagement, does not support deeper immersion experiences such as engrossment and total immersion. Conversely, **H4b** demonstrated that control over digital identity interactions enhances immersion across all three stages. Customization was also shown to enhance body-level self-presence (**H8a**), but did not influence emotional or identity-level self-presence. Control, in contrast, was associated with all three levels of self-presence (**H8b**) and with immersion at all stages, including engagement, engrossment, and total immersion. The combination of customization and control produced the strongest effects on engagement and body-level presence, whereas control alone was more decisive for achieving full immersion. These findings demonstrate that the regulation of digital identity boundaries and behaviors is essential for enhancing users' psychological absorption in the digital environment.

A central construct in the model is selective self-representation, which was investigated in **H2**, **H6**, and **H9**. Results confirmed that different types of self-representation – including precise copy of self, improved copy, modified version, and alternative version – are associated with variations in social interaction, immersion, and self-presence. For instance, **H2** showed that improved and modified versions were more likely to foster active communication and sensitivity to others' perceptions, while precise or alternative versions were linked with reduced communication. In **H6**, higher immersion was observed among users with improved or modified representations, but not among those using a precise copy, suggesting that psychological engagement in digital environments requires adaptation rather than replication. Similarly, **H9** showed that identity-level self-presence was stronger for precise, improved, and modified representations, while body-level and emotion-level self-presence were highest for modified and improved versions. These findings support the conclusion that self-representation in digital environments functions as an encoding of subjective self-image, rather than a reproduction of the objective self.

Social interaction was explored in **H5** and **H10** as a condition that reinforces immersion and self-presence. In **H5**, preparatory information-seeking and the perceived importance of others' opinions enhanced initial stages of immersion but diminished in relevance at later stages. Ongoing communication with other users was associated with engagement and total immersion, indicating that interpersonal feedback amplifies presence in the digital environment. **H10** further demonstrated that communication with others contributes to all levels of self-presence – bodily, emotional, and identity-related – by providing recognition, resonance, and affirmation of the user's digital self-representation. Together, these findings position social interaction as a psychologically meaningful amplifier that strengthens the internalization of digital identity.

The duration of interaction with digital identity, explored in **H7** and **H11**, was shown to be positively associated with immersion and self-presence, especially at engrossment and total immersion stages (**H7**), and across all levels of self-presence (**H11**). However, the findings suggest that time alone is insufficient; meaningful interaction and identity-relevant activities are necessary to activate psychological processes that contribute to presence and fusion. Duration becomes a facilitator of internalization only when digital self-representation is used purposefully and repeatedly.

Finally, the model incorporates self-presence as a psychological mediator between digital identity practices and immersion (**H12**). As shown, body-level and emotion-level self-presence were consistently linked to all three stages of immersion, while identity-level self-presence exhibited a discontinuous effect, showing influence only during engagement and total immersion. This pattern reflects a psychological mechanism in which users initially apply identity-relevant traits to their digital representation (engagement), temporarily lose conscious identity control during focused interaction (engrossment), and re-engage with the digital self at full immersion, where fusion occurs. These dynamics confirm and extend the Proteus effect,

supporting the notion that sustained interaction with digital self-representation can reshape the user's identity over time.

The configuration model demonstrates that digital identity is not a static outcome but a dynamic and interactive construct shaped by customization, control, selective self-representation, social interaction, and duration of interaction. When these components are activated in a psychologically meaningful context, they lead to heightened self-presence and immersion, culminating in a fusion between the user's digital representation and their core identity. This fusion represents the core mechanism through which users experience themselves as psychologically present in the digital environment.

Each of the core components included in the model plays a distinct role in shaping digital identity. **Digital identity** serves as the central psychological construct that mediates user interaction and self-representation in the digital environment. **Self-presence** acts as the internalization mechanism, reflecting the extent to which users experience their digital representation as part of their bodily, emotional, and identity-level self. **Immersion** refers to the experiential depth of digital engagement, ranging from initial attention to full psychological absorption. Importantly, immersion is conceptualized as a resulting phenomenon rather than a source of influence. It does not exert direct effects on other components but instead reflects the culmination of prior psychological processes – such as customization, self-representation, and social feedback – that activate and sustain engagement. For this reason, no arrows extend from immersion in the model. **The process of use** – including both **customization** and **control** – enables users to create, modify, and manage their digital representation. **Selective self-representation** involves the encoding of subjective self-image into the digital environment through deliberate transformation or emphasis of identity traits. **Social interaction**, consisting of **ongoing communication** and **importance of others' perception**, reinforces and validates the user's digital representation through social feedback mechanisms. **Duration of interaction** supports the stability and continuity of these psychological processes over time, providing the temporal foundation for the fusion of digital and personal identity.

Together, these components form a dynamic psychological system in which repeated, meaningful digital interaction fosters the development of a coherent, immersive, and personally significant digital identity.

Discussion

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the first hypothesis. The hypothesis was tested by assessing the relationships between three indicators of digital identity use – (1) time spent on creating and adjusting digital identity, (2) ongoing adjustments, and (3) self-regulation strategies – and three indicators of social interaction – (1) information-seeking behavior before digital identity creation, (2) the significance users place on social interaction, and (3) ongoing communication with others. These results contribute to a deeper understanding of digital identity as a socially embedded construct, shaped by both individual motivations and social feedback mechanisms.

Hypothesis 1: Confirmed. The first hypothesis, which proposed that the process of using digital identity (customization and control) is positively associated with the user's social interaction within the digital environment, was confirmed. The findings support the notion that digital identity construction is a self-reflective and socially guided process, rather than a purely technical or aesthetic decision. The positive association between time spent on digital identity customization and prior information-seeking behavior aligns with research suggesting that users engage in preliminary knowledge acquisition to enhance their self-presentation and ensure social acceptability (Wu et al., 2023). This structured approach reflects a cognitive process where users anticipate social expectations and norms before fully engaging in digital interactions (Adjei et al., 2020).

Additionally, the results confirm that digital identity is not static but evolves in response to social interaction. The observed link between ongoing digital identity adjustments and the significance users place on social interaction reinforces existing theories on identity co-construction in social environments (Peña et al., 2021). Users refine their digital identity through continuous social validation and adaptation, shaping their self-representation based on how they are perceived and received in digital spaces (Triberti et al., 2017). This supports the broader psychological perspective that identity is fluid and context-dependent, particularly in digital environments where users actively curate their self-image.

A particularly relevant finding is the role of communication as a driver of digital identity modification. Users who engage in frequent digital interactions adjust their identity in response to social expectations, norms, and feedback from their peers. This supports prior research on self-presentation strategies in online communication (Bozkurt & Tu, 2016), which suggests that users modify aspects of their identity to strengthen social bonds and increase relatability in digital settings.

Beyond confirming previous insights, the research introduces new perspectives on digital identity regulation and its social determinants. Notably, the absence of a strong link between time spent on digital identity creation and direct social interaction challenges the assumption that digital identity formation is initially socially driven. Instead, these results suggest that early-stage identity construction is often an introspective process, where users establish their self-perceived digital presence before engaging in active interaction. This insight aligns with studies on personal identity development, which indicate that identity construction often precedes social validation but later becomes influenced by social engagement (Teng, 2021).

Another significant insight concerns self-regulation strategies, which appear to function independently of immediate social interaction. While customization and ongoing adjustments are socially guided, digital identity regulation (such as selecting privacy settings, limiting

interactions, or controlling access to certain aspects of one's identity) appears to serve a protective function rather than a socially interactive one. This distinction suggests that some digital identity strategies prioritize stability and autonomy over social validation – a perspective consistent with self-determination theory (Ryan & Deci, 2017).

The research highlights that social interaction plays a crucial role in refining digital identity regulation over time. Users may initially engage in digital communication for social purposes, but ongoing engagement fosters identity awareness and adaptive self-regulation mechanisms. This suggests that digital identity management is an evolving psychological process, influenced not only by pre-existing identity structures but also by real-time social experiences within digital environments.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the second hypothesis. The hypothesis was tested by assessing the relationships between four types of selective self-representation – (1) precise copy of self (Substitution), (2) improved copy of self (Augmentation), (3) modified version of self (Modification), and (4) alternative version of self (Redefinition) – and three indicators of social interaction – (1) information-seeking behavior before digital identity creation, (2) the significance users place on social interaction, and (3) ongoing communication with other users. The results provide valuable insight into how users strategically construct and regulate their digital self-representations in response to social dynamics, emphasizing the social-psychological mechanisms underlying digital identity adaptation in digital environments.

Hypothesis 2: Partially confirmed. The second hypothesis, which proposed that there is an association between types of selective self-representation of one's digital identity and the user's social interaction within the digital environment, was partially confirmed, as significant associations were found for certain aspects of social interaction but not for others.

The findings indicate that the choice of a particular type of selective self-representation is independent of information-seeking behavior before digital identity creation. Users who sought external input prior to constructing their digital identity did not show a preference for any particular type of self-representation. This suggests that selective self-representation is primarily an identity-driven process rather than a reactive adjustment to external recommendations. Prior research highlights that users enter digital environments with a predetermined self-representation strategy, guided by self-concept clarity and personal identity preferences rather than immediate social influence (Triberti et al., 2017; Dechant et al., 2021). The findings align with this perspective, indicating that while users may refine details of their digital identity based on external input, their fundamental self-representation remains internally regulated.

However, once digital identity is established, the chosen type of selective self-representation significantly influences how users engage in social interaction. The results show that users who create a digital identity that closely mirrors their real self (precise or improved copy of self) place greater importance on how others perceive them in the digital environment. This supports theories on self-presentation and trust-building, which propose that individuals with high self-congruence in digital identity seek social validation, recognition, and reciprocity in online interactions (Peña et al., 2021; Nagy & Koles, 2014).

Conversely, users who adopt a modified or alternative version of self-place less importance on social feedback, reinforcing prior findings that identity transformation in digital spaces often serves purposes beyond validation, such as self-exploration, experimentation, or

self-protection (Gorini et al., 2011). By creating distance between their digital identity and real self, these users reduce social pressure and allow for more flexible digital interactions.

Additionally, the results reveal a non-linear relationship between selective self-representation and ongoing communication. Users who employ Augmentation (improved copy of self) or Modification (modified version of self) are more likely to actively communicate with others, whereas those who use Substitution (precise copy of self) or Redefinition (alternative version of self) engage in fewer social interactions. This suggests that strategic modifications to digital identity facilitate digital socialization, enabling users to align their representation with social expectations, visibility norms, and engagement strategies (Peña et al., 2021).

These findings further support the Proteus effect (Yee, 2014), demonstrating that users who actively engage in digital communication internalize aspects of their digital identity, reinforcing their interaction patterns over time. The results indicate that selective self-representation is not merely a static expression of identity but an adaptive mechanism, responding dynamically to social validation, feedback, and evolving norms in digital environments.

Taken together, these findings contribute to the understanding of digital identity as a socially embedded and strategically regulated construct. From a social-psychological perspective, the results highlight the dual function of selective self-representation – as both a reflection of personal identity and a tool for optimizing digital social interaction. While users' self-representation choices are primarily identity-driven, their engagement within digital environments is shaped by ongoing social interaction and feedback mechanisms. This reinforces the idea that digital identity formation is not an isolated process but an adaptive, iterative phenomenon, where users balance internal identity motives with external social dynamics in digital environments.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the third hypothesis. The hypothesis was tested by assessing the relationships between three indicators of digital identity use – (1) time spent on creating and adjusting digital identity, (2) ongoing adjustments, and (3) use of platform capabilities to control digital identity – and four types of selective self-representation. The results provide insight into how the process of using digital identity (customization and control) is associated with types of selective self-representation, emphasizing the social-psychological mechanisms underlying self-representation in digital environments.

Hypothesis 3: Partially confirmed. The third hypothesis, which examined the relationship between the process of using digital identity (customization and control) and types of selective self-representation, was partially confirmed, as only some aspects of customization were significantly associated with self-representation types. The findings indicate that the time invested in creating and adjusting digital identity is significantly associated with the type of selective self-representation. Respondents who spent less time on customization were more likely to create a precise or improved copy of self, suggesting that the encoding of original characteristics is a more immediate and cognitively effortless process. In contrast, those who engaged in prolonged customization efforts did not exhibit a clear preference for any specific type of selective self-representation, implying that more complex adjustments – such as modifications or redefinitions – may stem from broader social identity processes, including self-exploration, adaptation to group norms, and impression management in digital environments.

This aligns with research indicating that identity transformation requires a more iterative and deliberate approach (Yee et al., 2011; Ratan & Hasler, 2009). Users modifying or redefining their digital identity likely engage in ongoing self-presentation strategies shaped by the need for social validation and identity experimentation. In contrast, those who maintain a precise copy of self-rely on direct identity transfer, minimizing the need for prolonged decision-making, which aligns with theories in social psychology suggesting that individuals with a strong sense of self-consistency tend to exhibit less variability in self-representation (Swann, 1983).

However, while time spent on initial customization exhibits a significant relationship with selective self-representation, ongoing adjustments to digital identity do not show a clear association. The findings indicate that across all respondent groups, digital identity is continually refined, regardless of whether users maintain a precise copy of self or adopt a transformed representation. This suggests that social and environmental factors – such as peer feedback, evolving platform norms, and shifting social roles – drive continuous adjustments to digital identity, independent of initial self-representation strategies. These results align with the social constructionist perspective on identity, which posits that self-representation is not solely an individual decision but rather an interactive process shaped by ongoing social interactions and expectations (Goffman, 2023).

The research also examined the relationship between platform control mechanisms and selective self-representation strategies. The absence of a statistically significant association suggests that digital identity regulation is an independent process primarily driven by privacy concerns, security considerations, and platform affordances rather than by self-representation choices. This finding aligns with previous research indicating that identity control strategies are typically established at the early stages of digital identity formation, before users begin actively engaging with social interaction mechanisms (Bozkurt & Tu, 2016). From a social-psychological perspective, this suggests that digital identity control functions as a risk management tool rather than an extension of self-presentation strategies, reinforcing the distinction between self-presentation for social engagement and self-protection for digital security.

Taken together, these findings suggest that the process of using digital identity – particularly in terms of customization and control – plays a critical role in shaping user experiences in digital environments, yet does not rigidly dictate the type of selective self-representation users employ. Instead, self-representation strategies appear to be shaped by broader social and psychological factors, such as social norms, identity motives, and interpersonal expectations, rather than by the structural features of digital platforms. These results emphasize the need to view digital identity not only as an expression of self but also as a dynamic social construct that is continuously negotiated and refined in response to personal and external influences.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the fourth hypothesis and its sub-hypotheses. The hypothesis was tested by examining how the process of using digital identity – through customization (adjusting its characteristics) and control (regulating interactions within the digital environment) – affects the level of immersion.

To analyze this relationship, two sub-hypotheses were tested separately:

- **H4a:** Customization of digital identity (adjusting its characteristics) increases the level of immersion.

- **H4b:** Control over digital identity interactions within the digital environment increases the level of immersion.

Both aspects were measured using user-reported engagement with customization (adjusting digital identity over time) and control (regulating its actions and interactions within the digital environment). The level of immersion was assessed through the Extended Game Immersion Questionnaire (E-GIQ), evaluating three stages: engagement, engrossment, and total immersion.

Hypothesis 4: Partially confirmed. The findings indicate a differentiated impact of customization and control on immersion:

1. **H4a** (Customization): Customization of digital identity is positively associated with engagement but does not significantly influence engrossment or total immersion. Respondents who continue to adjust their digital identity over time exhibit higher levels of engagement, suggesting that personalization strengthens the initial psychological connection to the digital environment. However, customization alone does not predict deeper immersion.
2. **H4b** (Control): Control over digital identity interactions within the digital environment is positively associated with engagement, engrossment, and total immersion. Respondents who actively regulate their digital identity's interactions with the digital environment and other users demonstrate higher levels of immersion across all three stages. This suggests that the ability to control digital identity actions plays a decisive role in sustaining immersive experiences.
3. **Combined effect:** The highest levels of engagement and total immersion were observed among respondents who both customize and control their digital identity. This supports the idea that customization alone is not sufficient, and that immersion deepens when users actively regulate their presence and interactions within the digital environment.

These findings refine theoretical perspectives on digital identity as an adaptive tool for immersion in digital environments. While previous studies suggested that customization enhances self-representation relevance and psychological connection to digital environments (Teng, 2010; Bailenson et al., 2003), these findings highlight that customization alone is insufficient for deeper immersion. Instead, control over digital identity interactions appears to be the key determinant of engrossment and total immersion.

A possible explanation for these results is that customization primarily enhances self-representation relevance, drawing users into the digital environment by reinforcing their sense of presence. However, without control over how the digital identity interacts with elements of the digital environment, users remain in an engagement phase, unable to progress toward deeper levels of immersion.

In contrast, control over digital identity interactions fosters greater psychological absorption and fusion with elements of the digital environment. The ability to regulate interactions and manage external influences increases cognitive absorption and contributes to a seamless immersive experience (Witmer & Singer, 1998). These findings align with Flow Theory (Csikszentmihalyi, 1990), which suggests that autonomy over one's digital interactions sustains immersion by minimizing external disruptions and enhancing experiential continuity.

Additionally, the combined effect of customization and control indicates that users who actively adapt and regulate their digital identity achieve the highest levels of total immersion. This suggests that immersion is not merely a function of digital self-representation but a dynamic interaction between personalization and active regulation. Customization increases engagement by reinforcing the initial psychological attraction to the digital environment, while control enables users to sustain immersion by allowing them to regulate their experience and

interactions. The highest immersion levels occur when users integrate both customization and control, dynamically adapting their digital identity while maintaining autonomy over interactions.

From a social-psychological perspective, these results highlight that immersion is not a passive consequence of digital interaction but an active psychological process shaped by cognitive, affective, and behavioral engagement with digital identity. Immersion does not arise solely from modifications to digital self-representation, but rather from how individuals navigate, interpret, and regulate their presence within the digital environment.

This finding suggests that immersion is a multi-layered experience, in which customization strengthens self-identification with digital identity, while control mechanisms sustain and deepen engagement by allowing individuals to manage their role and interactions within the digital space. While customization creates an initial psychological connection, it is the ability to regulate and define interactions that facilitates prolonged immersive states.

These findings emphasize the role of social and psychological factors in immersion, particularly in contexts where digital identity functions as an extension of self-expression, social presence, and identity performance. The absence of control mechanisms may disrupt the continuity of immersion, leading to a fragmented sense of engagement and difficulties in sustaining psychological absorption.

Taken together, these results emphasize that immersion is not merely a function of digital self-representation but an evolving psychosocial process. Customization reinforces self-representation, while control ensures a stable and meaningful interaction with the digital environment, enabling individuals to actively shape their immersive experience.

Immersion is not a static state but a dynamic psychological phenomenon, shaped by how individuals construct, regulate, and negotiate their digital presence within the broader social context of digital interactions.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the fifth hypothesis. The hypothesis was tested by assessing the relationships between three indicators of social interaction – (1) information-seeking behavior before digital identity creation, (2) the significance users place on social interaction, and (3) ongoing communication with others – and three levels of immersion – (1) engagement, (2) engrossment, and (3) total immersion. The results provide insight into how social interaction facilitates deeper integration with the digital environment, emphasizing the social-psychological mechanisms underlying immersion.

Hypothesis 5: Partially confirmed. The fifth hypothesis, which proposed that social interaction increases the level of immersion, was partially confirmed, as significant associations were found for certain aspects of social interaction but not for others.

The findings indicate that users who sought information before creating their digital identity exhibited significantly higher levels of engagement, engrossment, and total immersion. This supports theoretical perspectives suggesting that immersion is shaped by preparatory cognitive engagement, where users develop expectations regarding self-representation and digital interaction before entering the environment. Prior research has demonstrated that social interaction fosters a sense of presence and belonging, which enhances the realism and authenticity of the digital experience (Gonzales, 2008). The results align with this perspective, confirming that individuals who incorporate social input into their digital identity formation experience a more structured and sustained immersion process (Bailenson et al., 2003).

Additionally, the significance placed on social interaction influenced engagement but did not extend to deeper levels of immersion. Users who considered others' perceptions of their

digital identity exhibited a higher level of engagement, indicating that initial immersion is socially anchored. However, as immersion deepens, external validation loses its influence, and users shift toward direct experiential involvement with the digital environment. These results extend prior findings from Hypothesis 2, which demonstrated that users who prioritize social validation tend to construct selective self-representations that closely resemble their real self. The findings for Hypothesis 5 suggest that while social validation is an important factor in early immersion, it does not determine the transition to higher immersion levels (Teng, 2010).

Furthermore, ongoing communication with other users was found to be significantly associated with engagement and total immersion but not with engrossment. This highlights the dual role of social interaction in immersion – at the engagement level, it provides a structured framework for navigating digital spaces, while at total immersion, it becomes seamlessly integrated into the user's experience. The absence of a significant effect on engrossment suggests that this stage represents a transition between socially guided engagement and a deeper, more autonomous state of immersion. These findings correspond with results from Hypothesis 3, which demonstrated that ongoing digital identity adjustments occur independently of self-representation type – implying that as users deepen their engagement with digital environments, social interaction becomes embedded within the experience rather than functioning as an external influence (Peña et al., 2021).

Taken together, these findings contribute to the understanding of immersion as a process that begins with social guidance but transitions into a self-sustained experience. From a social-psychological perspective, the results indicate that immersion is a socially regulated phenomenon in its early stages, as users rely on social cues, feedback, and validation to construct and refine their digital identity. However, as the level of immersion deepens, the social framework transitions into an internalized cognitive and emotional state, where self-representation and interaction become integrated into the digital experience itself. This transformation reflects fundamental mechanisms of social adaptation and identity fusion, where individuals move from socially influenced behavior to an autonomous psychological state shaped by prior social exposure and internalized norms.

These findings align with broader theories in social psychology, which suggest that identity-related processes are initially shaped by external social structures but gradually become autonomously regulated through repeated exposure and reinforcement (Triberti et al., 2017). The results highlight that immersion is not merely a technological or perceptual phenomenon but a dynamic social experience, evolving from external validation to deep psychological engagement. This reinforces the understanding of digital identity as a continuously negotiated construct, where users balance social influence and autonomous regulation in shaping their immersive experiences within the digital environment.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the sixth hypothesis. The hypothesis was tested by assessing the relationship between the level of personalization (using original characteristics) of digital identity and the level of immersion in the digital environment. Personalization was measured through four types of selective self-representation: (1) precise copy of self, (2) improved copy of self, (3) modified version of self, and (4) alternative version of self. Users who chose self-representation as a precise copy of self-incorporated more original characteristics of their digital identity, thus demonstrating a higher level of personalization compared to those who employed an improved, modified, or alternative version of self.

Hypothesis 6: Not confirmed. The sixth hypothesis, which proposed that increasing personalization (using original characteristics) of digital identity increases the level of

immersion, was not confirmed. The findings indicate the opposite pattern – participants of the research who represented themselves as a precise copy of self in the digital environment exhibited lower levels of engagement, engrossment, and total immersion compared to those with a modified or improved copy of self. These results suggest that increasing personalization (using original characteristics) of digital identity decreases the level of immersion rather than enhancing it.

This finding contradicts the theoretical assumption that a stronger resemblance between digital identity and its material counterpart fosters a deeper immersive experience. While prior research has emphasized that personalization enhances authenticity and psychological connection to the digital environment (Teng, 2010), the current results suggest that precise self-representation may impose material-world constraints, limiting the depth of immersive experience. Immersion, by definition, is not merely the replication of reality but the transformation of perception, allowing users to experience interaction with elements of the digital environment with an increasing degree of realism and authenticity.

One possible explanation for this pattern is the functional adaptation of digital identity for interaction within the digital environment. Digital environments allow users to interact with elements of the digital space in ways unrestricted by material-world constraints. However, users who create a precise copy of self may inadvertently carry over these constraints, limiting their ability to experience digital interactions in their full immersive potential. In contrast, those who modify their digital representation strategically adjust their digital identity to enhance their capacity to interact with and respond to the digital environment, thereby increasing immersion (Waltemate et al., 2018).

Another key factor influencing immersion is the stimulation of exploratory and imaginative engagement. Digital environments do not simply replicate material-world experiences – they allow users to construct new realities and actively reshape their experience. Users who modify their digital identity engage in exploratory and creative processes, which foster a deeper state of immersion. By stepping beyond material-world constraints, these users activate cognitive mechanisms that increase the perceived realism and authenticity of digital interactions (Teng, 2010). This aligns with research indicating that the ability to transcend material-world limitations fosters higher engagement, engrossment, and total immersion (Waltemate et al., 2018).

From a social-psychological perspective, these findings indicate that immersion is not merely an individual cognitive process but is shaped by users' ability to integrate into the digital experience dynamically. Immersion occurs when the digital environment and its elements take on the characteristics of objects from the material environment, allowing users to interact with them as if they were real. Users who modify or enhance their digital identity do not simply change their self-representation but adjust the way they experience and engage with the digital world. This supports the notion that immersion is a dynamic psychological state influenced by both personal identity processes and external affordances of the digital space (Bailenson et al., 2003).

These results suggest that immersion is not merely dependent on identity realism but on the degree to which digital self-representation enables deep, engaging, and transformative experiences. While precise self-representation may reinforce identity continuity, it can also limit the immersive potential by maintaining material-world constraints on digital interaction. In contrast, modifying or augmenting digital identity fosters a more fluid and psychologically engaging digital experience, enhancing interaction, creativity, and cognitive absorption.

Taken together, these results highlight that immersion is a process of psychological adaptation, where the depth of engagement is shaped not by the realism of identity but by the affordances that digital self-representation provides for interaction. Users who expand the boundaries of their digital identity experience through modification or augmentation achieve greater immersion, as they allow the digital environment to reshape their perception, cognitive state, and behavioral engagement.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the seventh hypothesis. The hypothesis was tested by assessing the relationships between the duration of interaction with digital identity (measured in hours per week spent online) and three levels of immersion – Engagement, Engrossment, and Total Immersion – using the Extended Game Immersion Questionnaire (E-GIQ). The results provide insight into the psychological mechanisms underlying immersion and its effect on the perception of interaction with elements of the digital environment.

Hypothesis 7: Partially confirmed. The seventh hypothesis, which proposed that the duration of interaction with digital identity would be positively associated with the level of immersion, was partially confirmed. While no relationship was found between interaction duration and engagement, a positive association emerged at the levels of engrossment and total immersion. These results suggest that immersion influences users' perception of interaction with elements of the digital environment rather than the mere duration of interaction being a determinant of immersion.

A key psychological insight from these findings is the transformation of time perception that occurs as immersion deepens. The absence of a relationship at the engagement stage suggests that users at this level remain aware of external time constraints and regulate their interaction with the digital environment accordingly. However, at the engrossment stage, emotional absorption begins to shape users' perception of time, making chronological time less relevant and increasing the likelihood of prolonged interaction with digital identity. At the total immersion stage, users experience a fundamental shift in time perception, where interaction is structured around subjective markers such as goal achievement, task completion, or the intensity of digital engagement rather than objective time units.

These findings align with Flow Theory (Nakamura & Csikszentmihalyi, 2014), which describes how deep cognitive and emotional absorption distorts time perception, leading to the experience of time passing more quickly than it actually does. This suggests that immersion is not a passive result of extended digital interaction but rather an active cognitive and psychological process in which users transition from externally regulated engagement to an internally structured experience of digital time. At higher levels of immersion, the perception of time shifts from chronological measurement to a self-referential system where digital interaction becomes the dominant frame of reference.

Beyond individual experience, these findings contribute to the broader social-psychological understanding of immersion by highlighting the role of identity engagement in shaping users' cognitive and emotional states. The transition from engagement to total immersion represents a shift from external regulation to intrinsic absorption, where time perception is no longer dictated by external constraints but by internalized experiences of digital interaction. This transformation underscores the social-psychological mechanisms underlying deep engagement with digital identity, reinforcing the idea that immersion extends beyond individual behavior and is shaped by broader cognitive and social adaptation processes.

From an applied perspective, these findings highlight both the benefits and potential risks associated with prolonged digital immersion. On one hand, the ability of immersive digital experiences to enhance user engagement, motivation, and satisfaction can be leveraged in fields such as education, training, and digital therapy. On the other hand, the transformation of time perception raises concerns about self-regulation and digital well-being, as users in deep immersive states may lose awareness of the duration of their digital interactions. These insights emphasize the importance of designing digital environments that support meaningful engagement while also fostering awareness of time perception shifts, helping users maintain a balance between immersive digital experiences and external responsibilities.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the eighth hypothesis and its sub-hypotheses. The hypothesis was tested by examining how the process of using digital identity – through customization (modifying its characteristics) and control (regulating interactions within the digital environment) – affects the level of self-presence.

To analyze this relationship, two sub-hypotheses were tested separately:

- **H8a:** Customization of digital identity (modifying its characteristics) increases the level of self-presence.
- **H8b:** Control over digital identity interactions within the digital environment increases the level of self-presence.

Both aspects were measured using user-reported engagement with customization (adjusting digital identity over time) and control (regulating its actions and interactions within the digital environment). The level of self-presence was assessed using the Cross-Media Self-Presence Questionnaire (CM-SPQ), evaluating three dimensions: body-level, emotion-level, and identity-level self-presence.

Hypothesis 8: Partially confirmed. The findings indicate a differentiated impact of customization and control on self-presence:

1. H8a (Customization): Customization of digital identity is positively associated with body-level self-presence but does not significantly influence emotion-level or identity-level self-presence. Respondents who continue to adjust their digital identity over time exhibit a higher level of body-level self-presence, suggesting that personalization enhances perceived embodiment within the digital environment. However, customization alone does not predict a stronger psychological connection to digital identity at the emotional or identity level.
2. H8b (Control): Control over digital identity interactions within the digital environment is positively associated with body-level, emotion-level, and identity-level self-presence. Respondents who actively regulate their digital identity's interactions within the digital environment and with other users demonstrate higher levels of self-presence across all three dimensions. This suggests that the ability to control digital identity actions plays a decisive role in reinforcing the psychological connection between the user and their digital representation.
3. Combined effect: The highest levels of body-level self-presence were observed among respondents who both customize and control their digital identity. This supports the idea that customization alone is not sufficient, and that self-presence strengthens when users actively regulate both appearance and interactions of their digital identity within the digital environment.

The findings provide further insights into the role of digital identity in shaping self-presence. While prior research suggested that customization enhances self-representation relevance and perceived embodiment, the present results indicate that customization alone does not necessarily extend to deeper emotional or identity-related self-presence. Instead, control over digital identity interactions appears to be the key determinant of self-presence at all three levels.

A possible explanation for these results is that customization primarily strengthens the user's perceived embodiment, reinforcing their alignment with the digital identity on a physical level. However, without control over how digital identity interacts with elements of the digital environment, users may remain in a stage of perceptual alignment rather than full psychological integration.

In contrast, control over digital identity interactions fosters a stronger psychological connection to digital self-representation. The ability to regulate digital identity behaviors and manage external influences allows users to establish a sense of predictability and coherence, reinforcing self-presence across bodily, emotional, and identity-related dimensions. These findings align with research on self-representation autonomy, which suggests that interaction management plays a central role in sustaining presence within digital environments.

The combined effect of customization and control indicates that users who actively adapt and regulate their digital identity experience the strongest sense of embodiment. This suggests that self-presence is not merely a function of digital self-representation but a dynamic interaction between personalization and active regulation. Customization enhances perceived embodiment, while control ensures consistency in interactions, fostering a coherent and stable digital presence.

From a social-psychological perspective, these results highlight that self-presence is not a passive outcome of digital identity use but an active psychological process, shaped by cognitive, affective, and behavioral engagement with digital self-representation. Self-presence does not emerge solely from modifications to digital identity characteristics, but rather from how individuals navigate, interpret, and regulate their digital interactions within social contexts.

These findings underscore the importance of user perception, interaction patterns, and social feedback in sustaining self-presence. Digital environments that enable both personalization of self-representation (through customization) and autonomy in managing interactions (through control mechanisms) are more likely to foster a stable and coherent digital self-experience. This psychological coherence strengthens the perceived authenticity of digital identity and supports a more continuous sense of presence across different digital contexts.

This has particular relevance for social and educational digital spaces, online communities, and identity-driven digital environments, where users actively engage in self-presentation, impression management, and social validation. The absence of control mechanisms may disrupt the continuity of self-presence, leading to weaker psychological integration and a diminished sense of agency over one's digital identity.

Taken together, these results emphasize that self-presence is not merely a function of digital self-representation but an evolving psychosocial experience. Customization reinforces self-identification with digital identity, while control sustains and deepens self-presence by allowing users to define their role and agency in digital interactions.

Self-presence is not a static attribute of digital identity, but a dynamic and socially embedded process, shaped by how individuals construct, regulate, and negotiate their digital self-representation within the broader digital environment.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the ninth hypothesis. The hypothesis was tested by assessing how different types of selective self-representation – ranging from a precise copy of self to an alternative version of self – affect the level of self-presence in digital environments. Self-presence was evaluated across three dimensions: body-level, emotion-level, and identity-level, using the Cross-Media Self-Presence Questionnaire (CM-SPQ).

Hypothesis 9: Partially confirmed. The ninth hypothesis, which proposed that increased personalization (using original characteristics) of digital identity enhances self-presence, was only partially supported. While increased personalization was associated with a higher level of identity-level self-presence, it did not lead to increased body-level or emotion-level self-presence. Instead, the findings indicate that self-presence is shaped more by how users encode and transform their subjective self-image into digital representation rather than by objective similarity to the real self.

1. *Body-level self-presence.* Participants with self-representation as a modified version of self exhibited a higher level of body-level self-presence compared to those with a precise or improved copy of self, as well as those with an alternative version of self. This suggests that body-level self-presence is maximized when digital identity reflects personally meaningful characteristics rather than an exact replication of physical traits. As previous research indicates, self-created digital representations heighten self-presence when they emphasize subjective identity markers rather than objective physical likeness (Rahill & Sebrechts, 2021).
2. *Emotion-level self-presence.* Participants with self-representation as an improved or modified version of self demonstrated a higher level of emotion-level self-presence than those with a precise copy of self. This finding highlights that emotional connection to digital identity arises not simply from accuracy but from the process of transformation itself. When users refine and enhance their self-representation, they invest psychological resources in shaping their digital identity to better reflect their aspirations. This aligns with the Proteus effect, which suggests that prolonged interaction with a digital identity can lead to behavioral and cognitive adaptation (Yee & Bailenson, 2007). However, when users adopt an entirely alternative version of themselves, the emotional bond weakens, as the digital identity is not immediately perceived as an extension of the self.
3. *Identity-level self-presence.* Participants with self-representation as a precise, improved, or modified version of self exhibited a higher level of identity-level self-presence compared to those with an alternative version of self. This suggests that digital identities aligning with an individual's real or aspirational self strengthen identity-level self-presence. However, this does not imply that alternative versions of self remain permanently detached from identity. As previous research suggests, digital environments allow users to express versions of themselves that may not be visible in offline contexts (Bargh, McKenna & Fitzsimons, 2002). Under certain conditions, alternative digital identities can gradually reshape aspects of the core self, leading to identity-level adaptation over time.

These findings challenge the assumption that self-presence is strongest when digital identity closely mirrors the physical self. Instead, self-presence emerges through selective encoding and transformation of the subjective self-image into digital representation. Users do not merely replicate themselves; they construct digital identities that emphasize personally significant traits, reinforcing their psychological connection to the digital environment. This aligns with prior research indicating that digital identity serves as a medium for expressing

aspects of self that might otherwise remain unexpressed in offline interactions (Talamo & Ligorio, 2001). Findings build on this by demonstrating that self-presence is strongest when digital representation reflects personally meaningful characteristics rather than an exact replication of the physical self.

From a broader social-psychological perspective, these results emphasize that digital identity is not a fixed entity but a dynamic construct shaped by selective self-representation processes. Furthermore, alternative versions of digital identity should not be regarded as entirely separate from self-identity, as long-term interaction with such representations may gradually lead to psychological assimilation. This supports and extends the Proteus effect by suggesting that under sustained engagement, digital identities initially perceived as distinct from the core self can influence and reshape aspects of identity-level self-presence over time (Yee & Bailenson, 2007).

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the tenth hypothesis. The hypothesis was tested by examining the relationship between the presence of communication participants and the level of self-presence across three dimensions: body-level, emotion-level, and identity-level. The presence of communication participants was operationalized as ongoing communication with other users, and self-presence was assessed using the Cross-Media Self-Presence Questionnaire (CM-SPQ). The results provide insight into the role of interpersonal interaction in shaping how users experience their digital self-representation in the digital environment.

Hypothesis 10: Confirmed. The tenth hypothesis, which proposed that the presence of communication participants is positively associated with self-presence, was confirmed. The results demonstrated statistically significant positive correlations between ongoing communication with other users and all three levels of self-presence. These findings indicate that interpersonal interaction within the digital environment performs not only a communicative but also a psychologically significant function. Digital identity, in this context, becomes more than an external representation – it serves as a channel for subjective presence, allowing users to experience embodiment, express emotions, and activate aspects of their identity within the digital environment.

Digital self-representation becomes more meaningful and psychologically integrated when users receive feedback from others, reinforcing its relevance and emotional resonance. These findings support earlier research showing that social interaction strengthens the user's sense of presence by increasing the salience and emotional intensity of digital self-representation (Biocca, 1997; Carr & Hayes, 2015). The result is also consistent with the identity-level self-presence framework, which posits that recognition and interaction within the digital environment increase the psychological significance of digital identity (Ratan, 2012).

From a social-psychological perspective, the findings suggest that digital identity becomes more “alive” in the user's perception through communication. The user's sense of being in the digital environment intensifies when their digital self-representation is not only visible but engaged with by others. This strengthens the user's experience of presence across bodily, emotional, and identity-related levels. Over time, this interaction contributes to a fusion process, in which the boundaries between physical and digital self become increasingly blurred, and digital identity is experienced as an extension of the self (Talamo & Ligorio, 2001).

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the eleventh hypothesis. The hypothesis was tested by examining the relationship between the duration of interaction with

digital identity and the level of self-presence across three dimensions: body-level, emotion-level, and identity-level. The duration of interaction was measured by weekly time spent online, and the level of self-presence was assessed using the Cross-Media Self-Presence Questionnaire (CM-SPQ). The results provide insight into how temporal engagement with digital identity relates to the subjective experience of self within the digital environment.

Hypothesis 11: Confirmed. The eleventh hypothesis, which proposed that the duration of interaction with digital identity would be positively associated with the level of self-presence, was confirmed. Statistically significant positive correlations were found between the amount of time spent online and all three levels of self-presence. These findings suggest that increased time spent interacting within the digital environment reinforces the user's sense of embodiment, emotional expression, and identity continuity through their digital self-representation.

However, the results also indicate that time alone is not the primary driver of self-presence. The psychological effect appears to depend on how users engage with their digital identity during this time. This interpretation aligns with prior research demonstrating that prolonged interaction enhances self-presence when it involves meaningful activity, such as active self-representation and identity expression through digital means (Skadberg & Kimmel, 2004). The findings are also consistent with flow theory, which emphasizes that immersion and psychological absorption occur through structured, goal-directed engagement rather than passive exposure (Csikszentmihalyi, 1990).

Self-presence emerges not from duration alone, but from the cumulative effect of behavioral engagement with digital identity – such as publishing content, expressing oneself through visual or textual forms, and participating in communication from the position of one's digital self-representation. These actions reinforce the authenticity and salience of digital self-representation, facilitating a gradual fusion between the user's subjective self and their digital identity. As users invest more psychological and behavioral resources into their digital identity, self-presence strengthens across all three levels.

From a social-psychological perspective, these results confirm that active interaction with digital identity is central to the development of self-presence. Duration of interaction serves as a necessary condition that enables these processes to unfold, but it is the user's systematic engagement with digital self-representation that transforms time into psychological presence. This highlights the importance of digital identity as both a temporal and representational construct, shaped by repeated acts of self-expression and ongoing activity within the digital environment.

As part of the broader investigation into digital identity and its psychological implications, this section summarizes the findings related to the twelfth hypothesis. The hypothesis was tested by assessing the association between three levels of self-presence – body-level, emotion-level, and identity-level – and three stages of immersion – engagement, engrossment, and total immersion. Self-presence was measured using the Cross-Media Self-Presence Questionnaire (CM-SPQ), and immersion was measured using the Extended Game Immersion Questionnaire (E-GIQ).

Hypothesis 12: Confirmed. The twelfth hypothesis, which proposed that self-presence is positively associated with immersion, was confirmed. All three levels of immersion were positively associated with body-level and emotion-level self-presence. Identity-level self-presence was positively associated with engagement and total immersion but showed no significant relationship with engrossment.

1. *Body-level self-presence.* Respondents with higher levels of engagement, engrossment, and total immersion reported higher levels of body-level self-presence. This confirms

that bodily experience is the initial dimension through which users interact with elements of the digital environment. It serves as the perceptually salient foundation of psychological presence and remains consistently activated as immersion deepens.

2. *Emotion-level self-presence.* Respondents with higher levels of engagement, engrossment, and total immersion also reported higher levels of emotion-level self-presence. This supports the idea that emotional resonance develops not from external outcomes, but through continuous expressive interaction with digital self-representation. These findings extend the Proteus effect by showing that emotional investment increases as users personalize and maintain their digital identity (Yee & Bailenson, 2007).
3. *Identity-level self-presence.* A positive association was found between identity-level self-presence and both engagement and total immersion, but not with engrossment. This indicates a break–reconnect trajectory. At the engagement stage, users seek alignment between their digital self-representation and their subjective self-image. During engrossment, this conscious regulation weakens as focus shifts toward bodily and emotional absorption. Identity-level self-presence re-emerges during total immersion, where the digital self-representation begins to influence the user and gradually integrates new characteristics into the user's identity structure.

These findings confirm the theoretical assumption that self-presence – especially at the identity level – is fully realized only under conditions of total immersion, which allows for a deep integration of digital experience (Brown & Cairns, 2004). While body-level and emotion-level self-presence evolve continuously through all stages of immersion, identity-level self-presence follows a dynamic sequence that involves temporary suspension and later reactivation under full psychological absorption.

From a psychological perspective, these results support the view of digital self-representation not only as a medium of identity expression but also as a potential source of identity transformation. The digital environment becomes a psychologically meaningful space where digital identity evolves from a representational structure into a dynamic component of identity development. This aligns with earlier findings that digital environments allow users to explore aspects of identity that may remain unexpressed in offline contexts (Talamo & Ligorio, 2001) and extends this perspective by demonstrating how such exploration may lead to actual identity-level integration.

These findings also support and expand the Proteus effect, indicating that digital self-representations, when experienced as psychologically real and consistently enacted, may shape users' behavior and self-concept over time (Yee & Bailenson, 2007). Total immersion provides the psychological conditions necessary for this fusion to occur, where digital identity ceases to function as a symbolic image and begins to affect the user's identity from within.

These findings emphasize that the association between self-presence and immersion is both multidimensional and psychologically adaptive. While bodily and emotional components of self-presence intensify progressively with immersion, identity-level self-presence requires full engagement with the digital environment to activate its transformative potential. This highlights that fusion between digital self-representation and personal identity does not occur automatically, but emerges only under specific psychological conditions made possible by total immersion.

Research limitations

Limitations that may affect the interpretation and application of the obtained data are:

- (1) The research used a non-experimental, cross-sectional design, relying exclusively on self-reported data. Although significant correlations were found between digital identity use, self-presence, immersion, and social interaction, causal conclusions cannot be drawn. This limits the ability to determine whether changes in one variable actively influence another.
- (2) The research focused solely on digital natives – users who have developed digital identity as an integral part of their personal and social development. Therefore, the results cannot be generalized to all digital social technology users. Digital immigrants, who experience digital interaction differently, may follow distinct psychological mechanisms.
- (3) All data were collected through self-report measures. While the adapted CM-SPQ and extended E-GIQ scales showed acceptable psychometric properties, they do not capture unconscious or behaviorally embedded psychological mechanisms. The use of additional implicit or physiological data (e.g., reaction times, biometric indicators) could enhance measurement validity.
- (4) Immersion was examined as an outcome of digital identity use and self-presence, but a possible reciprocal influence – where immersion reinforces digital identity and self-presence over time – was not assessed. Further studies should consider bidirectional pathways.
- (5) Although the constructs of body-level, emotion-level, and identity-level self-presence were conceptually separated, further scale refinement is needed to better distinguish these levels across varied digital contexts.

Further planned research

- (1) To conduct experimental studies that manipulate customization, control, or social interaction variables to test their direct causal impact on self-presence and immersion. Such studies would allow for a clearer understanding of underlying psychological processes.
- (2) To expand the sample by including digital immigrants and comparing their digital identity formation strategies with those of digital natives. This will help determine whether the theoretical configuration model is applicable across generations and user types.
- (3) To introduce multimodal measurement strategies combining self-reports with behavioral and physiological indicators (e.g., latency-based tasks, biometric sensors, usage logs) to validate key constructs such as immersion and self-presence in real-time settings.
- (4) To conduct longitudinal studies that explore how long-term engagement with digital identity affects the fusion between digital self-representation and core identity. This would clarify whether immersive experiences contribute to identity change over time.
- (5) To adapt the model to platform-specific contexts (e.g., avatar-based vs. social media platforms) and investigate how interaction features and interface affordances shape digital identity use and user presence.

Conclusion

- (1) A theoretical configuration model was developed, integrating digital identity use, self-presence, and immersion into a unified psychological framework. The model explains how digital self-representation becomes part of the user's core identity through mechanisms activated within the digital environment.
- (2) Self-presence and immersion were conceptualized as key mediators in the transformation and fusion of digital identity. The model introduces three psychological formulas that describe the dynamics of these constructs and define the conditions under which digital identity integrates with the user's sense of self.
- (3) Two new instruments were introduced: the Cross-Media Self-Presence Questionnaire (CM-SPQ) and the Extended Game Immersion Questionnaire (E-GIQ). Both tools were adapted to assess psychological states related to digital identity in a broader digital context and demonstrated acceptable psychometric validity.
- (4) The process of digital identity use – operationalized through customization and control – was associated with higher levels of social interaction, immersion, and self-presence. Customization supported engagement and body-level self-presence, while control mechanisms were central to achieving total immersion and identity-level presence.
- (5) Selective self-representation was operationalized into four distinct types – precise copy, improved copy, modified version, and alternative version. These types differentially influenced social behavior, emotional relevance, and psychological resonance, shaping the trajectory toward identity fusion.
- (6) Social interaction emerged as a psychological amplifier in digital identity development. Interpersonal communication within digital environments enhanced self-presence across all levels and fostered immersive engagement, reinforcing the integration of digital representation.
- (7) The duration of interaction with digital identity was positively associated with immersion and self-presence, particularly at deeper cognitive and emotional levels. This supports the idea that consistent and meaningful interaction contributes to the fusion of digital and core identity.
- (8) Results confirmed that self-presence mediates immersion, and that identity-level self-presence is most strongly activated during the stage of total immersion. This validates the break–reconnect mechanism, where identity regulation is suspended and re-established through immersive engagement.
- (9) The findings extend the Proteus effect, demonstrating that long-term engagement with a digital self-representation not only influences user behavior but also facilitates transformation at the identity level, especially when self-presence and immersion are jointly experienced.
- (10) The dissertation contributes to the advancement of social psychological theory by redefining digital identity as a psychologically internalized construct and introducing fusion as a dynamic outcome driven by motivational, behavioral, and interactional mechanisms in digital environments.
- (11) The research has practical significance for digital education, psychological well-being, and online behavior interventions. Insights into self-regulation and self-representation strategies can inform educational programs and digital literacy tools that support healthy identity development in digital environments.

- (12) The dissertation provides a foundation for future research on the Proteus effect, user adaptation to platform features, and the integration of behavioral indicators in studying digital identity processes. It also emphasizes the importance of developing refined psychological instruments to assess presence and identity coherence in digital environments.

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Appendices

Appendix A. Questionnaire

WHEN CYBER ME IS ME!

We are inviting you to participate in innovative and interesting research about the digital identity of an individual. The research is conducted within the framework of a doctoral thesis, by Valerij Dombrovskis (valerijs.dombrovskis@kiberprats.lv) – a representative of Cyberpsychology Association, in cooperation with Daugavpils University, under the supervision of the professor Aleksejs Ruža. The survey consists of three parts:

- 1) introductory information about the research; 2) demographic data – general information about users of technologies; 3) test – questions about the process of your Cyber Me creation, about the connection with it and digital environment, where your Cyber Me ‘lives’.

What is the purpose of this research and who conducts it?

The given research is aimed at the investigation of the perception of **Cyber Me** by people. The term ‘Cyber Me’ relates to the part of our identity, which is reflected in cyber environment (digital profile, an online character/ video game character, avatar, etc.). It is interesting for us to find out when **Cyber Me** becomes a part of its creator.

Participants

In order to participate in this research, you have to be: 1) a user of technologies and 2) you have to have your **Cyber Me** (digital profile, video game character, etc.), which you actively use to communicate/ interact with other users. For instance, you publish some content in social media or play online games. An obligatory condition is as follows: your Cyber Me has to contain a visual component (an image, embodiment, picture, avatar, etc.), which you perceive when communicating/ interacting with other users.

Participation and its Termination

Participation in this research is absolutely voluntary and you can interrupt your being in it at any time. In case you want to finalise the participation, simply stop answering questions. However, we kindly ask you to complete all parts of the survey, not missing a single question. Your participation is very important. If you still refuse to take part in it, those materials you will have already filled in, will be deleted and will not be included in the research.

Privacy and data Safety

Information about you is confidential and your data will be coded by an identification code. Processing and storage of the information provided by you will be performed in compliance with the ‘Law of personal data protection’. Your provided data will be used only for research purposes.

Ethical Issues and Contacts

The present study was approved in accordance with the processes of ethical control of Daugavpils University. In case you would like to discuss the research or questions related to your participation in it, please contact one of research members: Valerijs Dombrovskis (valerijs.dombrovskis@kiberprats.lv; +37127003584) or Aleksejs Ruža (aleksejs.ruza@du.lv).

If you would like to find out about the results of the research you are participating in, you are free to contact us via e-mails indicated above after 1st January, 2023 and we will be pleased to send you a summary of the study and the obtained results.

Please read the instructions as well as questions carefully. There are no right or wrong answers – we are interested in your opinion. If you possess several profiles, which you use to communicate within digital environment, then choose one of them, the one reflecting your true identity, even it does not resemble you outside the digital environment.

First, we would like to ask you some questions about you:

General information about a participant:

1. Gender:

- ☐ M
- ☐ F
- ☐ Nonbinary

2. Age (age last birthday): _____

3. My Cyber Me was created in:

- ☐ Social media (for instance, Instagram, Facebook, Twitter)
- ☐ Online game
- ☐ Video hosting (for instance, YouTube, Tik Tok)

4. I am online approximately _____h/per week

SECTION A. The following questions relate to the information about the creation of your Cyber Me.

5. I spent a lot of time to create and adjust my Cyber me

- | | |
|-----------------------|-----------------------|
| Yes | No |
| ☐ | ☐ |

6. I continue to adjust my Cyber Me from time to time

- | | |
|-----------------------|-----------------------|
| Yes | No |
| ☐ | ☐ |

7. I use all opportunities of the platform (limitations) in order to control the actions of my Cyber Me as well as the impact which other users may have on it

- | | |
|-----------------------|-----------------------|
| Yes | No |
| ☐ | ☐ |

8. Prior to the creation of my Cyber Me, I looked for/ asked for some information how to do it better

- | | |
|-----------------------|-----------------------|
| Yes | No |
| ☐ | ☐ |

9. **It is important for me how other users perceive characteristics of my Cyber Me in the digital environment**

Yes No
☐ ☐

10. **I actively communicate with other users**

Yes No
☐ ☐

11. **My Cyber me, it is:**

11.1. a precise copy of myself (it includes only those characteristics which I possess) ☐

11.2. an improved copy of myself (it includes only my best/ most prominent characteristics) ☐

11.3. a modified version of myself (some characteristics, which I possess, have been exchanged by others or improved with the help of a program) ☐

11.4. an alternative version of myself (a ready-made avatar has been selected: a game character or a photo) ☐

SECTION B. In this section we would like to find out about **your connection with Cyber Me**

12. **When you are in the digital space, how much do you feel that the Cyber Me is an extension of your body?**

not at all somewhat moderately very much absolutely
☐ ☐ ☐ ☐ ☐

13. **When you are in the digital space, how much do you feel your Cyber Me is a part of your body?**

not at all somewhat moderately very much absolutely
☐ ☐ ☐ ☐ ☐

14. **When using your Cyber Me, to what extent do you feel like you can reach into the digital space through your Cyber Me?**

not at all somewhat moderately very much absolutely
☐ ☐ ☐ ☐ ☐

15. **When using your Cyber Me, to what extent do you feel like your arm is stretched into the digital space through your Cyber Me?**

not at all somewhat moderately very much absolutely
☐ ☐ ☐ ☐ ☐

16. **When you are in the digital space, to what extent do you feel like your hand/hands can influence the digital space?**

not at all somewhat moderately very much absolutely
☐ ☐ ☐ ☐ ☐

17. When sad events happen to your Cyber Me, to what extent do you feel sad?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
18. When scary events happen to your Cyber Me, to what extent do you feel afraid?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
19. When arousing events happen to your Cyber Me, to what extent do you feel aroused?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
20. To what extent is your Cyber Me appearance related to some aspect of your personal identity?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
21. To what extent does your Cyber Me name represent some aspect of your personal identity?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
22. Is the behavior of the Cyber Me related to some aspect of your personal identity?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
23. Is the orientation (view on the world/life) of the Cyber Me related to some aspect of your personal identity?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	
24. Is the emotional background (dominant emotions/feelings or mood) of the Cyber Me related to some aspect of your personal identity?					
not at all	somewhat	moderately	very much	absolutely	
☐	☐	☐	☐	☐	

SECTION C. Further on we would like to ask questions about you and a particular digital space (a particular social media, online game, video hosting etc.) where your Cyber me lives.					
25. I would like to spend more time in digital space					
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	

	☐	☐	☐	☐	☐
26. I like the appearance and style of the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
27. I like being in the digital space because it is new and interesting					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
28. Generally, I can handle all the difficulties associated with being in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
29. It is easy for me to control all the processes of the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
30. The user interface of the digital space makes me feel comfortable					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
31. I like the type of the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
32. I would like to spend time collecting the information of the digital space and discussing it with friends					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
33. The time I spend being in the digital space is always more than I expected					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
34. My ability to perceive the environment surrounding me is decreased while I am in the digital space					

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
35. I am impatient when someone interrupts me when I am in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
36. When I am in the digital space, I often cannot hear people who call me					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
37. I often feel nervous or excited because of the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
38. I often forget the passage of time while I am in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
39. It frequently happens that I forget my schedule and/or to-do things in the real world while I am in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
40. While I am in the digital space, I feel unhappy if someone interrupts me					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
41. While I am in the digital space, it seems to me that everything that happens there, happens to me					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	O	O	O	O	O
42. My consciousness completely transfers from the real world to the digital space while I am solving the problems or tasks in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

	☐	☐	☐	☐	☐
43. I lose the perception of time and the real world surrounding me, as if everything just stops					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
44. I feel happy or sad depending on what happens to my Cyber Me and sometimes I even feel that it exists					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
45. I used to be so integrated into the Cyber Me in the digital space that I could feel his/her feelings					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
46. All of my senses, including vision, learning, and my mind, are concentrated on and engaged in the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
47. I lose the ability of perceiving the surroundings around me; however, it seems natural for me to be totally immersed in the atmosphere of the digital space					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐
48. I used to feel that the Cyber Me in the digital space is controlled by my will, and not by the mouse or the keyboard, so that the Cyber Me does just what I want to do. It seems like the thoughts and consciousness of the Cyber Me and Me are connected					
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	☐	☐	☐	☐	☐

Thank you for your participation in this study

Appendix B. Extended version of the questionnaire structure

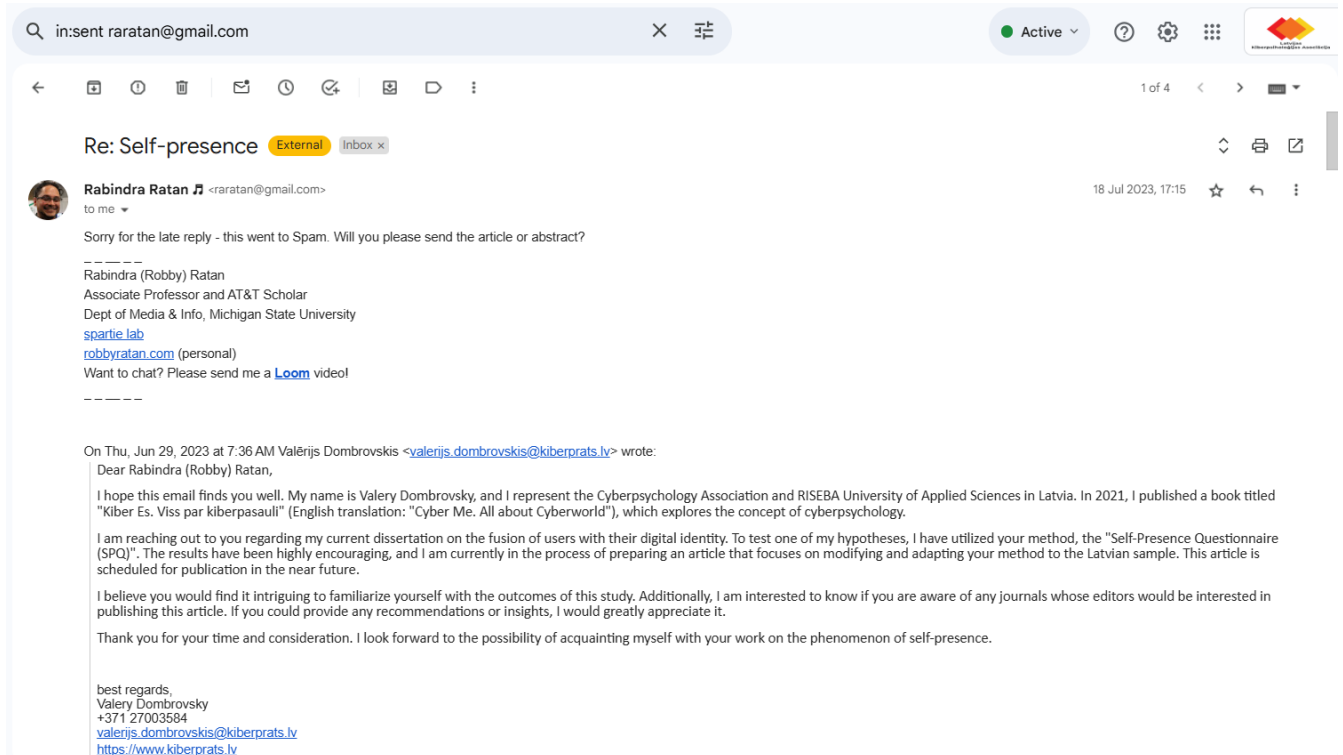
SECTION A. Introductory information about the research		
Information:	Overview of the research and its purpose	
	Ethical considerations and data privacy guidelines	
	Explanation of the term “Cyber Me” and its relevance to the research	
	Participant’s description	
	Details on participant eligibility and contact information for queries	
SECTION B. General demographics and information about the creation of the user's digital identity		
B1. General demographic characteristics		
Scale	QN	
Gender	1	Purpose: To record the participant’s gender identity for sample description. This component was included solely for demographic reporting and was not used in the primary statistical analysis of digital identity components. Scale type: Nominal scale (categorical response with three predefined options). Score conversion: Responses were assigned numerical codes for descriptive purposes only: 1 – Male; 2 – Female; 3 – Nonbinary. This variable was excluded from correlational and regression analyses due to its non-central role in the research model.
Age	2	Purpose: To record the participant’s age in completed years for descriptive purposes. This component was included solely to characterize the sample and was not used in the primary statistical analysis related to digital identity formation. Scale type: Ratio scale (open-ended numeric response indicating age in full years). Score conversion: Responses were recorded as raw numerical values. The variable was used for demographic reporting only and excluded from inferential statistical procedures.
My Cyber Me was created in:	3	Purpose: To identify the primary digital platform on which the participant's digital self-representation (“Cyber Me”) was initially created. This component served as a screening criterion to ensure participants had an established digital identity within a defined digital environment (social media, online game, or video hosting platform). It was not included in the statistical analysis of digital identity formation. Scale type: Nominal scale (single-choice categorical response with predefined platform types). Score conversion: Responses were recorded as categorical values representing the selected platform type. The variable was used to verify eligibility and describe the sample but excluded from inferential analysis.
B2. Information about digital identity creation		

Scale	QN	Description
Duration of interaction	4	Purpose: To assess the amount of time users spend engaging with their digital identities, regardless of whether the activity is related to work or personal use. This indicator reflects the overall duration of interaction with the digital environment through the user's digital self-representation. Scale type: Ratio scale (open-ended numeric response indicating the number of hours per week). Score conversion: Responses were used as raw numerical values (hours per week). Higher values indicate a greater duration of interaction. This variable was treated as continuous and included in correlation analysis.
Process of use (customization and control)	5,6,7	Purpose: To assess the extent to which users actively engage in the process of using their digital identity by personalizing its characteristics (customization) and regulating its interactions within the digital environment (control). This reflects their ability to manage and adapt their digital self-representation across contexts. Scale type: Nominal scale (dichotomous items with yes/no response options). Score conversion: Responses were converted to binary values: "yes" = 1 and "no" = 0. These indicators complement the item measuring time spent on creating and adjusting digital identity.
Social interaction	8,9,10	Purpose: To assess how users involve social considerations in the formation and use of their digital identity. This includes preparatory information-seeking before digital identity creation, the subjective importance of how digital identity is perceived by others, and the presence of ongoing interpersonal communication through digital platforms. Scale type: Nominal scale (dichotomous items with yes/no response options). Score conversion: Responses were converted to binary values: "yes" = 1 and "no" = 0.
Selective self-representation	11	Purpose: To assess how users engage in selective self-representation by encoding and presenting aspects of their subjective self-image through digital self-representation. This indicator reflects the degree to which users personalize, modify, or redefine their digital self-representation based on their identity-related motives. Scale type: Ordinal scale (forced-choice response with four nominal categories, reflecting increasing levels of transformation of the original self). Score conversion: Responses were assigned based on the degree of personalization and transformation: 4 – Precise copy of self (high degree of personalization/ correspondence between self-representation in digital environment and the real self)

			3 – Improved copy of self (medium high degree of personalization/ correspondence between self-representation in digital environment and the real self) 2 – Modified version of self (medium low degree of personalization/ correspondence between self-representation in digital environment and the real self) 1 – Alternative version of self (high degree of personalization/ correspondence between self-representation in digital environment and the real self) This ranking reflects the extent to which users selectively encode elements of their subjective self-image into their digital self-representation. The scale was used to explore associations between selective self-representation and other dimensions of digital identity experience, such as self-presence and immersion.
SECTION C. Self-presence questionnaire			
Scale	Subscale	QN	
Self-presence	Body-level	12,13,14,15,16	Purpose: To assess the extent to which users experience a sense of embodiment in digital environments, perceiving their digital self-representation as physically present or connected to their body. Scale type: Ordinal scale (5-point Likert-type responses ranging from "Strongly disagree" to "Strongly agree"). Score conversion: Each item was scored from 1 (Strongly disagree) to 5 (Strongly agree). Total score for the scale was calculated by summing the item scores, with higher values indicating a stronger experience of body-level self-presence.
	Identity-level	17,18,19	Purpose: To assess the extent to which users experience their digital self-representation as integrated with their core identity. This includes the perception that one's digital self-representation reflects stable and personally meaningful traits and contributes to the continuity of identity within the digital environment. Scale type: Ordinal scale (5-point Likert-type scale). Score conversion: Each item was rated from 1 ("Strongly disagree") to 5 ("Strongly agree"). Total scores were calculated by summing the individual item values. Higher scores indicate a greater level of identity-level self-presence.
	Emotion-level	20,21,22,23,24	Purpose: To assess the extent to which users experience emotional connection to their digital self-representation. This includes feelings of emotional involvement, affective resonance, and the perception that emotions are expressed and experienced through one's digital identity. Scale type: Ordinal scale (5-point Likert-type scale).

			Score conversion: Each item was rated from 1 ("Strongly disagree") to 5 ("Strongly agree"). Total scores were calculated by summing the individual item values. Higher scores indicate a greater level of emotion-level self-presence.
SECTION D. Immersion questionnaire			
Scale	Subscale	QN	
Immersion	Engagement	25,26,27,28, 29,30,31,32, 33	Purpose: To assess the initial stage of immersion, characterized by the user's interest, attention, and willingness to interact with elements of the digital environment through their digital self-representation. Engagement reflects the onset of psychological involvement and the user's focus on the digital context. Scale type: Ordinal scale (5-point Likert-type scale). Score conversion: Each item was rated from 1 ("Strongly disagree") to 5 ("Strongly agree"). Total scores were calculated by summing individual responses. Higher scores indicate a greater level of engagement within the digital environment.
	Engrossment	34,35,36,37, 38,39,40	Purpose: To assess the intermediate stage of immersion, where users experience emotional involvement and sustained attention while interacting with the digital environment through their digital self-representation. Engrossment reflects deeper psychological absorption, reduced awareness of the physical surroundings, and increased emotional engagement. Scale type: Ordinal scale (5-point Likert-type scale). Score conversion: Each item was rated from 1 ("Strongly disagree") to 5 ("Strongly agree"). Total scores were calculated by summing individual responses. Higher scores indicate a stronger emotional and attentional absorption in the digital environment.
	Total immersion	41,42,43,44, 45,46,47,48, 49	Purpose: To assess the highest level of immersion in the digital environment, characterized by a complete psychological absorption, loss of awareness of the physical environment, and full identification with the digital self-representation. This stage reflects a state in which the user perceives the digital environment as primary and experiences digital interactions as fully authentic. Scale type: Ordinal scale (5-point Likert-type scale). Score conversion: Each item was rated from 1 ("Strongly disagree") to 5 ("Strongly agree"). Total scores were computed by summing individual item scores. Higher total scores indicate deeper immersion and greater psychological integration with the digital environment.

Appendix C. Screenshot with confirmation of permission





To: Mr. Valērijs Dombrovskis, Study GIQ

Riga, 22 January 2025

Research Ethics Approval for the Study

"Extending the Game Immersion Questionnaire for Online Users"

On behalf of RISEBA University of Applied Sciences, following a thorough review of your research proposal and data collection report and request for the publication of results, the Ethics Committee confirms full approval for the following study:

- Study Title:** Extending the Game Immersion Questionnaire for Online Users
- Principal Investigator:** Valērijs Dombrovskis, Mg.psych., Director of Business Psychology Bachelor's programme, RISEBA University of Applied Sciences
- Review Details:** After a thorough review, it was determined that the study was implemented per the methodology and data collection procedures submitted and approved for data collection, executed from 12 October 2022 to 16 January 2023.
- The study adhered to the approved methodology, the highest ethical standards outlined in the university's guidelines, and compliance with local and international regulations.
- The study posed no risk of harm to the participants. All aspects of the research were designed to ensure the safety and well-being of respondents, including compliance with the following:
1. Anonymity of Participants: The study included individuals aged 13 to 65, and relevant specific measures were implemented to ensure compliance with the guidelines. All participants aged 13 to 18 are representatives of online gaming communities, communicate via their digital representations (e.g. avatars or pseudonyms) without disclosing personal identity information, and are not subject to GDPR requirements.
 2. Procedures for Minors: All participants, including those aged 13 to 18, were provided with detailed information about the study objectives, procedures, and confidentiality measures prior to participation, which was voluntary.
 3. Ethical compliance: The study adhered to the ethical standards outlined in the university's ethical guidelines and local and international ethical regulations.

RISEBA University of Applied Sciences

Legal name: Biznesa, mākslas un tehnoloģiju augstskola "RISEBA" SIA

Registration No.: 40003090010 | Address: Meža iela 3, Rīga, LV-1048, Latvia | Phone: +371 26465351 | E-mail: riseba@riseba.lv

Approval Notes:

This ethical approval applies to the study as per procedures reviewed and approved on 5 September 2022 before the study commenced and the implementation process reported on 27 December 2024.

This document confirms the study's ethical acceptability. It permits you to submit your original manuscripts for publication at your discretion, including your specific request for the article "Extending the Game Immersion Questionnaire for Online Users".

Please note that any significant amendments to the study methodology or scope after the Approval date may require additional review by the Ethics Committee.

Yours sincerely,



Valters Kaže, Dr.oec.

Vice-Rector for Research and Development

THIS DOCUMENT IS SIGNED WITH A QUALIFIED ELECTRONIC SIGNATURE ACCORDING TO THE EUROPEAN UNION EIDAS
REGULATION AND CONTAINS A TIMESTAMP

RISEBA University of Applied Sciences

Legal name: Biznesa, mākslas un tehnoloģiju augstskola "RISEBA" SIA

Registration No.: 40003090010 | Address: Meža iela 3, Rīga, LV-1048, Latvia | Phone: +371 26465351 | E-mail: riseba@riseba.lv

Appendix E: The Cross-Media Self-Presence Questionnaire (CM-SPQ)

Item	
Body-level	
A1	When using your Cyber Me, to what extent do you feel like your arm is stretched into the digital space through your Cyber Me?
A2	When you are in the digital space, to what extent do you feel like your hand/hands can influence the digital space?
A3	When using your Cyber Me, to what extent do you feel like you can reach into the digital space through your Cyber Me?
A4	When you are in the digital space, how much do you feel your Cyber Me is a part of your body?
A5	When you are in the digital space, how much do you feel that the Cyber Me is an extension of your body?
Identity-level	
B1	Is the behavior of the Cyber Me related to some aspect of your personal identity?
B2	Is the orientation (view on the world/life) of the Cyber Me related to some aspect of your personal identity?
B3	Is the emotional background (dominant emotions/feelings or mood) of the Cyber Me related to some aspect of your personal identity?
B4	To what extent is your Cyber Me appearance related to some aspect of your personal identity?
B5	To what extent does your Cyber Me name represent some aspect of your personal identity?
Emotion-level	
C1	When sad events happen to your Cyber Me, to what extent do you feel sad?
C2	When scary events happen to your Cyber Me, to what extent do you feel afraid?
C3	When arousing events happen to your Cyber Me, to what extent do you feel aroused?

Scoring key for the CM-SPQ

Responses are recorded on a 5-point Likert scale: **1 – not at all** to **5 – absolutely**

Subscale	Question Numbers	Number of Items	Score Range	Interpretation of Higher Scores
Body-level self-presence	12–16	5	5–25	Stronger embodiment and sense of physical integration with digital representation
Identity-level self-presence	17–21	5	5–25	Higher alignment between personal identity and digital representation
Emotion-level self-presence	22–24	3	3–15	Stronger emotional connection to experiences of digital representation

Total items: 13

Scoring: Sum of items per subscale. Higher scores indicate greater self-presence in the corresponding dimension.

Appendix F. The Game Immersion Questionnaire (GIQ) and the Extended GIQ (E-GIQ)

F1. Original Game Immersion Questionnaire (GIQ)

Item	
Engagement	
A1	I would like to spend more time in digital space
A2	I like the appearance and style of the digital space
A3	I like being in the digital space because it is new and interesting
A4	Generally, I can handle all the difficulties associated with being in the digital space
A5	It is easy for me to control all the processes of the digital space
A6	The user interface of the digital space makes me feel comfortable
A7	I like the type of the digital space
A8	I would like to spend time collecting the information of the digital space and discussing it with friends
A9	The time I spend being in the digital space is always more than I expected
Engrossment	
B1	My ability to perceive the environment surrounding me is decreased while I am in the digital space
B2	I am impatient when someone interrupts me when I am in the digital space
B3	When I am in the digital space, I often cannot hear people who call me
B4	I often feel nervous or excited because of the digital space
B5	I often forget the passage of time while I am in the digital space
B6	It frequently happens that I forget my schedule and/or to-do things in the real world while I am in the digital space
B7	While I am in the digital space, I feel unhappy if someone interrupts me
Total Immersion	
C1	While I am in the digital space, it seems to me that everything that happens there, happens to me
C2	My consciousness completely transfers from the real world to the digital space while I am solving the problems or tasks in the digital space
C3	I lose the perception of time and the real world surrounding me, as if everything just stops
C4	I feel happy or sad depending on what happens to my Cyber Me and sometimes I even feel that it exists
C5	I used to be so integrated into the Cyber Me in the digital space that I could feel his/her feelings
C6	All of my senses, including vision, learning, and my mind, are concentrated on and engaged in the digital space
C7	I lose the ability of perceiving the surroundings around me; however, it seems natural for me to be totally immersed in the atmosphere of the digital space
C8	I used to feel that the Cyber Me in the digital space is controlled by my will, and not by the mouse or the keyboard, so that the Cyber Me does just what I want to do. It seems like the thoughts and consciousness of the Cyber Me and Me are connected

F2. Extended Game Immersion Questionnaire (E-GIQ)

Item	
Engagement	
A1	I would like to spend more time in digital space
A2	Generally, I can handle all the difficulties associated with being in the digital space
A3	The user interface of the digital space makes me feel comfortable
A4	I like the type of the digital space
A5	I would like to spend time collecting the information of the digital space and discussing it with friends
Engrossment	
B1	My ability to perceive the environment surrounding me is decreased while I am in the digital space
B2	I am impatient when someone interrupts me when I am in the digital space

- B3 When I am in the digital space, I often cannot hear people who call me
 B4 I often feel nervous or excited because of the digital space
 B5 I often forget the passage of time while I am in the digital space
 B6 It frequently happens that I forget my schedule and/or to-do things in the real world while I am in the digital space

Total Immersion

- C1 While I am in the digital space, it seems to me that everything that happens there, happens to me
 C2 My consciousness completely transfers from the real world to the digital space while I am solving the problems or tasks in the digital space
 C3 I lose the perception of time and the real world surrounding me, as if everything just stops
 C4 I feel happy or sad depending on what happens to my Cyber Me and sometimes I even feel that it exists
 C5 I used to be so integrated into the Cyber Me in the digital space that I could feel his/her feelings
 C6 All of my senses, including vision, learning, and my mind, are concentrated on and engaged in the digital space
 C7 I lose the ability of perceiving the surroundings around me; however, it seems natural for me to be totally immersed in the atmosphere of the digital space
 C8 I used to feel that the Cyber Me in the digital space is controlled by my will, and not by the mouse or the keyboard, so that the Cyber Me does just what I want to do. It seems like the thoughts and consciousness of the Cyber Me and Me are connected

Note 1. Underlined items were deleted after EFA.

Scoring key for the E-GIQ

Responses are recorded on a 5-point Likert scale: **1 – strongly agree** to **5 – strongly disagree**

Subscale	Question numbers	Final number of items (after factor analysis)	Score range	Interpretation of higher scores
Engagement	25, 26, 28, 30, 32	5	5–25	Higher cognitive interest, comfort, and involvement in the digital environment
Engrossment	34, 35, 36, 37, 38, 39	6	6–30	Greater absorption and reduced awareness of the physical environment
Total Immersion	41–48	8	8–40	Full psychological integration into the digital environment and fusion with digital identity

Total items after adaptation: 19

Scoring: Sum of items per subscale (reversed as needed). Higher scores reflect deeper immersion.