

FUTURE OF WELL-BEING: THE METAVERSE ERA

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ABSTRACT

This preliminary research uses various system frameworks to delve into the ways in which Virtual Worlds may negatively impact the psychological well-being of its users and examines the underlying motivations driving this behavior. Secondly, it proposes an update to the limited definition of 'Problematic Internet Use' and moves towards a more concurrent definition of 'Problematic Virtual Use' or 'PVU' as the phenomenon that not just includes problematic online behavior but also the problematic use of social media, gaming, consumerism, and the future of immersive technologies. Third, it proposes a framework to identify problematic behavior patterns 'The User Type Quadrant', and finally proposes 3 innovative strategies to mitigate use of virtual worlds at the detriment of real-life connectivity and well-being – User Quadrant, Affinity Profile and The Attachment Blueprint.

This project hopes to create a change in the way online behavior of individuals and systems is understood and responded to in light of advancing technologies.

ACKNOWLEDGMENT

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TABLE OF CONTENTS

Pg. No	Topic
7	Research Question
8	The Problem
17	Ch.1: Virtual Worlds and Human Experience
18 21 25	<ul style="list-style-type: none"> ● Understanding Virtual Worlds ● Trends and Signals ● The Iceberg: Multiple Levels of the Problem
34	Ch.2: Well-being and Problematic Use
35 41 49 51 71 75	<ul style="list-style-type: none"> ● What is Psychological Well-being? ● Expanding Definitions: PIU to PVU ● Core Drivers of Problematic Virtual Use ● Compensating for Broken Well-being ● 360° Impact of Problematic Virtual Use ● Problematic Virtual Use as a Wicked Problem
77	Ch.3: Areas of Intervention
77 80 83 85 87	<ul style="list-style-type: none"> ● Attachment Patterns (Intrinsic) ● Hook Model (Extrinsic) ● Donella Meadows Leverage Points ● Actors Map ● Stakeholders Map
89	Ch.4: Potential Solutions
89 95 111	<ul style="list-style-type: none"> ● User Type Quadrant ● The Affinity Profile ● The Attachment Blueprint
121	Conclusion and Discussion
123	References

TABLE OF FIGURES

Pg. No	Figure Titles
9	Fig 1: Human Adaptability and Technology Advancement Curve
20	Fig 2: Adults in the USA Considering Joining the Metaverse
26	Fig 3: The Signals of the Problem
28	Fig 4: The Systems Supporting the Problem
30	Fig 5: The Worldviews Supporting the Problem
32	Fig 6: The Deep Myth Causing the Problem
46	Fig 7: The 3 Dimensions of Problematic Virtual Use
52	Fig 8: Mental Health Experiences Afforded and Displaced by Metaverse
56	Fig 9: Impact of Self-discrepancy on Well-being
73	Fig 10: 360° Impact View of Problematic Virtual Use (Incomplete)
76	Fig 11: The Vicious Cycle of Problematic Virtual Use
81	Fig 12: The Hook Model
83	Fig 13: Meadow's Points of Leverage
86	Fig 14: Actors Mapping for Virtual Technology Systems
88	Fig 15: Stakeholders Mapping for Virtual Technology Systems
90	Fig 16: Proposed User Quadrant of Virtual Worlds
101	Fig 17: Affinity Profile Components of Inquiry to Detect PVU
102	Fig 18: Affinity Profile Dashboard Prototype
105	Fig 19: Affinity Profile Daily Intervention Prototype
115	Fig 20: Disease Emergence Across Life Span
116	Fig 21: How Attachment Pattern Affects Resilience

RESEARCH QUESTION

How might we define the problematic use of virtual worlds?

How can we identify and mitigate the negative impact of virtual worlds on psychological well-being?

For the purpose and goals of the MRP and short research timeframes, this topic is approached primarily by exploring secondary research on the advancement of virtual technologies and central themes and facets of harm to the mind, body, and society. The breadth of this space is vast, so this research is purely focused on the intersection between consumer use of the metaverse, psychological well-being and potential technological harm as well as solutions for mitigation. Through this iterative process, I came to the primary research question.

THE PROBLEM

"We have Paleolithic emotions, medieval institutions and godlike technology."

— Dr E.O. Wilson, Sociobiologist

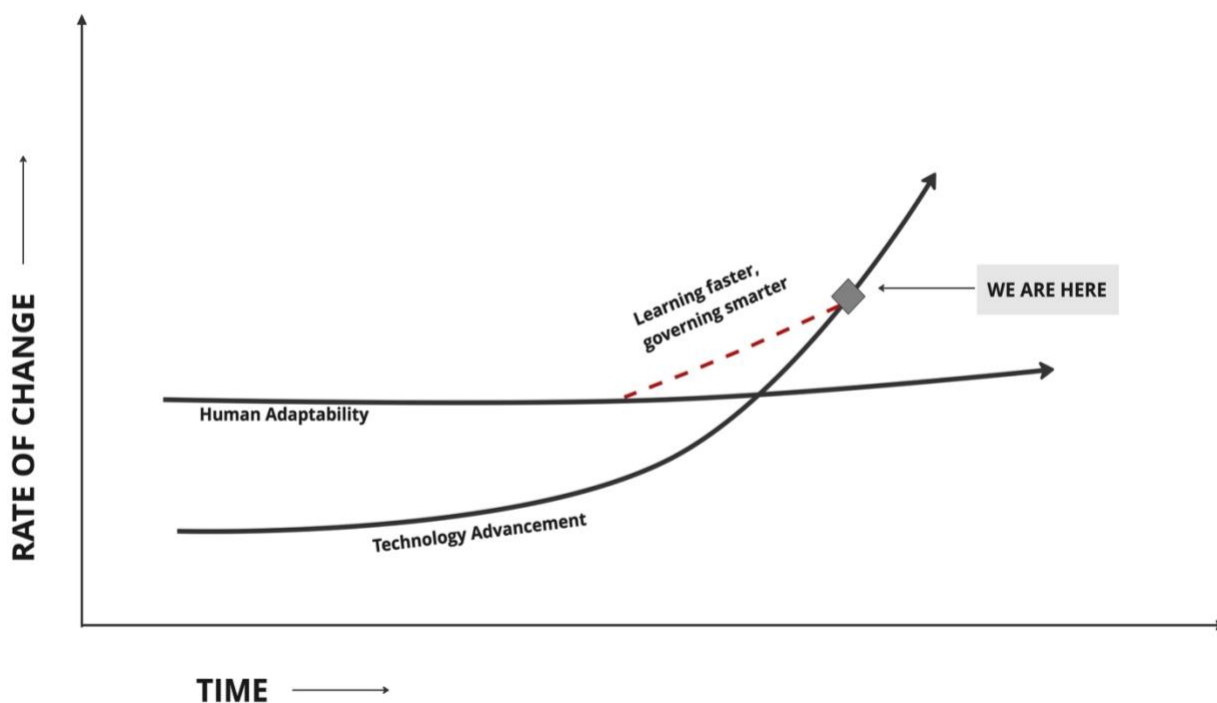
With technological advancements growing and becoming commercially available at the rate it is, we have entered a cognitive, intellectual, emotional and spiritual shift in our social evolution that we are not prepared for (Friedman, 2017). We are already falling behind and constantly playing 'catch up', causing maladaptive use of the technologies; hence increasing risk to mental, emotional, occupational, financial and spiritual well-being as well as social cohesion within a population. The validity and reason for this statement was explored in this research.

Plenty of studies and conversations have discussed the benefits and harms of digital technologies such as social media, gaming, remote work and virtual reality on the human brain and social behaviors. However, there exists a gap in the research conducted on what these benefits and harms could translate into when extrapolated into a life where these digital technologies aren't just two-dimensional screens but are instead immersive in nature in a way that stimulates a parallel 'reality' where one may actually live. This 'reality' being the Metaverse - a massively scaled, interoperable network of real-time rendered 3D virtual worlds which can be experienced synchronously and persistently by an unlimited number of other humans, each with an individual sense of presence - while supporting continuity of data such as history, identity, communication, payments, entitlements, and objects. (Ball, 2022)

WHY?

As new technologies emerge in the market, society is pushed to adopt them in the dimensions of their work, social life, entertainment, and health. However, the rate of this adoption is faster than humans are being educated or trained to adapt to, as discussed by the book 'Thank You for Being Late' (Friedman, 2017). The discussion is supported by the following graph stating technological change when compared to human adaptability and the potential of us as humans to adapt as seen in the dotted lines Parke (2017). Not only has technology become an imperative part of our society, but its advancements in computing speed and power have been approximately doubling every 1.5 to 2 years since the 1960s and 70s at an exponential rate. (Watson, n.d.) The following graph (redesigned) reveals the exponential growth of technology in comparison to the human adaptability curve over a period of time. As can be seen, it defines the gap in adaptability we are currently experiencing (the dotted line).

[Fig.1] Adaptability and Technology Advancement Curve, Adapted: (Friedman, 2017).



This gap is increasing exponentially every year given the increase in the rate of change of technological development. Many experts are skeptical about the

sustainability of this rate of growth. However, 91.6% of Fortune 1000 companies are increasing their investments in Big Data and AI which means this process doesn't seem to be stopping any time soon (Bean, 2019).

The difference in rates has made it increasingly challenging for many to keep up with and live in synchronicity and harmony with the technologies that are soon predicted to be integrated into everyday dimensions of work, social life, entertainment, and education. Narrowing it down to specifically digital technologies, the explosion of use in the last few decades have brought with it a whole new set of psychological, cognitive, physical and social side effects that are still in the early stages of exploration and investigation. Only in the last few decades has the study of digital technology on the human brain begun, and tech companies have already made leaps in their attempt to commercialize immersive technologies and bring them to market as the next evolution of human connectivity. Immersive technology in combination with XR, blockchain systems, AI and Big Data is changing not only how we interact with one another, but also how we view ourselves and our identity as individuals. Emergence in the research of maladaptive use of these technologies indicates long-term disintegration of well-being.

HOW?

It is increasingly clear that many virtual social technologies are designed to maximize daily engagement and exploit individual vulnerabilities for profit. The Metaverse and adjacent technologies (A.I, XR) that build Virtual Worlds are the next evolution of human interaction and have the potential to amplify these problems to an unknown magnitude. There are six dimensions to psychological well-being and the following chapters explore how all 6 have the potential to be adversely affected by the maladaptation to these advancing technologies, both at a micro and macro level. By extrapolating the mental health impacts of our current social and gaming technologies to the immersive 'virtual worlds' of the future, we can only speculate the potential negative impact of the Metaverse on the human psyche.

***Virtual in the context of this paper is defined by any platform or experience (immersive or non-immersive) that is non-tangible and created using digital technology. E.g., Metaverse, Instagram, Doordash, Video games etc.**

According to an April 2022 study, there are on average over 600,000 new internet users each day. Every second, an estimated 127 new devices around the world connect to the internet (Patel et al., 2019).

The boom of telecommunication technologies has been extremely beneficial to our civilization in building global connectivity, new business opportunities, a platform for creative expression, growth, and increasingly efficient monetary and information transaction systems. However, as we advance deeper into integrating man and machine in our lifestyles; being aware, educated and prepared for the challenges they bring can help us navigate through the fast-changing tech terrains while maintaining our well-being and mental health and using the technologies to benefit our growth rather than be a detriment to it.

“Moreover, some argue that we are on the precipice of a technological singularity.”

A technological singularity is a hypothetical event in which artificial intelligence (AI) and other advanced technologies reach a level of intelligence and sophistication beyond human understanding and control. The term "singularity" refers to the idea that, beyond this point, the future becomes unpredictable and difficult to comprehend, as technology advances at an exponential rate. (Kurzweil, 2005)

Experts in the fields of AI, technology, and futurism argue that we may be on the precipice of a technological singularity. Ray Kurzweil, a well-known futurist and inventor, has predicted that the singularity will occur in 2045, based on his analysis of past and current trends in technology (Kurzweil, 2005). Other experts argue that the singularity may occur sooner or later than Kurzweil's prediction, depending on various factors such as the development of quantum computing, the progression of AI research, and the availability of resources.

The potential implications of a technological singularity are vast and uncertain. Some experts predict that it could lead to a post-scarcity society, in which technology is advanced enough to provide for all human needs, and work and scarcity are eliminated (Bostrom, 2014). Others predict that it could lead to the creation of super-intelligent machines that may pose a threat to human existence and control (Yampolskiy, 2015).

A NEED FOR URGENT ACTION

As the possibility of a technological singularity looms, the impact cannot be ignored, and it becomes increasingly important to consider the potential impact on human well-being and the need for intentional design of education, emotional intelligence, and other critical skills. Experts suggest the need for a renewed focus on mindfulness, well-being, education, and training that emphasizes the development of critical thinking, creativity, emotional intelligence, and other skills that are difficult to automate (Ford, 2015). Furthermore, this could involve a shift away from traditional education models that prioritize rote learning and memorization, towards more flexible, adaptive learning environments that foster innovation and lifelong learning.

As technology advances at an exponential rate, it is crucial to consider the innovation of social and ethical frameworks that can guide us through the uncertainty and unpredictability of a singularity (Baumeister & Vohs, 2016).

Thus, this MRP aims to contextualize the deeper effects that mainstream use of virtual world technology and the Metaverse may have on our cognitive, emotional and social wellbeing, both on an individual level and society as a whole by using various design thinking tools. Moreover, it aims to understand what a future where humans are 'well-adjusted' to this technology might look like.

METHODOLOGY

This research amalgamates multiple steps and tools to study the impact of virtual worlds on well-being, and how it may be assessed and mitigated. The following is the sequence of my process:

Step 1: Literature Review

Literature review is the primary source of information for this research. This step includes pulling from past studies by experts and researchers in the fields of psychology, social technology, gaming, neuroscience, and well-being. Along with academic journals, this MRP considers insights from books authored by technologists and businessmen in the field of extended reality. This is because fiction has had a track record in predicting and designing many of our current technologies and realities. The

literature would be a source of defining complex terms, understanding the metrics of measurement of well-being, future technologies and the impacts of social platforms and virtual worlds on human psychology.

Step 2: STEEVP Trends and Drivers

This step includes deriving signals, trends and drivers occurring in our world today from news articles, journal, published articles and social media, especially around human-computer interaction, physical and mental health and value systems. These trends will be used to understand the roadmap of the Virtual World adoption in our society and its various implications.

Step 3: Causal Layered Analysis

This step includes Causal Layered Analysis (CLA), also known as the Iceberg model, which is a system thinking methodology that emphasizes the importance of exploring multiple layers of a system in order to gain a deeper understanding of its complexities and potential future outcomes. CLA involves analyzing a system through four layers: the litany layer (surface-level events and trends), the systemic layer (underlying structures and paradigms), the worldview layer (values, beliefs, and cultural norms), and the myth/metaphor layer (deeply ingrained narratives and archetypes). By exploring each of these layers, we can identify and address root causes of problems, envision alternative futures, and create strategies for positive change. In the context of exploring the future of well-being in the era of metaverses, CLA can help us identify and address underlying structural and cultural factors that lead to the problems of social technologies today, the motivating factors of problematic use and the impact it may have on well-being.

Step 4: Actors and Stakeholder Mapping

The use of Actors map and stakeholder mapping are powerful tools that help us understand the various actors involved in a system and their relationships to each other. Actors map is a visual representation of the actors within a system and their influence on the system's functioning, while stakeholder mapping identifies the stakeholders involved in a system and their interests, priorities, and relationships to each other. By using these tools, we can gain a better understanding of the diverse

perspectives and interests involved and identify potential conflicts, synergies, and opportunities for collaboration. This information can then be used to develop more effective strategies and interventions that account for the needs and perspectives of all stakeholders and maximize the potential for positive outcomes.

Step 5: Data Synthesis

This process integrates and analyzes data from the multiple sources mentioned above to gain a comprehensive understanding of the wellbeing and virtual world system. In the context of this research, it provides us with insights into trends, patterns, and opportunities for interventions in improving well-being in virtual environments.

Step 6: Recommendations and Solutions

This step includes providing recommendations and solutions that aim to address the potential risks and challenges associated with the future of well-being in the era of virtual worlds. One proposed solution is a model for understanding and assessing the risk of problematic virtual world use, which can help identify individuals who may be at greater risk and inform the development of targeted interventions. Another solution is a software prototype designed to help mitigate problematic use by promoting healthy and balanced use patterns and incorporating features such as reminders, self-monitoring, and goal setting.

In addition to these technological solutions, two educational programs are proposed as potential interventions. The Attachment Blueprint will be a program that focuses on developing healthy attachment styles in virtual environments and aims to promote social connection, empathy, and emotional regulation and aims to find alternative coping tools to decrease the need for escapism. Hence, promoting critical thinking, mindfulness, and responsible use of technology.

Together, these solutions aim to promote the well-being and flourishing of individuals in virtual environments, while also recognizing the potential risks and challenges associated with these emerging technologies. By taking a comprehensive and proactive approach to these issues, we can help ensure that the future of well-being is one that prioritizes human flourishing and fulfilment, while also accounting for the complexities and uncertainties of this rapidly changing technology landscape.

LIMITATIONS AND BOUNDARIES

It is important to acknowledge the limitations of this research paper. First, the future of well-being in the era of virtual worlds and advancing technologies is a rapidly evolving field, and as such, this paper is based on current knowledge and projections, which are inherently uncertain. For this reason, past research on the effects of adjacent technologies such as the internet, social media and video gaming have been used as a foundation to explore what the impact of immersive virtual worlds might be. Second, the proposed solutions and interventions are speculative and will require rigorous testing and evaluation to determine their effectiveness. Third, this paper focuses on the potential risks and challenges associated with the Metaverse and virtual social technologies but does not explore in depth the many potential benefits that these technologies may bring. Finally, the proposed solutions and interventions may not be applicable or effective in all cultural, social, and technological contexts. Despite these limitations, this paper aims to contribute to an ongoing dialogue about the future of well-being and to promote a more holistic and proactive approach to these emerging technologies.

IMPACTED PARTIES

The findings of this research have significant implications for various audiences, including tech designers, educators, therapists and cybersecurity.

Technology Designs: For tech designers, this research underscores the importance of intentional design of the Metaverse, social platforms and related technologies that prioritize human psychological well-being. By incorporating features such as healthy use patterns, reminders, and self-monitoring tools, designers can help mitigate the potential risks of problematic virtual world use and promote more positive outcomes.

Education: For educators, this research highlights the need for the development of educational programs that promote healthy attachment styles, relationship building and critical thinking skills in real life as well as virtual environments. The Attachment

Blueprint and Dark Studies programs proposed in this research offer potential models for such programs, which can help students develop the social and emotional competencies needed to thrive in the era of Metaverses.

Mental-Health Therapy: For therapists, this research emphasizes the importance of understanding and addressing the potential psychological and social challenges associated with the current as well as upcoming virtual social technologies and platforms. By developing a greater awareness of the risks and challenges of virtual environments, therapists can help clients develop strategies and coping mechanisms for managing problematic use and promoting well-being in these contexts.

Cybersecurity: This research offers valuable insights for cybersecurity, particularly in the emerging field of cognitive security. By defining, identifying, and providing mitigation strategies for problematic virtual world use, this study contributes to the protection of individuals and communities from socially engineered cyber-attacks that may degrade social cohesion. By understanding the underlying motivations and behaviors that drive problematic virtual use, the research can help inform cognitive security measures to counteract malicious actors who exploit users' psychological vulnerabilities. Furthermore, the mitigation strategies outlined in the thesis can be incorporated into cognitive security frameworks, promoting resilience against manipulative tactics and fostering safer, more cohesive digital environments.

Chp.1- Virtual Worlds and the Human Experience

This chapter explains a brief history of virtual worlds and the current state of their integration into our society. Further, it uses systems frameworks such as world trends and causal layered analysis to dig deeper into the problem, identifying its root cause.




PICTURE THIS

It's 10AM on a Wednesday and you are in a client meeting discussing a freelance graphic design project. You listen to the client requirements while creating 3D prototypes of what they visualize.

Suddenly- you get a bad headache. You need to take your medication, but your office is an hour away from home and you can't drive while having a migraine. You start stressing out.

Just as suddenly, you remember—you are not really in your office. Owing to the strikingly authentic look of the surroundings, you forgot that you were attending your weekly session in the metaverse. You finish the meeting in 20 mins, remove your virtual reality (VR) headgear, and walk to your bedside table and take the medication. You take a cozy 30 min nap in your bed, wake up and put the headset back on, choose your office avatar, and enter the meeting feeling fresh. You sigh and think, "Thank goodness for technology!"



UNDERSTANDING VIRTUAL WORLDS

Virtual worlds have been around since the early days of computing. In the 1970s, Adventure, a text-based game, was one of the earliest examples of a virtual world (Arora & Arora, 2008). As technology advanced, so did virtual worlds. In the 1990s, games like Ultima Online and EverQuest allowed players to explore vast, immersive worlds with other players from around the globe.

The concept of the Metaverse was first introduced in Neal Stephenson's 1992 science fiction novel, Snow Crash (Stephenson, 1992). The Metaverse is a virtual world that exists entirely within a computer network. It is a shared space where people can interact with each other and with digital objects in real-time. The purpose of the Metaverse is to create a fully immersive and interactive digital environment where people can work, play, and socialize without the limitations of the physical world.

Since the release of Snow Crash, the concept of the Metaverse has been the subject of much discussion and development. In 2003, Linden Labs released Second Life, a virtual world that allowed users to create their own avatars and environments (Steinkuehler & Duncan, 2009). Second Life quickly became popular and paved the way for other virtual worlds like World of Warcraft, Minecraft, and Fortnite.

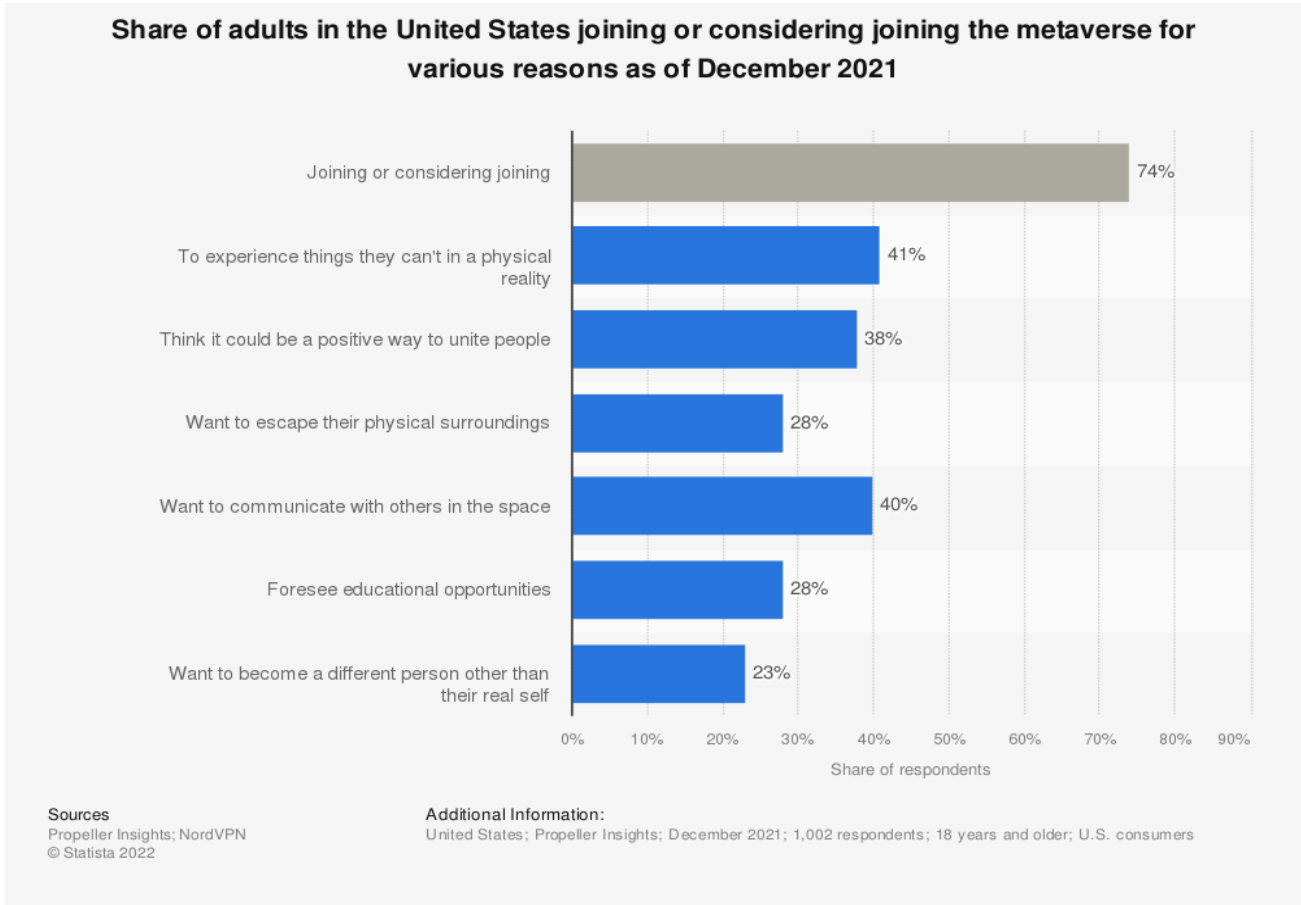
According to an interview conducted by experts Dr Sang-Min Park & Professor Young-Gab Kim (Dwivedi et al., 2022), there are four major differences between the current metaverse and the previous Second Life metaverse. 1) The new metaverse is more natural and offers greater immersion than did the previous one; it offers high recognition performance and a natural generation model due to the development of deep learning. 2) Unlike the previous PC-based metaverse, the current metaverse uses mobile devices to increase accessibility and continuity. 3) With the development of security technologies such as blockchain and virtual currency (e.g., Dime, Bitcoin), the economic efficiency and stability of metaverse services have improved. 4) Due to the limitations of offline social activity (e.g., Covid-19), interest in the virtual world has grown (Dwivedi et al., 2022).

Recently, there has been a renewed interest in the concept of the Metaverse. Companies like Facebook, Google, and Microsoft are investing heavily in virtual reality and augmented reality technologies, with the goal of creating a fully immersive Metaverse (Johnson, 2020). These technologies aim to blur the line between the physical and digital worlds, allowing users to interact with digital objects and other users as if they were in the same physical space. As technology continues to advance, the development of the Metaverse will undoubtedly continue to evolve, opening up new possibilities for people around the world.

As of a December 2021 survey in Fig.2, 74% of adults in the United States said that they were going to join or were considering joining the metaverse. Overall, 41% of respondents stated that their reason for wanting to join the metaverse was to experience things they couldn't do in physical reality and 38% thought that the metaverse could be a positive way to unite people.

Additionally, 23% of those asked said that they wanted to join the metaverse in order to become a different person other than their real self. (Statista, 2022)

Each Metaverse platform may offer different user experiences. We can distinguish roughly between three different categories of Metaverse platforms: consumer, organizational, and industrial. (Consumer, Enterprise or Industrial? The 3 Main Ways We Are Using the “Metaverse” Explained, n.d.) Of course, just like in the physical world, in the Metaverse and Virtual Worlds, all usages may blur. Organizational and industrial metaverse platforms focus on work-related and business applications. But this paper focuses on consumer Metaverse applications, which includes social, dating, shopping, entertainment, and gaming. The following chapter will reveal the various trends and signals occurring in the world right now are strong indicators of the adoption of new forms of creative and social technologies and applications. (Maslow, 1943)



[Fig.2] Share of Adults in USA Joining or Considering Joining the Metaverse (Statista, 2022)

TRENDS AND SIGNALS

World trends refer to the major developments and shifts that are taking place in different spheres of society, including technology, politics, and culture. These trends are important to evaluate in the context of the impact of virtual worlds on well-being because they can help to inform our understanding of the broader social and cultural factors that are contributing to the rise of virtual worlds and the potential consequences of this trend. By examining world trends put forth by foresight research trend maps, news articles, blogs and social media, we can gain insights into the ways in which virtual worlds are affecting human behavior. This section focuses social, technological and economic trends of human-computer interactions, physical and mental health and value systems.

Society (Summarizing various news, research, and trend map articles)

- **“Move fast Break Things” Pushback**

The "Move fast Break Things" trend is a response to the rapid pace of technological development and the desire to constantly innovate. This approach can lead to unintended consequences, such as the spread of misinformation or the misuse of personal data. The trend is often associated with large tech companies that prioritize growth and innovation over responsibility. The tension between innovation and responsibility is highlighted by this trend. The trend is experiencing pushback due to its potential unintended consequences, such as the spread of misinformation or the misuse of personal data. Smaller tech startups have also embraced this trend.

- **Remote On:** The COVID-19 pandemic has accelerated the trend of remote work and interaction, which has been growing rapidly over the past five years due to technological advancements. This has led to changes in work culture and expectations, including the implementation of flexible hours and the shift from physical office spaces to virtual ones. The trend towards remote work has been driven by a desire for greater flexibility and work-life balance, as well as the need to adapt to changing

circumstances. While challenges such as isolation and burnout exist, it is likely that this trend will continue to grow in the coming years.

- **Digital Inequality:** As many as 40% of the population still lack access to the internet, leading to digital inequality and social and economic inequality. This lack of access can be due to factors such as poverty, location, and infrastructure. The COVID-19 pandemic has highlighted the importance of digital access, as many activities have shifted online. Those who lack access to digital resources may struggle to participate in activities such as work, education, and healthcare, further exacerbating their disadvantages. Governments and organizations around the world have implemented initiatives to address digital inequality, but there is still much work to be done to ensure equal access to digital resources and opportunities.
- **Loneliness:** Loneliness and social isolation have become increasingly prevalent in recent years, both in developed and developing countries. The causes of loneliness are multifaceted and include factors such as social change, aging populations, and the rise of digital communication. Some of the effects of loneliness include negative impacts on mental and physical health, decreased social trust, and reduced productivity. Addressing loneliness and social isolation will require a multifaceted approach that includes both individual and societal-level interventions. Potential solutions include community-building programs, increased access to mental health services, and the development of technology that can facilitate meaningful social interactions.

Technology

- **Digital Detox:**
Digital detox is a popular trend where individuals take a break from technology to reduce stress and increase mindfulness. Overuse of technology can lead to burnout, anxiety, and depression. The constant notifications and distractions that come with technology can make it difficult to focus and be productive. Taking a break from technology can help reduce stress, increase focus and productivity, and improve overall mental health. There are several ways to practice digital detox, including

taking a break from social media, turning off notifications, and setting aside designated times for technology use.

- **Big Tech Power Concentration (NN):** The trend of big tech power concentration, also known as the "fourth power," refers to the significant influence that large technology companies wield over legislation, economics, and innovation. As technology companies have gained more power and influence, they have been able to shape the direction of innovation and influence government policies related to technology. The power of these companies has led to concerns about their lack of accountability and the potential for negative consequences, such as the spread of misinformation or the misuse of personal data. These companies have had a significant impact on the economy, with many of them becoming among the largest and most profitable companies in the world, and on the political landscape, with many governments struggling to keep up with their influence. The trend highlights the need for greater accountability and transparency in the technology industry.
- **Decentralization (Innovation Zone)-**
Decentralization is a technological trend driven by the development of blockchain technology, the Internet of Things, and the emergence of the Metaverse concept. Younger generations have expressed a desire for greater openness and freedom in the digital world. Decentralization can lead to greater transparency and accountability, as well as increased user control over their data and digital identities. However, there are also challenges associated with decentralization, such as ensuring that decentralized systems are secure and reliable, and issues related to interoperability and standardization. The trend highlights the importance of balancing innovation and responsibility in the technology industry.

Economic

- **Attention Economy:**
The attention economy is the concept that attention is a valuable commodity in today's digital age, leading to its monetization through advertising and other media-related industries. The rise of social media and other digital platforms has contributed to the attention economy by

using addictive features to capture and hold users' attention. This has caused concerns about the impact of social media on mental health and the spread of harmful content. The effects of the attention economy include significant innovation in the media and advertising industries, personalized content and services, but also privacy concerns and sensationalist content. Media companies, advertisers, and social media platforms share the responsibility to ensure that they are not engaging in harmful practices.

- **Gen Z Impact:**

Generation Z has grown up in a completely digital world, which has shaped their needs and defined new expectations from products and services. They are known for their ability to navigate digital platforms with ease and their preference for authenticity and transparency. According to a report by McKinsey, they are more likely to support brands that prioritize sustainability and social justice, and engage in activism and social causes. They focus on individuality and self-expression, embrace diverse identities, and reject traditional gender norms. They are also more likely to seek out products and services that cater to their unique needs and preferences.

- **Meta-economics, Crypto, and NFTs:**

The Metaverse is a virtual universe that will be accessible to anyone with an internet connection. It will be populated by virtual avatars that can interact with one another and with virtual objects. Cryptocurrencies like Bitcoin and Ethereum and NFTs are expected to play a significant role in the economics of the Metaverse. The use of crypto and NFTs is expected to create a new economic ecosystem that is independent of traditional financial institutions, allowing for the creation and exchange of virtual goods and services. However, there are also concerns about the potential negative consequences of the use of crypto and NFTs in the Metaverse, such as environmental impact and fraud.

Using these trends as a foundation, the next section digs deeper into the signals, the systems and structures that enables these signals, worldviews that

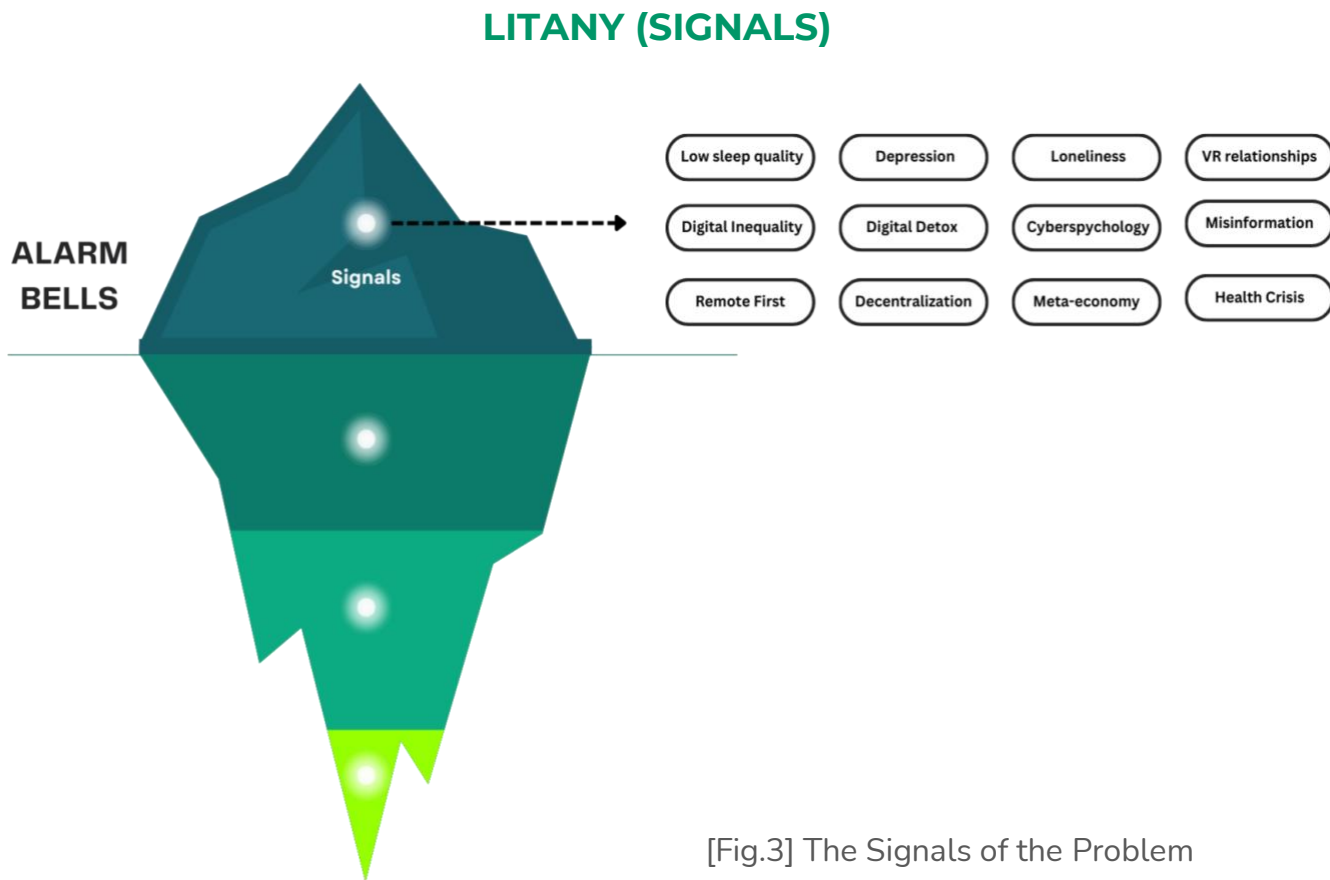
promote such systems and the underlying mindset that drives these worldviews using the Causal Layered Analysis systems framework.

THE ICEBERG: MULTIPLE LEVELS OF THE PROBLEM

Causal Layered Analysis (CLA) is a powerful system thinking tool that can provide a deeper understanding of complex issues related to the future of well-being in virtual worlds.

The four layers of CLA (iceberg) include the litany layer, which represents surface-level events and trends; the systemic layer, which encompasses underlying structures and paradigms; the worldview layer, which includes values, beliefs, and cultural norms; and the myth/metaphor layer, which consists of deeply ingrained narratives and archetypes (Inayatullah, 1998). By exploring each of these layers, we can identify and address root causes of problems and create strategies for positive change.

By examining the underlying structures and assumptions that shape virtual worlds, we can identify potential sources of conflict, risk, and opportunity. For example, by exploring the worldview layer, we can gain insight into the values and cultural norms that underpin virtual worlds, and how they may influence human behavior.



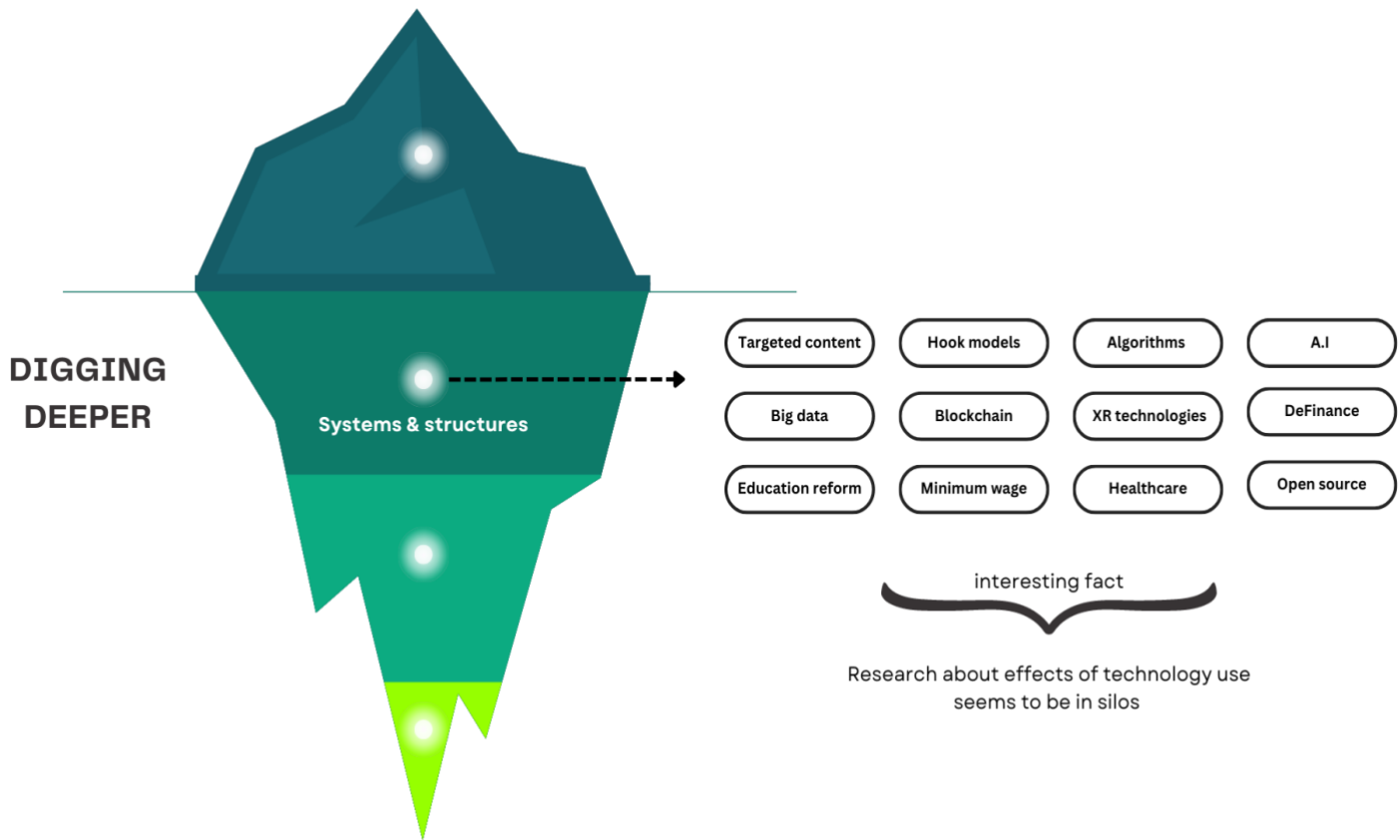
Over the past few years, several signals have emerged that suggest increased virtual platform use.

1. A decline in sleep quality has been associated with increased usage of virtual platforms, as studies indicate that excessive screen time can interfere with sleep patterns (Owens et al., 2018). Additionally, higher rates of depression and loneliness have been linked to the use of virtual platforms, with certain research connecting social media usage to heightened feelings of social seclusion (Primack et al., 2017).
2. The emergence of virtual reality relationships has been recognized as a possible trend, with some specialists proposing that such relationships may become more widespread as technology continues to progress, particularly in immersive environments (Spiegel, 2018).

3. Digital inequality is an escalating concern, with unequal access to technology and digital competencies potentially intensifying existing social and economic disparities (Lloyd & Friedel, 2018).
4. Digital detox and cyber psychology have surfaced as areas of research and practice, with some experts recommending more deliberate use of technology and a heightened focus on the psychological effects of virtual platform utilization (Chou & Edge, 2012; Rosen et al., 2013).
5. The proliferation of misinformation and false news has become an increasingly urgent problem in the age of virtual platforms, with social media and other online platforms playing a significant role in the propagation of inaccurate information (Wardle & Derakhshan, 2017).
6. The prevalence of remote work has grown, with the COVID-19 pandemic expediting the transition towards remote work and online cooperation (Dunford & Tippett, 2020).
7. Decentralized platforms and meta-economies have arisen as possible remedies to some of the issues related to centralized virtual platforms, with some specialists supporting more decentralized methods of governance and ownership (Sundararajan, 2018).
8. The ongoing health crisis has emphasized the significance of virtual platforms for communication, collaboration, and networking, as many individuals and organizations have come to depend on virtual platforms for work, education, and social engagement (WHO, 2020).

Overall, these signals suggest a complex and rapidly evolving landscape of virtual platform use, with both potential benefits and risks for well-being and social cohesion.

SYSTEMS AND STRUCTURES



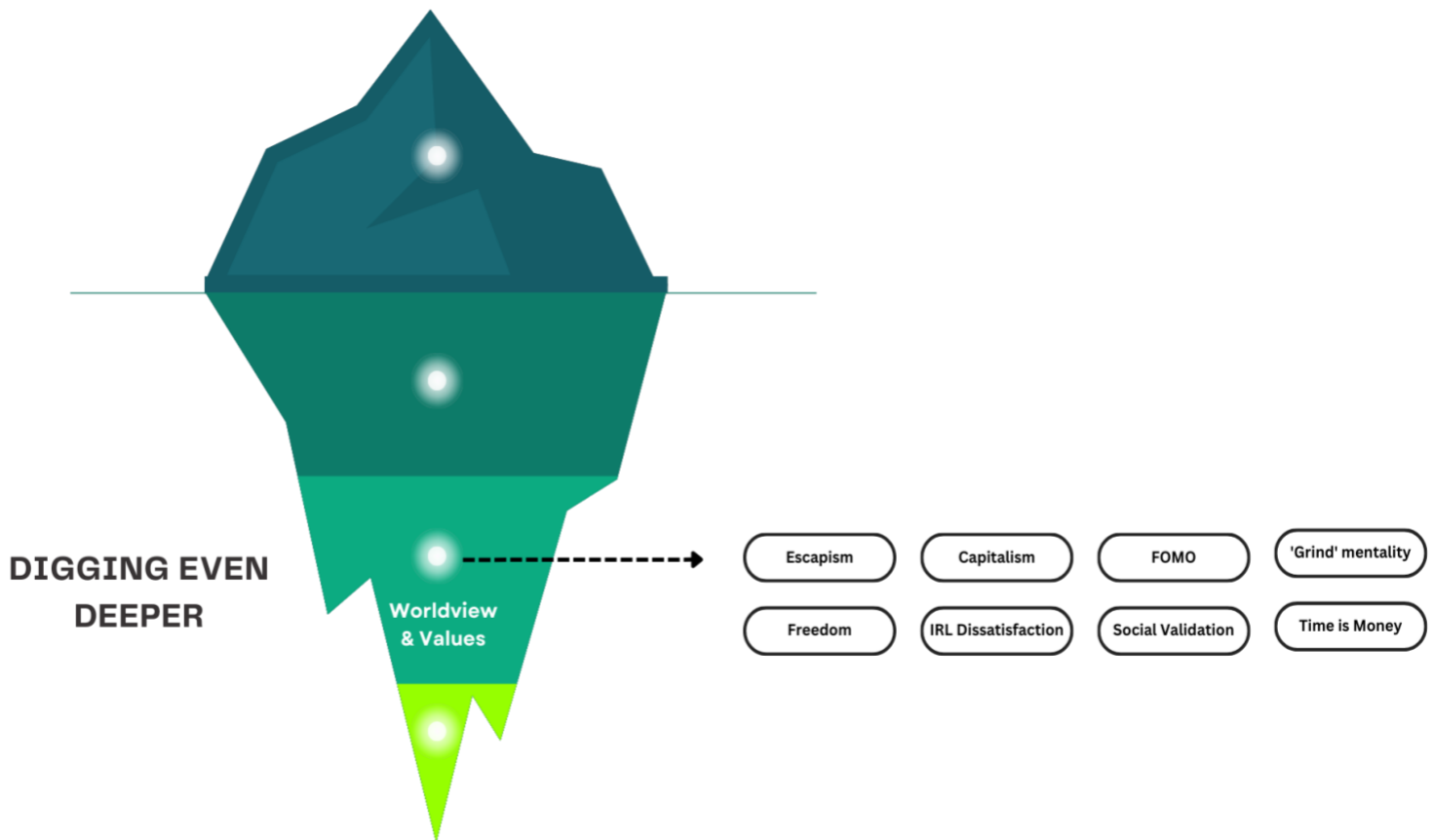
[Fig.4] The Systems Supporting the Problem

The emergence of these signals are supported by a range of systems and structures that incentivize engagement and consumption.

1. Targeted content algorithms have enabled virtual platforms to tailor content to users' preferences, making it more engaging and addictive (Lanier, 2018). Hook models, such as those used by social media platforms, leverage behavioral psychology to encourage users to engage with the platform more frequently (Eyal, 2014).

2. Artificial intelligence and big data are being used to personalize content, optimize engagement, and automate decision-making on virtual platforms (Nafus & Sherman, 2014; Tufekci, 2018).
3. Blockchain technology is enabling decentralized governance and ownership models for virtual platforms, potentially reducing the power of centralized platforms (Swan, 2015).
4. XR technologies, such as virtual and augmented reality, are creating new opportunities for immersive experiences on virtual platforms, potentially increasing their addictive qualities (Vorderer & Klimmt, 2004).
5. DeFi, or decentralized finance, is a rapidly growing area of blockchain technology that is enabling new forms of virtual economic activity and ownership (Swan, 2020).
6. Education and minimum wage policies can influence the extent to which individuals are able to access and engage with virtual platforms, potentially exacerbating digital inequalities (Noble, 2018). Healthcare systems can play a critical role in supporting individuals who may be experiencing negative impacts of virtual platform use, such as depression or sleep problems (WHO, 2020).
7. Finally, open-source software services are enabling new forms of collaboration and innovation in the development of virtual platforms, potentially increasing their accessibility and reducing the power of centralized platform providers (Benkler, 2006).

WORLDVIEWS AND VALUES



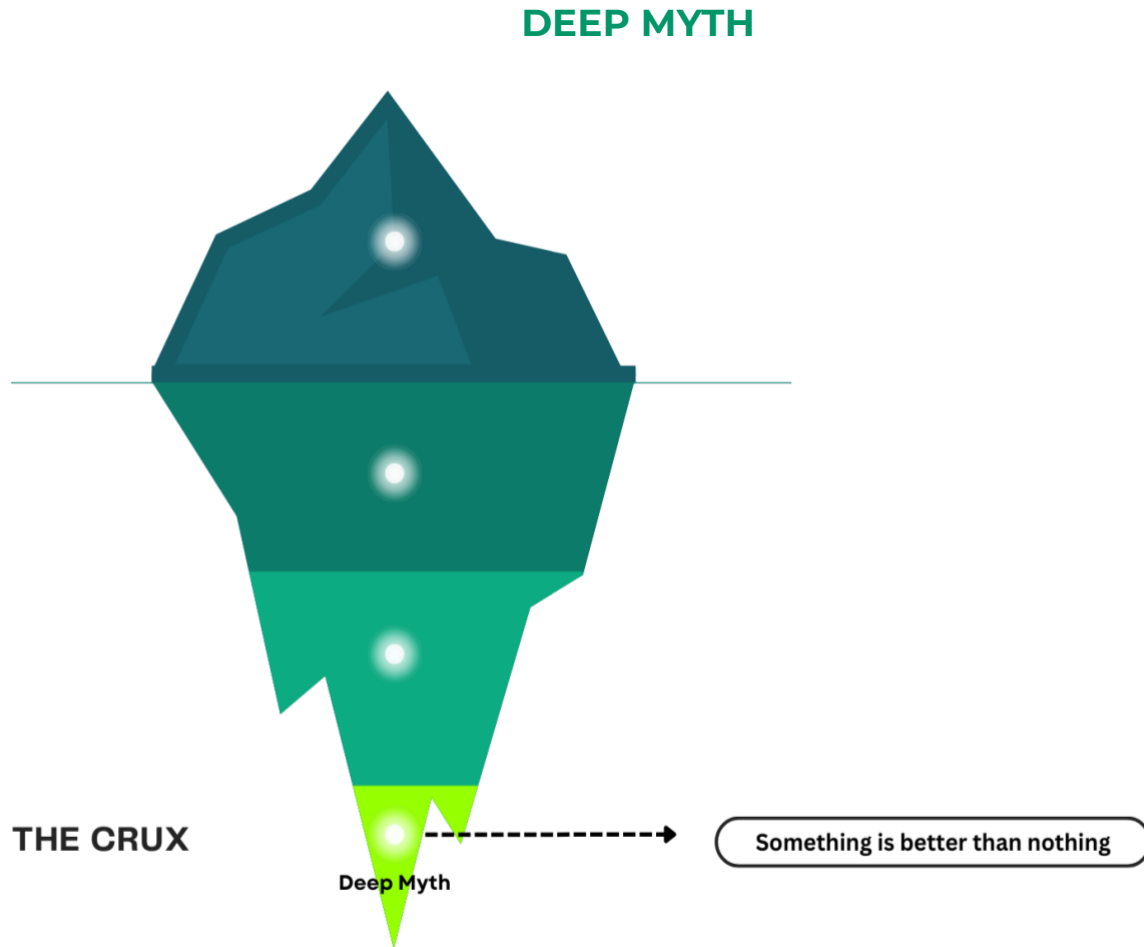
[Fig.5] The Worldviews supporting the Problem.

The systems and structures that support them are fueled by a range of worldviews and values that incentivize and reinforce online engagement and consumption of virtual resources.

1. Escapism, or the desire to retreat from reality, is a key motivator for virtual platform use, especially during times of stress or dissatisfaction with real-world circumstances when one isn't equipped with the proper tools to cope with stress (Barak et al., 2008; Kuss & Griffiths, 2012).
2. Capitalism and the pursuit of profit are key drivers of many virtual platform business models, encouraging constant growth and engagement to maximize revenue (Fuchs, 2017).
3. FOMO, or the fear of missing out, is a psychological driver of virtual platform use, as individuals seek to stay connected and up-to-date with their social

networks and online communities and are anxious about not staying up to date with their peers (Przybylski et al., 2013).

4. The 'grind' mentality, or the idea that hard work and constant engagement are necessary for success, can lead individuals to prioritize virtual platform use over other disconnected offline activities or quality time in relationships (Leménager et al., 2018).
5. Freedom and autonomy are highly valued in many cultures and are often associated with the ability to engage via online platforms on one's own terms, especially location freedom. (Baumeister & Leary, 1995).
6. IRL dissatisfaction, or dissatisfaction with one's real-life circumstances, can lead individuals to seek out virtual platforms as a way to escape or compensate for real-world challenges or limitations (Kuss et al., 2017).
7. Social validation, or the desire for approval and recognition from others, is a key motivator for virtual platform use, as individuals seek to build and maintain social connections, reputation, and identities online (Boyd & Ellison, 2008).
8. Finally, the value of time as money is a key aspect of many cultures and can lead individuals to prioritize efficiency and productivity over leisure or relaxation which many times is associated with an online activity (Van der Aa et al., 2015).



[Fig.6] The Deep Myth Causing the Problem

The most profound level of the iceberg model is the "fundamental or deep myth" layer. This layer embodies the essential beliefs, principles, and presuppositions that form the foundation of a specific occurrence or system (Inayatullah, 2008). These myths are frequently unspoken and unquestioned, making them challenging to identify and confront. Nevertheless, they can significantly impact how people and societies perceive and interact with their surroundings.

A potential example of a fundamental myth contributing to problematic virtual platform usage is the belief that "something is better than nothing." This myth implies that any form of social interaction, even if facilitated through technology, is superior to a complete lack of connection.

This myth can be especially persuasive for those who may struggle with self-assurance, social abilities, or coping strategies to handle stressful real-world situations. In such instances, online social platforms can offer a feeling of connection, affirmation, or escape that might be absent in face-to-face interactions.

Considering that technology is designed to help us evade discomfort, the desire to dodge challenges, uneasiness, or rejection may lead people to engage in compensating behaviors. These behaviors benefit the individual momentarily by providing temporary relief, diversion, or gratification. However, over time, such compensation can be detrimental, as it may result in a lack of resilience, self-efficacy, and genuine social capabilities.

Moreover, it may cause dependence on technology for emotional regulation or social connection, rather than cultivating the skills and resources needed to manage real-world relationships and challenges. This dependency could contribute to feelings of seclusion, disengagement, and dissatisfaction with one's actual life situation (Vanman et al., 2020).

In summary, the fundamental myth of "something is better than nothing" can be a potent force in driving compensating behavior and usage of online social platforms. Although such behavior may be advantageous for the individual in the short term, it can have adverse effects on well-being and social cohesion in the long run.

Chp. 2- Well-being and Problematic Virtual Use

“We have paleolithic emotions, medieval Institutions and godlike technology.”

— Dr. E.O. Wilson, Sociobiologist

This chapter aims to define psychological well-being and its 6 dimensions. It also expands on the definition of Problematic Internet Use to build a more inclusive definition of Problematic Virtual Use, its core drivers and 360° impact on the mind, body and society.

WHAT IS PSYCHOLOGICAL WELL-BEING?

Psychological well-being refers to a person's overall state of mental health, including their emotional, social, and psychological functioning. It is simultaneously the absence of the crippling elements of the human experience – depression, anxiety, anger, fear – and the presence of enabling ones – positive emotions, meaning, healthy relationships, environmental mastery, engagement, and self-actualization (Adler et al., n.d.).

Psychological well-being considers a broader spectrum of constructs than what is traditionally conceived of as '*happiness*' (Novak & Adamskaya, 2017). It is not merely the absence of mental illness but the presence of positive emotions, satisfaction, and a sense of purpose in life (Ryan & Deci, 2001).

Scientifically, psychological well-being is defined by several theories. Two such prominent theories are the hedonic and eudemonic views of well-being.

The hedonic approach posits that happiness involves positive emotions and the absence of negative ones, a subjective experience of happiness and pleasure. It is often associated with the pursuit of pleasure and the avoidance of pain (Subjective Well-Being: Three Decades of Progress, n.d.).

The second is the eudaimonia approach, which suggests that happiness results from individuals attaining their full potential through full psychological functioning. It is the sense of purpose and fulfillment that comes from living a meaningful life. It is more focused on personal growth, self-realization, and the pursuit of excellence (Waterman, 1993). The multidimensional model of psychological well-being aligns with the eudaimonia approach and aims to fulfill human potential through six key features: autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance (Guerra-Bustamante et al., 2019).

6 DIMENSIONS OF PSYCHOLOGICAL WELL-BEING

Defined by Guerra-Bustamante, (2019)

1) Self-acceptance:

High self-acceptance: Individual indicates a positive attitude towards themselves, including acknowledging and accepting multiple aspects of themselves, both good and bad qualities, and feeling positive about their past life.

Low self-acceptance: Individual indicates dissatisfaction with themselves, disappointment with what has occurred in their past life, troubled with certain personal qualities, and a desire to be different than what they are.

2) Autonomy:

High Autonomy: Individual is self-determining and independent; can resist social pressures to think and act in certain ways; regulates behavior from within; and evaluates themselves by personal standards.

Low Autonomy: Individual is concerned about the expectations and evaluations of others; relies on judgments of others to make important decisions; and conforms to social pressures to think and act in certain ways.

3) Environmental Mastery:

High Environmental Mastery: Individual has a sense of mastery and competence in managing the environment; controls complex array of external activities; makes effective use of surrounding opportunities; and can choose or create contexts suitable to their personal needs and values.

Low Environmental Mastery: Individual has difficulty managing everyday affairs; feels unable to change or improve surrounding contexts; is unaware of surrounding opportunities; and lacks a sense of control over the external world.

4) Personal growth:

Here are two descriptions of personal growth:

Strong personal growth: Individual feels like there is a constant development and expansion, are open to new experiences, and are seeing improvement in oneself and one's behavior over time. They have a sense of realizing their potential and are changing in ways that reflect more self-knowledge and effectiveness.

Weak personal growth: Individual feels stagnant and lacks a sense of improvement or expansion over time. They might feel bored and uninterested with life and feel unable to develop new attitudes or behaviors.

5) Positive relationships:

Strong Positive Relations: Individual has warm, satisfying, trusting relationships with others; is concerned about the welfare of others; is capable of strong empathy, affection, and intimacy; and understands the give and take of human relationships.

Weak Relations: Individual has few close, trusting relationships with others; finds it difficult to be warm, open, and concerned about others; is isolated and frustrated in interpersonal relationships; and is not willing to make compromises to sustain important ties with others.

6) Purpose:

Strong Purpose in Life: Individual has goals in life and a sense of directedness; feels there is meaning to the present and past life; holds beliefs that give life purpose; and has aims and objectives for living.

Weak Purpose in Life: Individual lacks a sense of meaning in life; has few goals or aims, lacks a sense of direction; does not see purpose of past life; and has no outlook or beliefs that give life meaning.

WELL-BEING AND TECHNOLOGY USE

Virtual Worlds consist of three primary motivations for online usage: Social interaction, gaming, and consumer activities such as dating, shopping, entertainment, and sports (Heng et al., 2021). Technology use, such as social media and gaming platforms, can have both positive and negative effects on the various dimensions of psychological well-being.

The following table gives a quick glimpse into some of the benefits and challenges of virtual worlds:

Benefits	Challenges
Improved accessibility: The metaverse has the potential to make education, healthcare, and other services more accessible to people in remote or underserved areas.	Technology misuse and socially engineered cyber-attacks: Centralized user data could potentially be used for nefarious purposes and breeding grounds for cyber-attacks, harassment, and misinformation.
Enhanced creativity: Can explore and experiment with new forms of art, communication and problem solving.	Addiction and dependency: Potential to be addictive or escapist, negatively impacting mental health, identity, productivity, and social cohesion.
Expanded socialization: Creates new social networks, jobs, businesses, and industries, providing opportunities for innovation and growth.	Displaced socialization: Virtual worlds can create a sense of detachment from real-life social interactions, leading to a decrease in social skills, response prediction errors and isolation.

On the positive side, technology can provide social support, enhance communication, and facilitate self-expression (Hussain & Griffiths, 2009). Immersive 3D virtual worlds could offer the ability to enhance real-world features and customize the surrounding environment to individual needs. Virtual reality (VR), augmented reality (AR), and mixed reality (MR) have been utilized as tools in the diagnosis and treatment of various mental health disorders for the past decade. Studies have shown positive results in their effectiveness in treatment. VR/AR/MR have been considered a potential solution to the shortage of mental health professionals and lack of access to mental healthcare.

Virtual worlds, such as video games and social media platforms, can provide a sense of escapism and immersion that can lead to both hedonic and eudemonic happiness. Hedonic happiness can be achieved through the pleasure and excitement of engaging in immersive virtual worlds. Eudemonic happiness can be achieved through the sense of purpose and personal growth that comes from achieving goals and progressing in virtual worlds.

However, beyond the motion sickness and nausea caused by current technological limitations, as virtual reality becomes increasingly realistic, we must consider the potential long-term effects. Young adults often spend a significant amount of time playing 3D immersive games and using social media, leading to potential negative effects such as insecurity, anxiety, depression, and behavioral addiction. In addition, excessive scrolling through social media platforms can negatively affect individuals' attention span and worsen symptoms of adolescents with attention deficit hyperactive disorder or ADHD. (Turkle, 2011; Dwivedi et al., 2022; Armstrong et al., n.d.)

Excessive or maladaptive use of virtual worlds can also lead to negative outcomes, such as social isolation, cyberbullying, addiction, isolation, loss of IRL (In real life) social skills and a loss of connection with reality. (Twenge et al., 2017; Kuss & Griffiths, 2011)

For instance, the accessibility of internet pornography that is already on its way in the VW space and is becoming increasingly accessible, could lead to severe

addiction and make real-world relationships less appealing, potentially resulting in weakened marital bonds and increased divorce rates. We must also investigate the potential for increased aggression, violence, and isolation, as similar negative effects have been observed with less-immersive technologies like video games. (World Economic Forum, n.d.)

WHY FOCUS ON CHALLENGES?

Core human needs as per Maslow's hierarchy of needs puts relationships or "love/belonging", Achievement "sense of esteem" and identity development or "self-awareness" at the forefront of human development and advancement. Media studies theorists Sherry Turkle (Turkle, 2011) and Michel Foucault (Foucault, 1988) argue that Virtual Worlds will be detrimental to those participating in it as consumers, as a result of how it does not satisfy one's needs for substantial relationships, in comparison to physical experiences, and of how it produces a virtual self that inhibits self-actualization. (de Castro, 2023)

An example of a Virtual World is to be expected to come from Meta Platforms. CEO Mark Zuckerberg refers to books like "Snow Crash" and "Ready Player One" when describing his vision, which describes a day-by-day usage of the Metaverse (Mark Zuckerberg Outlines His Vision for a Ready Player One-like Metaverse and It Sounds Wild, n.d.). It heavily seems to imply an escapism from the modern, dysfunctional world. A Facebook (Meta Platforms) whistleblower working on the Metaverse has warned that the Metaverse will indeed be addictive. Beyond whistleblower reports and uncovered documents, research has shown that the internet, video games and social media in particular, can cause or exacerbate mental health issues such as anxiety or depression, attention deficit disorder, eating disorders, body dysmorphia disorder, and can be highly addictive (Sternlicht, L., and Sternlicht, A., 2022). This poses to change the fabric of some essential elements of human development and well-being. A deeper analysis in the following sections show the impact of this technology on the essential elements of socialization, the feeling of achievement, identity and environmental attunement and the core drivers that enable it.

EXPANDING THE DEFINITION: 'PROBLEMATIC INTERNET USE' TO 'PROBLEMATIC VIRTUAL USE'

Because of its scope, its projected popularity and its immersivity, the metaverse may pose unique opportunities and risks for mental health. This study integrates existing evidence on the mental health impacts of problematic internet use, problematic social media use and internet gaming disorders to anticipate how the metaverse could influence mental health. Further, this section proposes an update to the limited definition of 'Problematic Internet Use' and moves towards a more inclusive definition of 'Problematic Virtual Use' as the phenomenon that not just includes problematic internet behavior but also the problematic use of social media, gaming, consumerism, and the future of immersive technologies.

Problematic internet use (PIU) is a phenomenon that has been the subject of much research in recent years. It is defined as "an inability to control one's use of the internet which leads to distress or functional impairment" (Griffiths, 2005). This definition is intentionally broad and is essentially a multidimensional syndrome that consists of cognitive, emotional, and behavioral symptoms that result in difficulties with managing one's offline life. The literature suggests that symptoms include using the Internet as maladaptive mood regulation, compulsive use of the Internet, a preference for online social interaction, cognitive preoccupation with the Internet, and negative outcomes due to Internet use (Caplan, 2005a, 2005b).

Studies have shown that PIU has significant correlations with loneliness, depression, shyness, aggression, introversion, and social skill deficits (Caplan et al., 2009). Secondly, the cognitive and behavioral symptoms of PIU are particularly linked to online social interaction. (Davis, 2001) suggests that PIU arises mainly from the unique social environment available online. (Morahan-Martin and Schumacher, 2000) found that problematic use of the internet is differentiated from less problematic use based on interpersonal uses of the internet.

One of the most well-known categories of PIU is internet addiction. Internet addiction is characterized by excessive and compulsive use of the internet and is often associated with symptoms such as withdrawal, tolerance, and negative effects on

social, occupational, or other areas of functioning (Young, 1998). Other categories of PIU include cyberbullying, online gambling, and excessive online shopping.

What qualifies as problematic use?

One of the key differences between problematic and non-problematic use is the ability to control one's behavior and maintain offline well-being. Non-problematic use is characterized by the ability to use the internet or engage in other online activities in a way that does not interfere with other areas of functioning, while problematic use is characterized by an inability to control one's behavior in a way that leads to negative consequences (Kuss & Lopez-Fernandez, 2016).

There are several factors that can contribute to problematic use. One of the most significant factors is the ease of access to the internet, as well as the availability of online activities that can be engaging and rewarding (Kuss & Lopez-Fernandez, 2016). Additionally, personality factors such as impulsivity and sensation-seeking have been found to be associated with problematic internet use (Kuss & Griffiths, 2012). Furthermore, social factors such as social support and social norms can play a role in determining whether or not someone engages in problematic internet use (Wartberg et al., 2014).

Similarly, research on PIU in the context of gaming has shown that excessive gaming can lead to several negative outcomes, including decreased academic performance, lower levels of social support, and decreased physical health (Rehbein et al., 2015).

However, the definition of problematic internet use (PIU) needs to be updated and expanded to address the current and future landscape of virtual activities and immersive technologies. During analysis of literature review and various past studies, it was realized that traditional PIU definitions focus on web1 and web2 experiences, such as social media, gaming, and business applications, often studied in silos. This segmented approach does not reflect the increasingly interconnected and immersive nature of digital experiences, as well as the emergence of web3 technologies and their impact on users' well-being.

By including web2 and web3 experiences, PVU provides a more accurate representation of the transforming digital landscape. Furthermore, PVU emphasizes the study of user impact through a multidimensional approach to understanding and addressing problematic virtual behaviors including psychology, physiology, and society. This expanded definition allows for a more nuanced understanding of the factors that contribute to PVU and the development of more effective prevention and intervention strategies, ultimately fostering healthier interactions between individuals and the ever-evolving digital world.

	Problematic Internet Use	Problematic Virtual Use
Concept of tech use	Web1.0 + Web2.0 (SNS, Gaming, Consumerism)	Web2.0 + Web3.0 + Future of immersive technologies and other human-computer interactions
Research definitions of online tech use	<p>Problematic internet use (PIU): An inability to control one’s use of the internet which leads to distress or functional impairment” (Griffiths, 2005). This definition is intentionally broad and is essentially a multidimensional syndrome that consists of cognitive, emotional, and behavioral symptoms that result in difficulties with managing one’s offline life.</p> <p>Social Media Addiction: Characterized by excessive concern, motivation, time and effort spent online, leading to impairment in IRL social activities, education or occupation, interpersonal relationships, and psychological well-</p>	Gap: These definitions do not cover future virtual or immersive arenas and technology

	<p>being. It is also known as Social Media Use Disorder or Networks Use Disorder (Andreassen, 2017).</p> <p>Internet Gaming Disorder (IGD): The ICD-11 describes IGD as "a pattern of gaming behavior ('digital-gaming' or 'video-gaming') marked by an impaired ability to control gaming, an increasing emphasis placed on gaming over other activities to the point that gaming supersedes other interests and daily pursuits, and the persistence or intensification of gaming despite the manifestation of negative consequences" (World Health Organization, 2019).</p> <p>Online Shopping Addiction (OSA): Consumerism enabled by recognized predictors of addictive behaviors in general: low self-esteem, low self-regulation, negative emotional state and female gender as well as predictors specific to the online retail medium: enjoyment, social anonymity and cognitive overload. (Rose & Dhandayudham, 2014)</p>	
<p>Methodologies to study the impact of tech use</p>	<p>Disaggregated silos</p>	<p>Aggregated 360° view</p>

Dominant philosophy	Largely addiction-based motivation	Largely compensation-based motivation
Research conducted	Conducted reactively. (In hindsight)	Conducted proactively. (In foresight)

PROBLEMATIC VIRTUAL USE (PVU)

Most research on the harms of Problematic Internet Use, social media and Gaming has been conducted in hindsight, as the world started discovering the negative consequences of excessive or mindless use of social platforms. Much of this research seems to be conducted **reactively**. However, as XR technologies develop and the internet becomes more immersive, we can anticipate the emergence of PVU as the next iteration of Problematic Internet Use. This phenomenon of PVU can be researched **proactively** and in foresight- taking into consideration the discoveries of past research, as well as foresight and systems tools to anticipate future problems. Hence, a new definition of Problematic Virtual Use (PVU) is proposed to address the limitations by offering a comprehensive and holistic perspective on the issue. PVU incorporates the interconnectedness of PIU, SMA, IGD, and problematic consumerism such as Online Shopping Addiction (OSA) while also considering the future of immersive technologies, including but not limited to virtual reality, augmented reality, and mixed reality applications.

As a starting point, Problematic Virtual Use (PVU) may be defined as “a *maladaptive pattern of engagement in various online platforms, virtual activities and immersive technologies, characterized by excessive and compulsive behaviors that cause significant impairment in an individual's social, cognitive, emotional, or occupational functioning and may or may not be an attempt to fulfill unmet physio-psycho-social needs in the real world that are essential for an individual's well-being.*”

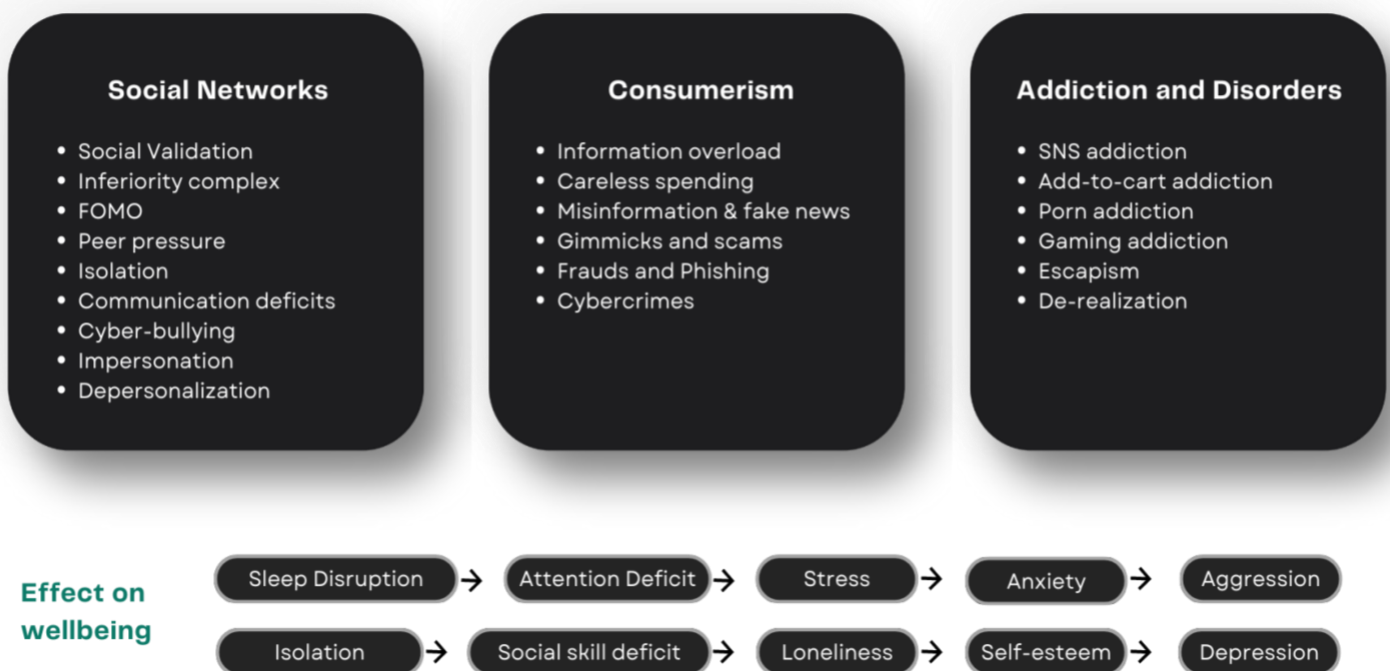
PVU may also involve a persistent need to access virtual worlds, neglect of real-world activities and relationships, and impaired control over virtual world use (Kuss et al., 2017).

This umbrella term not only encompasses problematic internet use, problematic social network use, gaming addiction, and problematic consumerism, but also addresses anticipated and unanticipated developments in future human-computer interactions and immersive technologies as shown in Fig.7 below.

Crucially, individuals will exhibit varying uses and psychological reactions to the metaverse, leading to diverse effects on their mental health. Aspects such as their technological motivations, developmental phase, sociodemographic context, and pre-existing mental health issues may alter and shape the positive and negative consequences of the virtual worlds on their mental well-being.

[Fig.7] The 3 Dimensions of Problematic Virtual Use

3-DIMENSIONS OF PROBLEMATIC VIRTUAL USE



“This may not be a problem of addiction, as much as a problem of compensating for core needs that aren’t met in real life (IRL).” - (Kardefelt-Winther, 2014)

MOVING FROM ‘COMPULSION’ TO ‘COMPENSATION’

A 2014 study investigated the psychological characteristics of gamers as predictors of excessive internet, social media, and gaming use, and concluded major drivers of problematic use to be social anxiety, loneliness, need for achievement and coping with stress. (Kardefelt-Winther, 2014)

As a result, the authors suggested an alternative explanation for internet addiction, which they call *"compensatory internet use."* This interpretation highlights that excessive internet use may be a coping mechanism rather than a compulsive behavior (Kardefelt-Winther, 2014). This distinction has important implications for how the cause of PVU, its negative outcomes, and mitigation strategies are studied. Until now, research on this topic has mostly focused on addiction and predictors of addictive behavior. In contrast, (Shen and Williams, 2011) proposed a different perspective. “It is clear now that the effects of [internet use] are very much dependent on the purposes, contexts, and individual characteristics of users. In other words, who they are, with whom they use the media, and for what purposes collectively explain a sizable portion of the consequences of use.”

The metaverse could potentially aid short-term mental health by providing control (over an avatar and its virtual environment), cognitive stimulation, physical activity, social connections, and a sense of autonomy and competence. Nevertheless, repeated gratifying and compensating experiences might result in addiction-like behaviors, and extensive involvement in virtual realms may encourage and sustain the evasion of real-life challenges. Moreover, the time dedicated to virtual worlds may displace (diminish) other factors that contribute to mental health, such as sleep patterns and offline social connections.

Research has shown that excessive virtual world use can lead to social isolation, reduced academic or professional performance, dissociation, loss of self-determination,

loneliness and physical health problems and have negative impacts on depression, anxiety, and addiction (Kuss et al., 2014). The immersive and interactive nature of virtual worlds can make them particularly engaging, which can lead to increased usage time and difficulty disengaging from virtual world activities. This can make it challenging for individuals with PVU to balance virtual world use with real-world responsibilities and relationship.

PVU may be marked by the following components:

1. **Excessive and compulsive engagement:** The individual spends an inordinate amount of time on virtual activities or immersive technologies, often prioritizing them over essential life responsibilities and interpersonal relationships.
2. **Loss of control:** The individual struggles to regulate their virtual use and experiences difficulty in reducing or stopping their engagement despite negative consequences.
3. **Negative consequences:** The individual's virtual use results in significant distress, interference with daily functioning, or impairment in social, emotional, or occupational domains.
4. **Withdrawal and tolerance:** The individual may experience withdrawal symptoms when not engaged in virtual activities or may require increasing amounts of time or intensity of use to achieve the desired level of gratification.
5. **Escapism or mood alteration:** The individual often turns to virtual activities or immersive technologies as a coping mechanism to alleviate stress, anxiety, or depression, leading to an unhealthy reliance on these platforms for emotional regulation.

The following chapters builds upon this body of research and serves as a foundation for the theory that PVU may occur because the internet has something to offer that the individual wants or needs and doesn't receive in real life (IRL). This need may align with the idea of coping mechanisms as core drivers of problematic behavior and not necessarily the compulsive nature of addictions (Kardefelt-Winther, 2014).

CORE DRIVERS OF PROBLEMATIC VIRTUAL USE

“We make decisions as a function of the environment that we're in.”

-Dan Ariely, Behavioral Economist

How might PVU be detected?

PVU could be detected through various means, including self-report measures, clinical interviews, and behavioral observations. Self-report measures can assess individuals' attitudes, beliefs, and behaviors related to virtual world use, while clinical interviews can identify the severity and impact of PVU on psychological well-being. Behavioral observations can track individuals' actual usage of virtual worlds, including frequency and duration of use, to identify patterns of excessive, compulsive or compensatory behaviors (Kuss et al., 2017).

Core Drivers of PVU:

Yee (2006, 2007) developed a validated framework that outlines the motivational factors that drive individuals to play massively multiplayer online (MMO) games. This framework has been used in research on excessive use of online platforms, including the studies conducted by Caplan et al. (2009) and Kuss et al. (2012) used in previous chapters. Given that the primary motivations for virtual world use includes social media and gaming (Heng et al., 2021), Yee's framework has been used in this study as a starting point to understand core drivers.

The framework assesses a player's inclination towards online gaming in relation to three primary motivations: achievement, social interaction, and immersion (escapism) (Caplan et al., 2009).

The achievement motivation assesses the player's desire to gain power, advance quickly, and amass in-game status or wealth.

The social interaction motivation measures the player's desire to chat with others, form relationships with other players, and experience a sense of community within the game.

Finally, immersion involves role-playing with other players, customizing the character's appearance, knowing information about the game that most other players do not know, and using the game as a form of relaxation, escapism, or avoidance of real-life problems (Caplan et al., 2009).

The study found that all three motivations were significantly related to problematic internet use, with social interaction being the strongest predictor. This suggests that individuals may turn to virtual worlds as a way to satisfy their social needs, which can lead to problematic use.

Maslow's theory (Maslow, 1943) of human motivation provides a broader perspective on the drivers of human behaviour, identifying five categories of needs that must be fulfilled in a hierarchical order. The needs range from physiological needs, such as food and shelter, to self-actualization needs, such as personal growth and fulfillment. Maslow suggests that individuals are motivated by a hierarchy of needs, and each level of needs must be satisfied before they can move up to the next level.

Comparing the findings of these two studies, Caplan et al. (2009) and Maslow (1943) highlight the importance of compensatory social interaction, achievement, and immersion or escapism in driving problematic virtual world use. While Maslow's theory provides a more general perspective on human motivation, Caplan et al.'s research provides a specific application of this theory to virtual worlds. Both studies suggest that individuals may turn to virtual worlds to **fulfil unmet needs, particularly social needs**, which can lead to problematic use. Ultimately, both suggest that understanding these underlying motivations of virtual world use is critical in preventing problematic use and promoting psychological well-being.

COMPENSATING FOR BROKEN WELL-BEING

Because of its scope, its projected popularity, and its immersivity, the metaverse may pose unique opportunities and risks for mental health. It may benefit mental health by affording control (over an avatar and its virtual environment), cognitive activation, physical activity, social connections, and a sense of autonomy and competence. However, repetitive rewarding experiences may lead to addiction-like behaviors, and high engagement in virtual worlds may facilitate and perpetuate the avoidance of challenges in the offline environment. Further, time spent in virtual worlds may displace (reduce) other determinants of mental health, such as sleep rhythms and offline social capital. According to a 2022 study (Paquin et al., 2022), 2 broad categories of mechanisms, by which the metaverse may influence mental health, emerge: experiences or behaviors that are **afforded (short-term)** by its use and experiences or behaviors that are **displaced (long-term)** by it. Some of these compensatory mechanisms are visualized in detail in Fig. 8 below.

What sets the virtual worlds apart from previous technologies is the greater immersivity it affords, compared with traditional social media and video game devices. Immersion seems to be a factor that could amplify many of the mental health impacts described above: with greater immersion may come greater displacement of bodily awareness, greater embodiment over one's avatar, greater sense of co-presence with internet-based friends, and generally more vivid experiences. In turn, these features and experiences are likely to shape the motivations, affordances, and mental health risks associated with virtual world use. (Paquin et al., 2022)

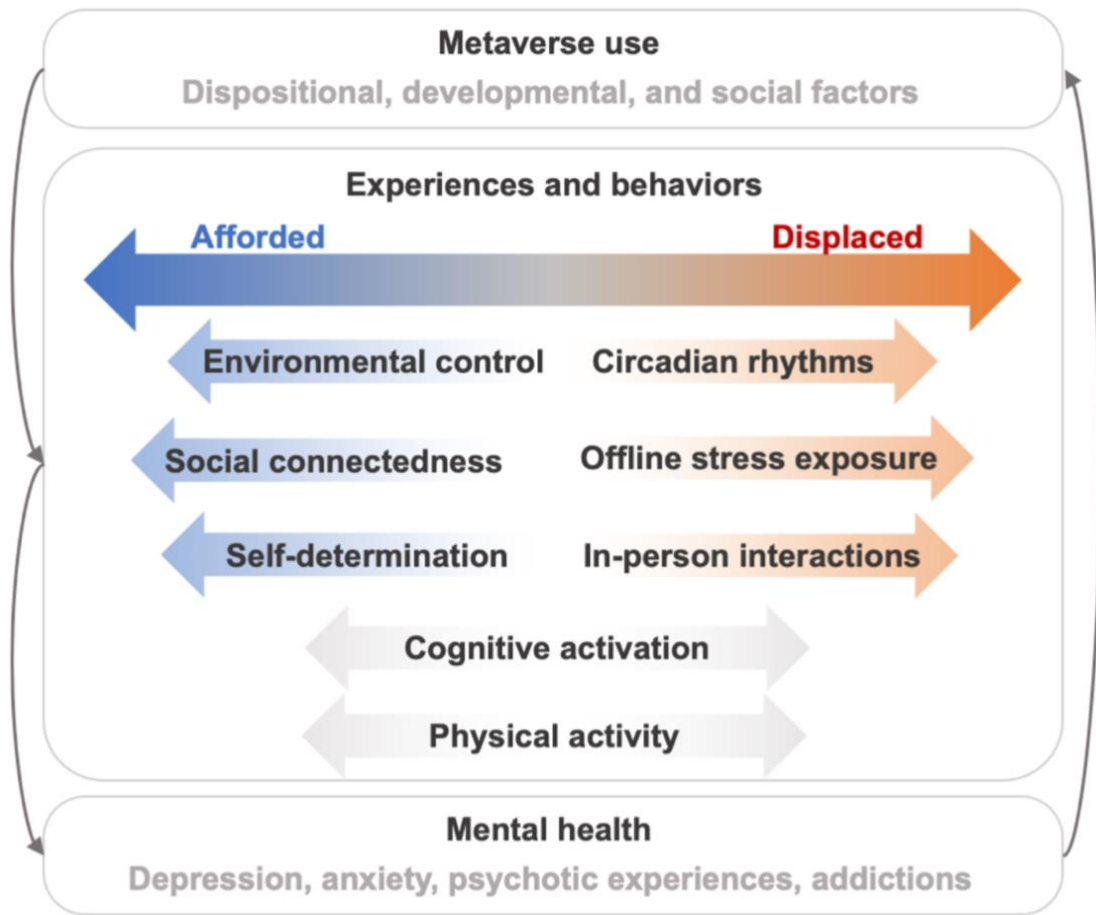


Figure 8. Interplay among Metaverse use, experiences, behaviors, and mental health. Participation in the Metaverse may afford certain experiences and behaviors relevant to mental health, while displacing others. The type of use, as well as individual and contextual factors, likely influence these effects. Together, these mechanisms subsequently influence mental health outcomes. In turn, mental states reciprocally influence interactions with the Metaverse.

[Fig.8] Mental Health Experiences Afforded and Displaced by the Metaverse, (Paquin et al., 2022)

Given the drivers and motivations at play discussed in the previous chapter, let's take a deeper look at the 6 dimensions of psychological well-being and how individuals may use such compensatory mechanisms for fractures in their wellbeing, causing perhaps unintentional engagement in problematic virtual use.

1) Self-acceptance → Self-representation → Low Self-esteem/Increased Self-discrepancy.

According to Goffman's *self-presentation theory* (Dolezal, 2015), and Gonzales and Hancock's hyperpersonal model of behavior suggests that computer-mediated communication allows users to optimize their self-presentation, providing an advantage over face-to-face communication. It can be argued that the performance of the digital self is a carefully calculated self-presentation (Gonzales and Hancock, 2011).

Individuals tend to carefully craft an image and reputation of their ideal selves on social platforms, which can lead to social comparison struggles. This means that individuals may struggle to find mostly upward comparisons to measure themselves against, resulting in an average day being compared with the 'greatest hits' of others (Zhao et al., 2008).

Avatar creation has become a significant research topic in the field of computer-mediated communication due to its crucial role in online social networks as the primary mode of communication or in conjunction with other modes. One of the primary reasons for creating avatars is to represent one's identity (Zimmermann et al., 2022.) According to Lin and Wang (2014), the creation of open avatars is linked to specific motives such as exploring digital worlds, finding friends, and portraying one's own identity. This is aimed at fulfilling the needs of self-expression and self-esteem (Sibilla and Mancini, 2018). For example, on social network sites, people may manipulate their photos to build a more desirable image. In online games, players can pick or construct different game avatars (Loewen et al., 2021).

In a study (Canada, 2009) analyzing Avatar behavior in Second Life, residents were found to be able to accumulate wealth, power, and reputation throughout the virtual community by investing their personal time and money in

their avatar. Users exhibited a growing attachment to their virtual personas and saw their avatar as a reflection of their physical selves. When devoting hours to interaction in virtual worlds, users developed new extensions of themselves to explore and broaden their individual identity. For some players, their online avatar proved to be more central and essential than their physical avatar. [28] Players perceived their game avatars as more extroverted and less neurotic (Bessièrè et al., 2007), and also rated the virtual avatar in Second Life as more outgoing and attractive than themselves (Messinger, 2007).

According to the theory of *transformed social interaction* (Bailenson et al., 2008), one of the main dimensions of avatar-mediated communication is the transformation of self-representation. This dimension allows users to strategically alter their avatar's appearance and behavior, regardless of their actual characteristics. Bente et al. (2008) have also identified the strategic emphasis and suppression of avatar features as a central factor in avatar-mediated communication. These findings suggest that avatar creation may serve as a compensation for flaws seen in the actual self and self-esteem issues.

According to *impression management theory* (Mummendey, 1995), individuals attempt to present themselves in the most positive and idealized manner possible (Mummendey, 1995). *Self-discrepancy theory* (Higgins, 1987) distinguishes between three types of self:

- Actual (how we really are);
- Ideal (how we would like to be);
- Ought (how we think we should be in the society we live in) (Higgins, 1987).

The actual self represents one's current self-image, while the ideal self includes the representation of how one wishes to be perceived and the qualities one desires to possess. How we feel about ourselves depends on the gap between different self-representations (Higgins, 1987) and people will experience self-discrepancy when they perceive their actual self as distanced from their ideal self and ought self (Hu et al., 2022).

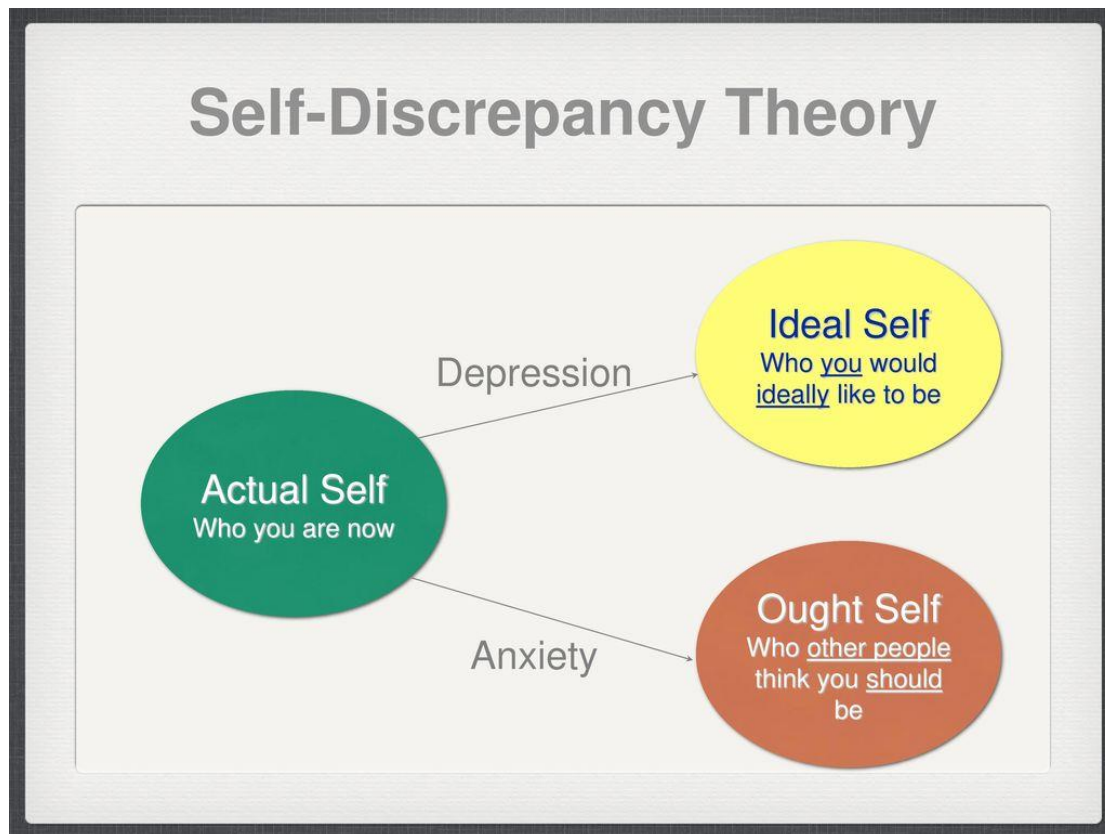
Self-representation as Compensatory Mechanism for Self-acceptance:

Scholars proposed the concept of virtual self-discrepancy to describe the degree to which an individual's virtual identity deviates from the individual's actual identity in the real world (Jin, 2012). A lot of information and values that users receive online could affect their self-image which in turn, could affect their level of self-discrepancy. For example, exposure to ideal photos on social network sites and the promotion of ideal, thin, perfect skinned models in online advertisements tend to make people more concerned and self-conscious about their body type (Kim and Damhorst, 2010; Ahadzadeh et al., 2017). Many tend to compare themselves with these ideal images and perceive a greater self-discrepancy. Such comparison also has a significant impact on the individuals' assessment of their body parts (Flynn et al., 2020a,b). Young people are susceptible to the trends of virtual peer groups and many strive to meet these expectations in order to become popular (Siibak, 2009). Therefore, when individuals compare online ideal images to themselves, the difference between their actual self and ideal self becomes more complex and more difficult to fulfill. In this case, individuals may experience greater self-discrepancy.

(Bessièrè et al., 2007) found that players with lower psychological wellbeing are more likely to experience greater virtual self-discrepancy and vice versa. Different types of self-discrepancies can result in various psychological discomforts, such as dejection-related emotions (such as disappointment, dissatisfaction, and shame) and agitation-related emotions (such as fear, guilt, and self-contempt) (Higgins, 1987). When individuals experience such negative emotions, they may engage in non-deviant, deviant or escapist behavior to alleviate the psychological discomfort (Higgins, 1987). Virtual self-discrepancy can also induce negative experiences in self-presence (Jin, 2012). Studies found that such discrepancy in Second Life is negatively associated with self-presence and flow as well as increased levels of anxiety and depression.

In this view, avatar creation may be a form of or lead to compensation for dissatisfaction with one's actual self or self-esteem issues and significant self-discrepancy can result in negative emotions (Higgins, 1987), such as depression (Bessièrè et al., 2007) and problematic online behavior (Lemenager et al., 2020).

[Fig.9] Impact of Self-discrepancy on Well-being (Higgins, n.d.)



2) **Autonomy → Social or Algorithmic determinism → Lowered Self-determination**

Self-determination theory defines self-determination as “means acting with a sense of choice, volition, and commitment, and it is based on intrinsic motivation and integrated extrinsic motivation” (Deci & Ryan, 2010). The book, *Intrinsic Motivation and Self-Determination in Human Behavior* (Deci & Ryan, 1985) suggests that there are two different types of behavior regulation or motivation:

- Autonomous motivation or regulation refers to acting out of a sense of willingness, volition, and choice (Deci, 2017).
- Controlled motivation or regulation refers to acting out of a sense of pressure, demand, or obligation (Deci, 2017).

Research surrounding this theory has found that autonomous regulation is linked with greater overall well-being. “Those behaviors that are more self-determined and less controlled are associated with a stronger sense of personal commitment, greater persistence, more positive feelings, higher quality performance, and better mental health” (Deci & Ryan, 2000). Studies have found that autonomous motivation is also associated with greater creativity and improved problem-solving (Deci, 2012).

Conditions for autonomy include decisions that are in accordance with one’s own second-order desires (Frankfurt, 1971), values (Watson, 1975), practical identity (Korsgaard, 1996), or after engaging in critical reflection. Individuals require certain skills, capacities, and powers known as ‘autonomy competencies’ to act autonomously. These include the ability to reason and critically reflect on their values, create different alternatives, develop a concept of morality, and view themselves as self-directing agents deserving of respect. (Sahebi & Formosa, 2022) When such a process is inhibited, it may be categorized as ‘oppressive socialization’.

Social environments may be oppressive to autonomy without obvious signs because socialization tends to influence how individuals perceive the world from a paradigm level, be it the standards of beauty that society aspires to, what defines success, or what career paths are seen as desirable. According to relational accounts, these social interactions help people develop the skills they need to be independent, but can hinder it if they are unhealthy, oppressive or manipulated through certain crafted information or environments.

According to Christman's view (Sahebi & Formosa, 2022) of autonomy, a person's values are considered autonomous only if they would not resist holding those values if they became aware of the historical process that led them to hold those values. This requires some rational self-reflection and no self-deception. However, if a person is brainwashed, manipulated, or oppressed into holding certain values, they are not considered autonomous.

Algorithmic Determinism as Compensatory Mechanism for Autonomy:

A study of 194 users of Second Life, which is the largest social virtual world, found that the sense of presence and perceived autonomy are influential in users' continued use of social virtual worlds. (Yoonhyuk Jung, 2011) “Perceived” is the key term here. Much of the literature that explores virtual social platforms fail to engage in

depth with the philosophical literature on autonomy (Sahebi & Formosa, 2022). A study by (Sahebi & Formosa, 2022) outlines three related but distinct autonomy harms that may be inflicted on the users of social platforms: (1) disrespect of autonomy; (2) interference with the exercise of autonomy; and (3) impairment in the maintenance or development of autonomy competencies. Autonomy of users can be disrespected and harmed through the control that social platforms can have over its users' *data*, *attention*, and *behaviour* (Sahebi & Formosa, 2022).

Data:

As users navigate through and interact with one another in social platforms, they generate incredible amounts of data which are recorded and stored by the owners of the platforms. This data is subsequently used by the companies to generate profit, typically through selling advertising. "They are the world's largest advertising agencies that operate as big data collection and commodification machines" (Sahebi & Formosa, 2022). The loss of control by users over their data shows important autonomy implications.

Potential for exploitation of users: Exploitation of user data can be morally classified as a disrespect of autonomy, especially if users cannot reasonably refuse to participate in the exchange (Valdman, 2009) or only consents because some vulnerability of theirs is preyed on (consciously or not) by their exploiter (Wood, 1995). The loss of autonomous control over intimate data can also impact on the autonomy competencies of self-respect, self-love, and self-esteem (Sahebi & Formosa, 2022).

Control over Attention:

(Citton, 2017) provides a comprehensive account of attention by situating it within the economic model of "an attention economy". (Zulli, 2018) argues that "the glance", which is defined as "a quick, fleeting, and indiscriminate type of seeing", is a "key feature of what drives our attention economy" and allows us to examine "how digital technologies restructure user and economic behavior". In a constant competition to attract user's attention, companies design the architecture of their virtual platforms to manipulate and direct user's see. Although some may argue that users are able to regulate the content that they see by choosing who they follow, this perspective fails to acknowledge the intricate workings of social platforms, including the arrangement of content, the use of algorithms, and the significant economic influence held by social media companies to persuade individuals with high followings and attention to

promote what they want the users to see. Algorithms are central to what users view, consume and engage with on their platforms.

This leads to the creation of 'echo chambers' which leave users devoid of diverse ideas and beliefs, resulting in users only consuming heavily bias information or news e.g. Sole focus on one political perspective and not others, which may also lead to radicalization. Use of user data to manipulate the knowledge scape around a user is a direct threat to autonomous capacities. (Susser et al.,2019) found that Facebook can target vulnerable teenagers by tracking their profiles and displaying advertisements during moments of negative emotions, such as insecurity or feelings of worthlessness, to sell them products such as beauty creams or clothing. Such algorithms or the amplification of content can result in "'mismatched expectations' surrounding who individuals believe themselves to be (Identity self-discrepancy); which can lead to heightened states of anxiety, embarrassment and lowered self-esteem, self-love, and self-respect. (Sahebi & Formosa, 2022)

Behavior Control:

Such data and attention control can lead to manipulation on a rational and deliberative level, through influencing beliefs, desires, values, and critical thinking, and on an affective or emotional level, by exploiting emotions such as fear or disgust, to control the behaviors of others. Manipulation can occur through *deceiving* ("causing them to have false beliefs"), *tempting* ("creating a desire for what they lack reason to want"), and *inciting* ("causing an inappropriate emotional response") (Susser, et al., 2019). All three dimensions of manipulation are prevalent on virtual social platforms. Furthermore, addiction through the 'infinite scrolling' features, social pressures such as FOMO [fear of missing out], and continuous pop-up notifications is built in through design. (Sahebi & Formosa, 2022) Unrealistic expectations and comparison ideals lead to reduced self-esteem, which is an important autonomy competency and objective decision making.

3) Environmental Mastery → Dissociation and De-realization → Lowered Self-efficacy

If we could create a world where we can be whoever we want to be, however we want to be and wherever we want to be, and have the power to build our own environments, what is the motivation to overcome the discomfort, limited control and dysfunctions of this beautiful real world?

According to Bandura (1997), "perceived" self-efficacy can be defined as "the beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments." King, Delfabbro, and Griffiths (2010) suggest that video games can create a sense of self-efficacy or feelings of mastery. They explain that problematic gamers who have low self-efficacy levels in real life may compensate through playing video games that are specifically designed to facilitate and reward the gamer after succeeding at challenges in the video game. In this way, video games provide an encouraging terrain that enables gamers to foster needs of competence that, in turn, boost their self-efficacy levels, at least in the virtual world. (Gawlick, 2021)

Environmental Control as Compensatory Mechanism for Environmental Mastery:

According to the *displacement hypothesis*, excess virtual socialization and gaming displaces time spent on real-world activities and socialization, leading to reduced performance and efficacy in everyday life (Weis & Cerankosky, 2010). This results in a vicious cycle where the individual's perceived self-efficacy deteriorates, and the need for a sense of belonging or control is compensated in the online world, often at the expense of neglecting everyday real life (Jeong & Kim, 2011). This can lead to reduced mastery experiences in the real world (Bandura, 1997), which in turn can cause higher levels of depression, anxiety, social phobia, loneliness, and substance use (Gawlick, 2021).

According to Turkle (de Castro, 2023), virtual worlds and the formation of new identities pose a danger to users as they turn to these "consequence-free" spaces and carefully constructed environments that isolate them from others physically and are vastly different from the real world. This experience of existence could encourage users to increasingly disconnect from the physical world as well as dissociate from their sense of self, which is more fluid and multi-sided than what is depicted or created

online. Social media, video games, and mobile devices have already had negative effects and the immersive qualities of the metaverse may worsen these effects (de Castro, 2023)

Virtual Reality Dissociative Trance

DPD or depersonalized disorder is a sense of detachment and unreality toward oneself or the external world. The symptoms of depersonalization and derealization (DP/DR) lie on a continuum ranging from normal, everyday cognitive processes (such as daydreaming) to clinical manifestations such as full-fledged chronic dissociative disorder (Aardema et al., 2010). Depersonalization occurs when we feel disconnected from our bodies and thoughts. It can be a terrifying experience, and symptoms can include anxiety, panic attacks and more.

Research observed a case in 2000 of a child who experienced a dissociative trance after playing a video game for continuous hours. He identified as one of the main characters and left his home at night to 'fight his enemies and save a princess'. Following psychiatric hospitalization and medication to bring him back to lucidity, the study hypothesized that excessive hours of immersion at a very young age loosened the boundaries of the child's identity and sense of reality. This trance like state was termed as Video-terminal Dissociative Trance or VDT (Schimmenti & Caretti, 2010). DT was defined as a clinical syndrome related to problematic internet use and was determined by a combination of 3 factors: addiction, regression and dissociation. According to Schimmenti & Caretti (2010):

Addiction is defined by (a) a ritualistic involvement with the computer and its applications; b) obsessive and compulsive behaviors related to the virtual experience; (c) a tendency to daydream as a defense against problematic interpersonal relationships; (d) feelings of shame concerning the behavior; and (e) phobic tendencies toward real interactions.

Regression is defined by (a) an identification with the virtual experiences and relationships (virtualization) as a defense against overwhelming feelings of anxiety that derive from interpersonal stressors; (b) compulsivity and self-absorption in the use of a computer; (c) autistic and schizoid fantasies as a defense against overwhelming experiences; and (d) an impoverishment of object relations.

Dissociation is defined by (a) a weakening in the boundaries of the self and a reduction of self-coherence;(b) an inflated sense of self, controlled by peripheral yet dominant self-states; (c) an alteration in the sense of time; (d) depersonalization/derealization symptoms, and the weakening of reality testing; and (e) a marked alteration in the state of consciousness (trance), up to the loss of the customary sense of personal identity.

In VDT, individuals lose touch with reality and become absorbed in virtual worlds. This differs from typical interactions with technology because it replaces the integrative functions of the mind with alternative sensory experiences and virtual identities, which can negatively affect and eventually dissolve an individual's personality. VDT is a potentially impairing syndrome that involves a self-absorbed and trance-like state, where the entire mental experience is involved with auto-hypnotic phenomena and dissociation.

Multiple empirical studies have shown the relationship between dissociation and problematic internet use as well as a third factor; attachment pattern (Aardema et al., 2010).

Forbes published an article about a 2010 study that found that people were more likely to experience symptoms of depersonalization following a VR immersion. (Ra,n.d.)

In a study (Aardema et al., 2010), a nonclinical sample of 30 people were administered measures of dissociation, sense of presence, and immersion before and after an immersion in a virtual environment. Results indicate an increase in dissociative experience (depersonalization and derealization), including a lessened sense of presence in objective reality as the result of exposure to VR. Higher pre-existing levels of dissociation and a tendency to become more easily absorbed or immersed were associated with higher increases in dissociative symptoms resulting from VR immersion.

Dissociation is a defense mechanism that is a normal function of the human mind, which allows behaviors, thoughts, memories, and feelings to become split off from one another. It involves a disruption or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor

control, and behavior. Dissociation allows an individual to avoid temporary emotional distress by screening out excessive or overwhelming stimuli. However, when dissociation is relied upon as a person's primary response to stress, it can become pathological. This often happens when an individual is exposed to frequent and/or extreme traumatic experiences. In such cases, symptoms such as depersonalization, derealization, amnesia, compartmentalization, identity disturbance, and altered personality may emerge as a result. (American Psychiatric Association, 2013; Bromberg, 1996; Carlson et al., 2012; Dalenberg et al., 2012; Porges, 2001; Steinberg, 1993).

4) Positive relationships → Virtual socialization → Decreased social skills and isolation.

As virtual realms, the metaverse, and digital social platforms continue to expand at an unprecedented rate, the way in which we interact and socialize as humans has undergone a substantial shift. These virtual landscapes enable individuals to establish connections, converse, and participate in joint endeavors, thereby transcending physical boundaries and broadening their social circles. Although these platforms have undoubtedly made social experiences more accessible, a mounting body of research indicates that, in certain instances, virtual connections may act as a compensatory mechanism for offline socialization, potentially resulting in diminished real-world interactions and the emergence of social skill deficits (Valkenburg & Peter, 2009).

Virtual Relationships as Compensatory Mechanisms for Real Life Socialization:

Numerous studies have explored the role of virtual relationships as compensatory mechanisms for socialization, particularly among individuals experiencing difficulties in establishing and maintaining offline connections. For instance, Caplan (2003) found that individuals with high levels of social anxiety were more likely to use the internet as a form of social compensation, developing virtual relationships to fulfill their social needs. Similarly, (Kowert, Domahidi, and Quandt, 2014) reported that socially anxious individuals were more likely to seek out online gaming environments as a means to satisfy their need for social interaction.

Research suggests that the reliance on virtual relationships and reduced offline interaction may contribute to the development of social skill deficits. For example, a study by (Grieve, Indian, Witteveen, Tolan, and Marrington, 2013) revealed that individuals with high levels of problematic internet use exhibited lower levels of social skill development compared to their non-problematic counterparts. Moreover, (Kuss, Griffiths, and Binder, 2013) found that excessive online gaming was associated with impaired social functioning, suggesting that virtual environments may hinder the development and maintenance of essential social skills.

Going back to displacement theory, cross-sectional studies show that as the amount of time spent on video games increases, the severity of social anxiety also heightens (Gawlick, 2021). The perceived self-efficacy in interacting in 'real' offline interpersonal relationships reduces (Jeong & Kim, 2011) and is then, at least partially, responsible for the maintenance of the social anxiety arousal (Bandura, 1988). Despite a heightened sense of belonging and connectedness to online peers, increased feelings of social isolation, loneliness and (social) anxiety persist, suggesting that online relationships cannot replace face-to-face contacts for reducing those feelings (Stockdale & Coyne, 2018).

Virtual worlds use from a social compensatory perspective has also brought up new concerns and phenomenon in society such as *Phubbing*, *Touch Starvation* and *Response Prediction Errors*.

Phubbing: The act of snubbing someone in a social setting by looking at one's phone instead of engaging in conversation, has been identified as a growing concern in the context of virtual relationships and reduced offline interaction. A study by (Chotpitayasunondh and Douglas, 2016) found that phubbing was associated with decreased relationship satisfaction, increased depression, and reduced overall well-being. The authors argued that this behavior could lead to a decline in social skills, as individuals may become more reliant on their devices and less attentive to the needs and cues of their conversation partners.

Touch Starvation: The increasing reliance on virtual relationships and reduced offline interaction may also contribute to touch starvation, a phenomenon where individuals experience a lack of physical touch and intimacy in their lives. Touch is a

fundamental aspect of human socialization, playing a critical role in emotional regulation, stress reduction, and the formation of secure attachments (Field, 2010). As virtual relationships often lack the physical component of touch, individuals who primarily engage in online socialization may experience touch starvation, which could, in turn, hinder the development of essential social skills and emotional regulation abilities.

In Japan, the experience of touch deprivation can be seen in various situations, potentially resulting from a mix of cultural customs, shifts in lifestyle, and a growing dependence on technology. One instance of touch deprivation in Japan is the occurrence of "hikikomori," where people isolate themselves from social interactions and remain within the confines of their homes for an extended duration, leading to an absence of physical touch and social connections (Teo & Gaw, 2010).

Initially believed to be exclusive to Japan, hikikomori has been identified in other countries as well. Although technology use is not the sole cause, the escalating reliance on digital devices and virtual communication has been proposed as a contributing element to this social isolation (Kato, Kanba, & Teo, 2020).

Response Prediction Errors: Another factor that may contribute to reduced social skills in the context of virtual relationships is the concept of response prediction errors. In face-to-face interactions, individuals continuously make predictions about how others will respond to their actions, adjusting their behavior accordingly to facilitate smooth social exchanges (Frith, 2007). In virtual environments, however, response prediction can be more challenging due to the absence of non-verbal cues and the potential for communication delays. This difficulty may lead to an increased likelihood of response prediction errors, which could contribute to the development of social skill deficits and reduced confidence in real-life social interactions.

To summarize, while virtual relationships in the metaverse and online social platforms have expanded the possibilities for human socialization, there is evidence to suggest that they may serve as compensatory mechanisms for offline socialization in some cases. Incorporating the concepts of phubbing, touch starvation, and response prediction errors into the discussion of virtual relationships and social skill deficits highlights the complexity of this issue. This reliance on virtual relationships may

contribute to reduced real-life interaction and the development of social skill deficits. Further research is needed to understand the complex interplay between virtual and real-life socialization and to develop strategies to promote healthy social engagement in both online and offline environments.

5) Personal Growth → Reward Addiction → Addiction and Decreased Mindfulness

Personal growth is a critical aspect of psychological well-being, encompassing an individual's ability to develop their potential, expand their self-awareness, and maintain a sense of purpose and direction in life (Ryff, 1989)

Attention is a crucial cognitive process that plays a significant role in personal growth. Filtering out distractions is crucial for personal growth, as it allows us to focus our attention on what truly matters, and eliminate any hindrances that might impede our progress. Attention is also a precursor to mindfulness as it enables us to engage in reflective thinking, a critical component of personal growth. Reflective thinking allows us to examine our experiences, evaluate our beliefs and values, and gain insights into our thoughts and behaviors (Gagne, 1970). Mindfulness practices, such as meditation and deep breathing, can help us cultivate a greater sense of awareness and control over our thoughts and emotions, enabling us to filter out distractions more effectively.

From an emotional point of view, reflective thinking can help us better understand our emotions and how they impact our behavior. By reflecting on our emotions, we can develop greater emotional intelligence and self-awareness, which can improve our relationships with others and enhance our overall well-being. From a spiritual point of view, reflective thinking can help us develop a greater sense of purpose and meaning in life. By examining our beliefs and values, we can gain insights into our deepest desires and motivations, enabling us to align our actions with our true purpose. This can lead to a greater sense of fulfillment and happiness, as we become more connected to our inner selves and the world around us.

Distraction as a Compensation Mechanism for Personal Growth

In today's world, where virtual worlds and social platforms have become a ubiquitous presence, the ability to filter out distractions has become even more important. Prolonged use of virtual worlds and social platforms can lead to cognitive overload, which can hinder our ability to filter out distractions, have time for reflective thinking and focus on what truly matters (Hou et al., 2020).

Research has shown that the constant use of digital technologies can have a negative impact on our ability to engage in mindful and reflective thinking. Firstly, the constant availability of these platforms and the expectation of immediate response can lead to multitasking and fragmented attention (Oulasvirta et al., 2012). This divided attention impairs an individual's capacity for sustained focus and mindfulness, disrupting their ability to engage in self-reflection and personal growth (Levine et al., 2012). Secondly, virtual and social platforms can promote social comparison, which may foster negative emotions such as envy, dissatisfaction, and feelings of inadequacy (Festinger, 1954; Vogel et al., 2014). These negative emotional states can hinder mindfulness by triggering ruminative thinking and emotional reactivity, limiting an individual's ability to cultivate a non-judgmental, accepting awareness of the present moment (Nolen-Hoeksema, 2000).

Thirdly, the persuasive design of virtual and social platforms, which often employ reward-based systems (e.g., likes, comments, shares), can encourage compulsive and habitual use (Fogg, 2002). This compulsivity may result in mindless scrolling and consumption of content, further detracting from the practice of mindfulness and opportunities for personal growth (Turel & Serenko, 2012).

The reason for this is that these technologies promote a culture of distraction and instant gratification, where the emphasis is on immediate responses and rapid-fire interactions rather than deeper reflection and contemplation. As a result, our attention span has become shorter, and our ability to focus for extended periods has been eroded and risk of reward-based addictions have increased. These distractions can come in many forms, from external factors like notifications, alerts, and social media feeds, to internal factors like thoughts and emotions.

Reward Addiction as a Detriment to Personal Growth

Reward addiction refers to the excessive pursuit of pleasurable experiences, often at the expense of other meaningful activities and pursuits (Volkow, Koob, & McLellan, 2016). Virtual and social platforms are designed to elicit rewarding experiences, such as receiving "likes," comments, and followers, which activate the brain's reward system and release dopamine, a neurotransmitter associated with pleasure and reinforcement (Meshi et al., 2013). This reinforcement encourages further engagement with these platforms, potentially leading to an addiction-like cycle (Turel et al., 2014). Technology companies often employ hook models to drive user engagement, exploiting the brain's reward system to create habits and promote compulsive use (Eyal, 2014). These models involve a cycle of triggers, actions, variable rewards, and investments that keep users engaged with digital platforms. The constant exposure to these hook models can contribute to reward addiction and potentially undermine an individual's sense of purpose by prioritizing short-term gratification over long-term goals and meaningful pursuits (Alter, 2017).

The operant conditioning theory (Skinner, 1938) posits that behaviors are more likely to be repeated when they are reinforced by rewards. In the context of virtual and social platforms, these rewards come in the form of social validation and approval from peers (Nadkarni & Hofmann, 2012). As individuals continue to receive positive reinforcement for their virtual activities, they may prioritize these experiences over more meaningful pursuits that foster personal growth (Twenge, 2013).

Moreover, virtual and social platforms utilize intermittent reinforcement schedules, wherein rewards are delivered unpredictably, making them particularly addictive (Hofmann et al., 2017). Intermittent reinforcement can lead to an escalation in the pursuit of rewards, even when the probability of receiving them decreases. This dynamic can exacerbate reward addiction and further detract from personal growth opportunities (Lin et al., 2012).

Furthermore, the constant pursuit of rewards on virtual platforms can lead to a phenomenon called hedonic adaptation, wherein individuals become desensitized to the pleasurable effects of rewards and require increasingly higher doses of stimulation to achieve the same level of satisfaction (Frederick & Loewenstein, 1999). This

adaptation can create an insatiable appetite for rewards, further reinforcing the cycle of reward addiction and detracting from personal growth (Kuss & Griffiths, 2011).

The mechanism by which the use of online games can lead to addictive behaviors has been explained using the *Hedonic Management model* of addiction by Brown (1997) (e.g., Hussain et al., 2012; Lee et al., 2021). According to this model, activities that help achieve a positive hedonic tone may lead the individual to want to maintain this positive hedonic tone over time. This could distort the person's long-term goal-planning functions while simultaneously leading to addictive behavior.

Some authors have speculated that immersive VR experiences may provide intense psychological rewards (Sternlicht and Sternlicht, 2022) that could eventually lead to problematic compulsive use by users. The results of the study suggest that the addictive potential of VR apps, in their current state, is similar to that of other online activities based on more traditional media, such as video games or the use of social networking sites. However, "the fact that feelings of embodiment are a predictor of addictive VR use suggests that future applications employing more immersive technologies might prove more addictive for users" (Barreda-Ángeles & Hartmann, 2022). These behavioral addictions are characterized by symptoms such as excessive stimulus salience (i.e., recurrent thinking about the activity), mood modification (e.g., alleviating negative emotional states), tolerance (i.e., needing increasingly greater amounts of the activity), withdrawal symptoms (e.g., unpleasant feelings when the activity is discontinued), conflict (e.g., in interpersonal relationships), and relapse after discontinuation of the activity (Griffiths, 2005).

This is not to say that virtual worlds and social platforms are inherently bad. They can be incredibly useful tools for connecting with others, staying informed, and learning new things. We can strike a balance between the benefits of technology and the importance of reflection and introspection in our lives. Several strategies can be considered to address the negative effects of virtual use on personal growth, including promoting digital literacy and awareness of the potential risks associated with excessive virtual use. Developing healthier technology design practices that prioritize user well-being and encourage individuals to engage in activities that foster a sense of purpose and meaning outside of virtual environments (Fried & Hansson, 2018; Hancock & Rickman, 2021).

6) Purpose → Social Validation → Extrinsically Motivated Actions

One dimension of well-being that may be particularly affected by problematic virtual use is sense of purpose, defined as having a clear direction in life and a sense of meaning derived from pursuing personal goals (Ryff, 1989). The concept of purpose in life refers to the pursuit of meaningful goals and a sense of direction that contributes to psychological well-being and personal fulfillment (McKnight & Kashdan, 2009). Social validation, on the other hand, encompasses the process of seeking approval, affirmation, and recognition from others (Leary, 2001). While the pursuit of purpose is an intrinsically motivated and self-directed process, social validation often relies on external cues and feedback from others.

Social Validation as a Compensation Mechanism for Personal Purpose

Virtual and social platforms are designed to foster connection and communication, but they can also promote a reliance on social validation as a source of self-worth and identity (Nadkarni & Hofmann, 2012). As individuals seek validation from their virtual peers, they may become increasingly focused on extrinsic goals and the pursuit of superficial markers of success, such as "likes," followers, and shares (Kross et al., 2013) or increased popularity by participating in the latest 'trends' and 'hypes' prevailing.

This shift in focus could be a hindrance to the process of discovering and following one's purpose in life. Instead of engaging in self-reflection, goal-setting, and the pursuit of intrinsically motivated aspirations, individuals may prioritize the accumulation of social validation and external markers of achievement (Deci & Ryan, 2000). In doing so, they risk losing sight of their genuine interests, values, and passions, which are essential components of purpose-driven living (Steger et al., 2009).

Moreover, virtual and social platforms can foster social comparison, leading individuals to measure their success and worth against the curated lives of others (Festinger, 1954). This comparison can undermine one's sense of purpose and contribute to feelings of inadequacy, self-doubt, and dissatisfaction (Vogel et al., 2014). Instead of cultivating a unique and authentic sense of purpose, individuals may

feel compelled to conform to societal expectations and external standards, further hindering personal growth and fulfillment (Swann et al., 2007).

Research has also shown that excessive use of virtual and social platforms can have detrimental effects on psychological well-being due to the various reasons stated above, including increased symptoms of depression, anxiety, and loneliness (Primack et al., 2017). These negative emotions can impair one's ability to discover and

1dpursue a purposeful life, as they may lead to disengagement, withdrawal, and a lack of motivation (Seligman, 2002).

To summarize, the use of virtual and social platforms can contribute to social validation as a compensatory mechanism or detriment for discovering and following one's purpose. By prioritizing external validation and social comparison, individuals may lose sight of their intrinsic motivations, values, and passions, which are essential for leading a purpose-driven life. To mitigate these negative effects, it is crucial to promote a balanced approach to virtual platform usage and encourage self-reflection, authentic self-expression, and the pursuit of meaningful goals and aspirations.

360° IMPACT OF PROBLEMATIC VIRTUAL USE

Despite the growing body of research on the impacts of Problematic Virtual Use (PVU) on individuals and society, it is still predominantly studied in silos. This segmented approach primarily results from the separate examination of various aspects of PVU, such as Problematic Internet Use (PIU), problematic social network use, gaming addiction, and problematic consumerism. Several reasons can explain this siloed approach:

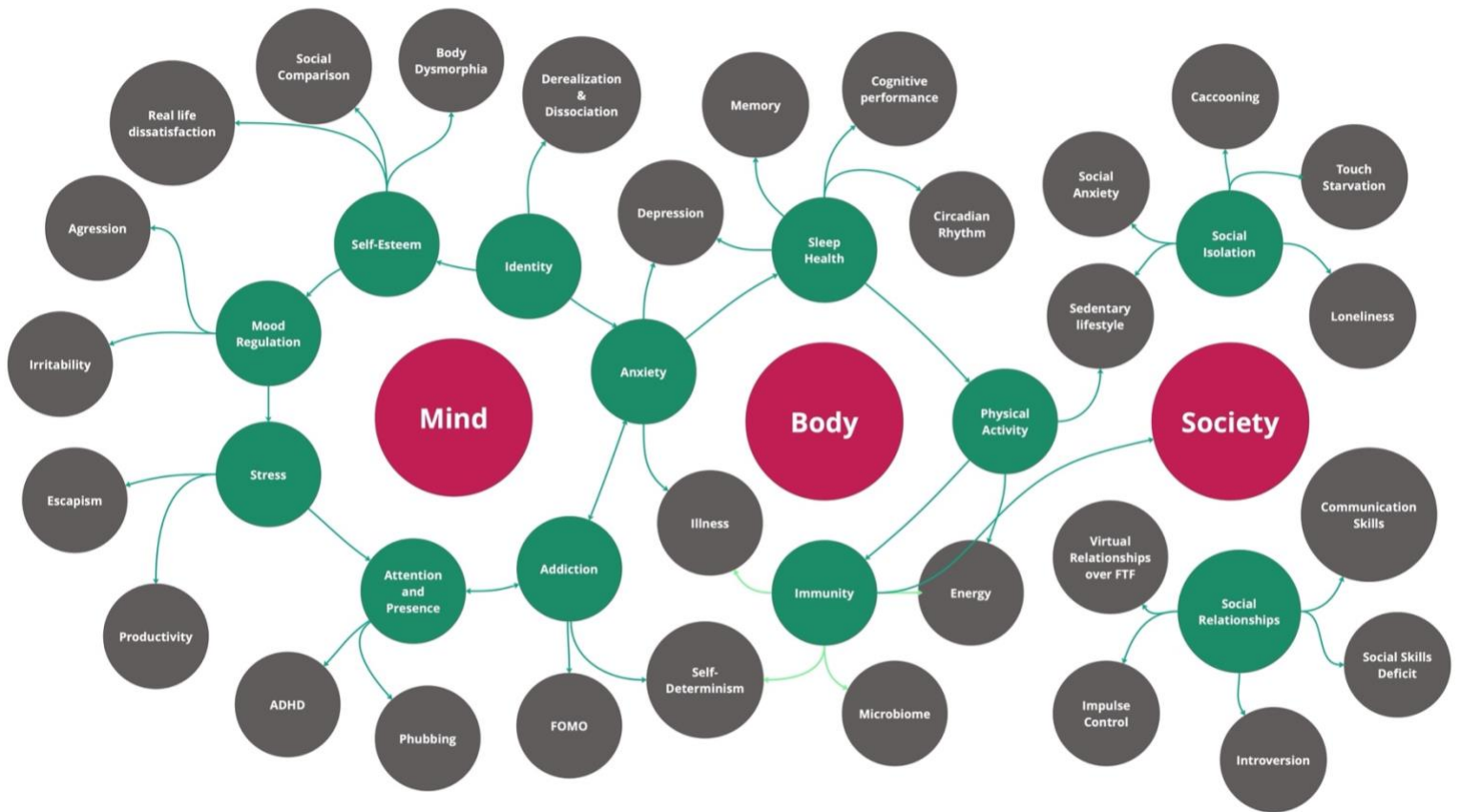
Firstly, the interdisciplinary nature of PVU research presents challenges in integrating findings from different fields, such as psychology, sociology, neuroscience, and information technology (Sundar & Limperos, 2013). These disciplines often have distinct research methodologies, theoretical perspectives, and terminologies, making it difficult to create a unified understanding of PVU and its impacts (Griffiths, 2000).

Secondly, the rapid evolution of digital technologies and virtual platforms has led to a focus on the immediate and specific impacts of emerging applications and platforms (Caplan, 2010). This emphasis on the novelty of each technology can contribute to a narrow focus on individual aspects of PVU, rather than examining the overarching patterns and relationships between various forms of problematic virtual behavior (Van Rooij & Prause, 2014).

To better understand the comprehensive impact of PVU, it is essential to adopt a 360° view that synthesizes findings from various disciplines and sub-domains of PVU research and by bringing together all the 3 dimensions of impact: Mind, Body, and Society. This holistic approach can provide valuable insights into the common underlying mechanisms, risk factors, and outcomes associated with problematic virtual behavior across diverse contexts (Kuss & Griffiths, 2017).

A 360° view such as the one synthesized in Fig.10 below, can also help to identify shared protective and intervention strategies that are effective across different manifestations of PVU (King et al., 2017). By examining the broader patterns and relationships between various forms of PVU, researchers, policymakers, and practitioners can develop more targeted and comprehensive prevention and treatment programs that address the root causes and consequences of problematic virtual behavior (Young, 2017).

[Fig.10] A 360° Impact View of Problematic Virtual Use (Incomplete)



How PVU might manifest:

Notable, how a metaverse impacts human behavior in the physical world will be a critical ongoing question as discussed in a study by (Koohsari et al., 2023). The study points out that:

1. It is likely that not all the existing issues in the relationships between the built environment and health can be discussed and tested in a metaverse in its current form.
2. A metaverse represents a virtual environment where individuals can interact and engage with others in a digital realm. It is uncertain, yet probable, that existing societal structures might be replicated within a metaverse, primarily due to the digital divide, which refers to the discrepancies among individuals based on their access to digital resources, capabilities, and knowledge (Koohsari

et al., 2023). Consequently, specific demographic groups, such as those with lower income, less education, or belonging to minority communities, could be excluded from a metaverse (or research concerning a metaverse) as a result of inadequate access, computer literacy, or a sense of security required to participate in metaverse-related research. As a result, new ethical dilemmas surrounding the prevention of the digital divide may need to be considered when conducting research involving a metaverse (Koohsari et al., 2023).

3. When people engage in a significant portion of their everyday routines (and hours) within a metaverse, they might become detached from the real world, opting for a metaverse instead, which can lead to mental health repercussions like social withdrawal, depression, and antisocial conduct. It is crucial to acknowledge the social seclusion induced by virtual spaces, particularly for children and teenagers (Koohsari et al., 2023). As an illustration, a rise in online gaming has been linked to a reduction in the social networks of younger adolescents.
4. The embracing of a "metaverse way of life" might inadvertently lead to negative consequences for physical health by promoting a sedentary lifestyle. For example, dedicating numerous hours each day to existing within the metaverse may result in an excessive amount of sitting, which has been linked to a range of detrimental health outcomes. In order to circumvent an unhealthy level of inactivity, engagement in the metaverse should necessitate real-world physical movement.
5. A range of prevalent short-term health issues experienced by individuals utilizing virtual settings include headaches, eye fatigue, dizziness, and queasiness. The manifestation of these health-related symptoms could potentially deteriorate a person's physical capabilities, thereby deterring them from participating in health-promoting activities like physical exercise and ambulation.
6. There may also be a reluctance to engage in urban design or community health decision-making due to reduced social cohesion because the physical world may seem less important to immersed people as the popularity of the metaverse increases.

Finally, there are some concerns about the vital roles of technologies in creating a metaverse as a virtual space where we work, play, and communicate. Specifically, artificial intelligence (mimicking human intelligence in computers) technologies will be used for many functions in a metaverse. Artificial intelligence has been shown to recreate social patterns in multiple areas (Koohsari et al., 2023). A metaverse relying heavily on artificial intelligence may recreate existing social patterns, including inequitable, ageist, racist, and heteronormative virtual environments.

In summary, as the metaverse takes shape through the efforts of the industry and its users, a unique opportunity arises for researchers, clinicians, and individuals with personal experience to collaboratively generate knowledge on its potential effects on mental health and illness. This collaboration aims to influence policymaking, technological advancement, and patient guidance. In the next chapter, we delve deeper into the core motivations and behaviours that may lead to PVU and ways PVU may impact psychological well-being through the compensation mechanisms that arise from the inability to fulfil core needs by individuals in real life.

PROBLEMATIC VIRTUAL USE AS A WICKED PROBLEM

In this constantly evolving digital era, the rising concern of problematic virtual world use (PVU) significantly influences one's psychological well-being. From a system thinking viewpoint, PVU can be categorized as a wicked problem due to its multifaceted, convoluted nature and the absence of clear-cut solutions. Wicked problems, as identified in systems thinking, involve intricate issues that encompass a vast array of interconnected aspects, rendering them difficult to resolve. These problems are characterized by their complexity, interconnectivity, and lack of definitive answers. **In the context of PVU, several vicious cycles contribute to its development, including factors such as self-esteem, real-life dissatisfaction, social comparison, attention deficit, anxiety, depression, stress, coping mechanisms, loneliness, social skill deficit, communication, phubbing, dissociation and de-realization, identity conflict, sleep health, immunity, cocooning, FOMO, and usage time, among others.**

Tackling PVU as a wicked problem is complex due to the involvement of various players and agendas in our economy and the tech companies that develop these platforms. Tech companies have a vested interest in preserving user engagement, as it

Chp. 3- Points of Intervention

TARGETING THE ROOT CAUSES OF PVU

ATTACHMENT PATTERNS (INTRINSIC)

"Intimate attachments to other human beings are the hub around which a person's life revolves, not only as an infant or a toddler or a schoolchild but throughout adolescence and years of maturity as well, and on into old age. From these intimate attachments a person draws strength and enjoyment of life and, through what he contributes, gives strength and enjoyment to others. These are matters about which current science and traditional wisdom are at one."

- John Bowlby (The "father" of attachment theory), 1980

The significance of attachment patterns in the context of online addiction and problematic virtual use (PVU) has been increasingly recognized in recent years. Attachment theory posits that individuals develop characteristic patterns of relating to others based on their early experiences with caregivers (Bowlby, 1988). These attachment patterns can be broadly categorized into secure and insecure types, which include anxious, avoidant, and disorganized attachment styles (Ainsworth et al., 1978).

Attachment style is a crucial factor in understanding the root causes behind the cravings, lack of, and compensation for the three core drivers of Problematic Virtual Use (PVU): need for love and belonging, need for achievement and esteem, and

environment attunement/coping with stress. This is because attachment styles fundamentally influence individuals' expectations and experiences of interpersonal relationships and their ability to regulate emotions and manage stress (Bowlby, 1988).

Need for love and belonging.

Individuals with insecure attachment styles, such as anxious or avoidant attachment, may struggle to establish and maintain close and supportive relationships in real life (Mikulincer & Shaver, 2007). As a result, they may turn to virtual platforms to satisfy their need for love and belonging. For example, individuals with anxious attachment may excessively use social media to seek reassurance, validation, and connection with others (Oldmeadow et al., 2013), while those with avoidant attachment may find refuge in online gaming or virtual worlds, where they can avoid the vulnerability and intimacy of real-life relationships (Kuss & Griffiths, 2012).

Need for achievement and esteem.

Insecure attachment can also impact an individual's sense of self-worth and competence, leading to a heightened need for achievement and esteem (Mikulincer & Shaver, 2007). Virtual platforms may provide an attractive alternative to real-life pursuits, as they often offer immediate feedback, recognition, and opportunities for mastery and control (Griffiths et al., 2014). Individuals with insecure attachment styles may be particularly drawn to these features, as they can compensate for feelings of inadequacy, rejection, or failure experienced in their offline lives (Kardefelt-Winther, 2014).

Need for environment attunement and coping with stress.

Attachment styles play a significant role in individuals' ability to attune to their environment and cope with stress (Mikulincer & Shaver, 2007). Insecure attachment patterns can hinder the development of effective emotion regulation and stress management strategies, making individuals more susceptible to the negative effects of stress (Mauder & Hunter, 2001). In response, they may resort to problematic virtual use as a means of escaping or numbing their emotional distress (Schimmenti et al., 2017). For example, compulsive internet use has been linked to emotion regulation

difficulties and a greater reliance on maladaptive coping strategies, such as avoidance, denial, and self-blame (Caplan, 2010).

Research has linked insecure attachment styles to problematic internet use (PIU) and other forms of online addiction, suggesting that individuals with insecure attachment patterns may be more vulnerable to PVU (Kardefelt-Winther, 2014; Schimmenti et al., 2017). Focusing on attachment patterns as an intrinsic motivation to PVU is important for several reasons.

Firstly, understanding the role of attachment patterns in PVU can provide valuable insights into the underlying psychological mechanisms that contribute to the development and maintenance of problematic virtual behaviors (Schimmenti et al., 2017). By identifying the role of insecure attachment in PVU, researchers can develop targeted intervention strategies that address the root causes, rather than merely treating its symptoms (Mikulincer & Shaver, 2016).

Secondly, recognizing the relationship between attachment patterns and PVU can facilitate early identification of individuals at risk for developing online addiction. By assessing attachment patterns alongside other known risk factors, such as the Hook vs Hookless model of user experience (Eyal, 2014), researchers and clinicians can create a more comprehensive risk assessment framework for PVU. This quadrant-based approach, with attachment patterns on one axis and the Hook vs Hookless model on the other, can help detect user risk to PVU and inform targeted prevention and intervention efforts (Schimmenti et al., 2017).

HOOK MODEL (EXTRINSIC)

How do companies create habit-forming products? It's simple: They manufacture them.

- Farnam Street, 2018

The hook model, first proposed by Nir Eyal (2014), is a framework that explains how technology companies create habit-forming products to engage users and ultimately drive compulsive use of their platforms. These models have become pervasive in social platforms, resulting in users spending excessive amounts of time online, which may contribute to PVU. This section delves into the components of hook models and elucidates how they serve as key extrinsic motivation factors.

[Fig.12] The Hook Model: Eyal, N. (2014)

The Hook Model

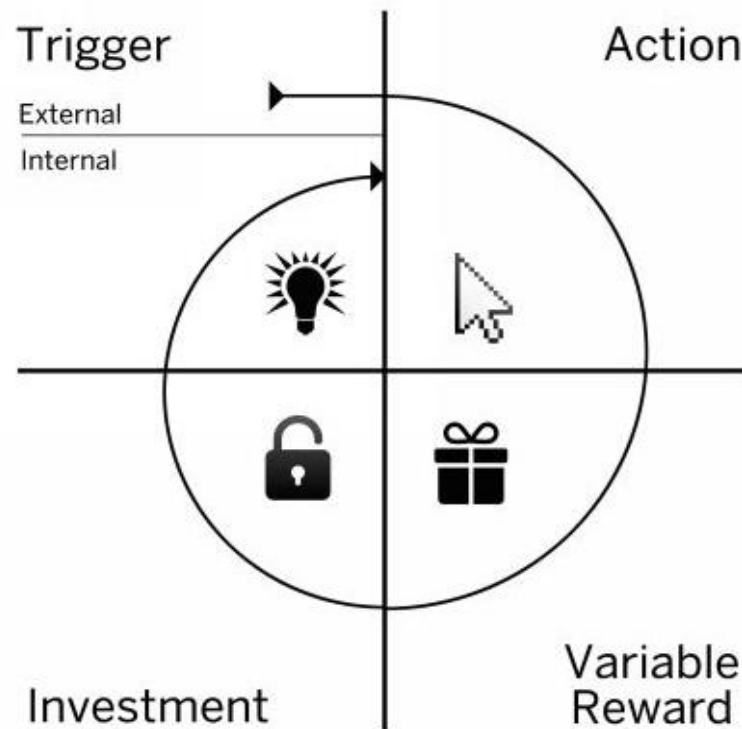


Fig. Illustrates Components of Hook Models:

1. **Trigger:** The first component of the hook model is the trigger, which can be either external or internal. External triggers include notifications, prompts, or advertisements designed to elicit an action from the user, while internal triggers arise from the user's emotions, thoughts, or needs (Eyal, 2014). Social platforms often exploit these triggers, such as the desire for social connection or validation, to encourage users to engage with their platforms.
2. **Action:** The action is the user's response to the trigger, which may involve logging into a social platform, scrolling through a feed, or sending a message. Eyal (2014) posits that the likelihood of a user performing the desired action is determined by their motivation to engage and the ease with which the action

can be completed. Social platforms typically facilitate user actions by making their interfaces simple, intuitive, and enjoyable to use.

3. **Variable Reward:** The variable reward component refers to the unpredictable and intermittent reinforcement that users receive as they engage with social platforms (Eyal, 2014). These rewards may include likes, comments, shares, or personalized content, which create a sense of excitement and anticipation. The unpredictability of these rewards heightens the user's desire to continue engaging with the platform, as they seek to replicate the pleasure associated with receiving a reward.
4. **Investment:** The final component of the hook model is the investment users make in the platform, such as building social connections, curating content, or personalizing their profiles (Eyal, 2014). These investments increase the user's commitment to the platform and create a sense of ownership, making it more likely that they will continue to engage with the platform in the future.

Extrinsic Motivation and PVU:

The hook model demonstrates how social platforms utilize extrinsic motivation factors to encourage users to engage with their products. The variable rewards associated with social platforms, such as likes or comments, activate the brain's dopamine reward system, reinforcing the user's desire to continue engaging with the platform (Volkow, Koob, & McLellan, 2016). This external validation can become a primary source of motivation for users, potentially leading to excessive or compulsive use of the platform (Kardefelt-Winther, 2014).

As users become increasingly reliant on the extrinsic rewards provided by social platforms, they may develop an unhealthy attachment to these virtual environments and increase their usage time, resulting in PVU. This excessive use can have negative consequences for individuals' mental health, relationships, and overall well-being (Alter, 2017).

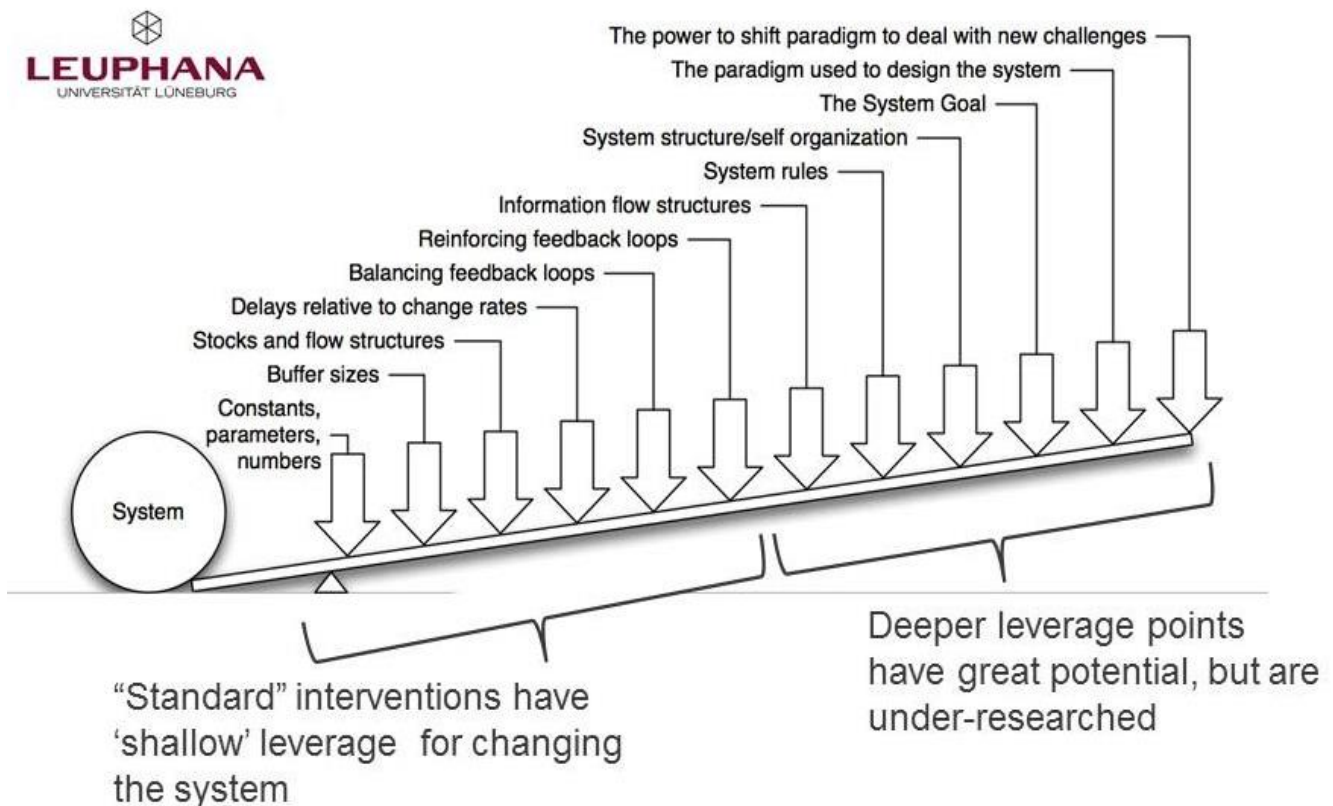
In summary, the hook model illustrates how social platforms leverage extrinsic motivation factors to drive user engagement, contributing to PVU. Understanding the mechanisms through which these platforms foster compulsive use is essential for researchers, technology developers, and policymakers seeking to mitigate the negative

impacts of PVWU on individuals and society by actively shifting towards designs that are hookless.

DONELLA MEADOWS POINTS OF LEVERAGE

Donella Meadows, a pioneering systems analyst, developed a list of 12 leverage points within a system for generating effective change. These leverage points are critical for understanding and improving the functioning of complex systems (Meadows, 1999).

Leverage Points became one of the first major projects worldwide to address the underlying, foundational issues of how of complex social-ecological systems can be transformed. Fig.13 depicts the various points one can intervene within a system,



[Fig.13] Meadow’s Points of Leverage: Meadows, D. (1999)

In this paper I will be focusing on solutions towards the deeper leverage points mainly System self-correction, Information Flows and Paradigm of System use.

Change in the rate of system self-correction involves altering the speed and efficiency of self-regulating mechanisms within the system. By changing the rate of self-correction, we can improve the system's ability to adapt to changing conditions and maintain stability. The component within the system I focus on here is the user. By building self-awareness and self-reinforced feedback loops, there is potential for self-correction against problematic virtual world use.

Information flow involves altering the communication channels and feedback mechanisms that inform the behavior of the system's actors (the user, tech platform designers, therapists and educators). By changing the information flows, we can improve the accuracy and timeliness of information and create new opportunities for learning and innovation.

The leverage point of mindset or paradigm that underlies the system involves challenging the assumptions and beliefs that drive the system and replacing them with new ways of thinking. By changing the mindset, we can alter the underlying values and beliefs that drive the system and the various motivations that lead to system use.

My proposed recommendations also touch upon the leverage of change in the power dynamics within the system. This involves shifting the balance of power between different actors in the system, such as governments, corporations, and individuals. By changing the power dynamics, we can create new opportunities for collaboration and cooperation within the system.

ACTORS MAP

The Actors Map in Fig. 14 below identifies the “who” of the system of virtual world development, the various entities involved in the system, their roles, and the relative knowledge and power they possess. Understanding how these actors influence the system, how they align with each other, and with the government, is critical for coordinated actions to achieve ambitious well-being design goals. Some questions answered through this tool were – Who is developing virtual world technologies? Is there a coalition of people and organizations banded together by common beliefs on policy decisions? Who are the legislators relying on to provide the basis for the validity of proposed measures? Which industries are contributing to the process of mainstream adoption of virtual worlds?

The research then identified the key actors in the virtual technology space and categorized them as Communities, Organizations, Industry Ecosystem, Policy makers and Influencers. After multiple iterations and the analysis of relationships among the actors and actants, the research finally arrived at a list that was most relevant to designing virtual technologies in the well-being context. Since the boundary is at a global level, the role of international NGOs and Government departments is also considered as they affect policymaking and are influential in determining how the future of these technologies will be developed and used.

[Fig.14] Actors Mapping of Virtual Technology Systems



STAKEHOLDER MAP

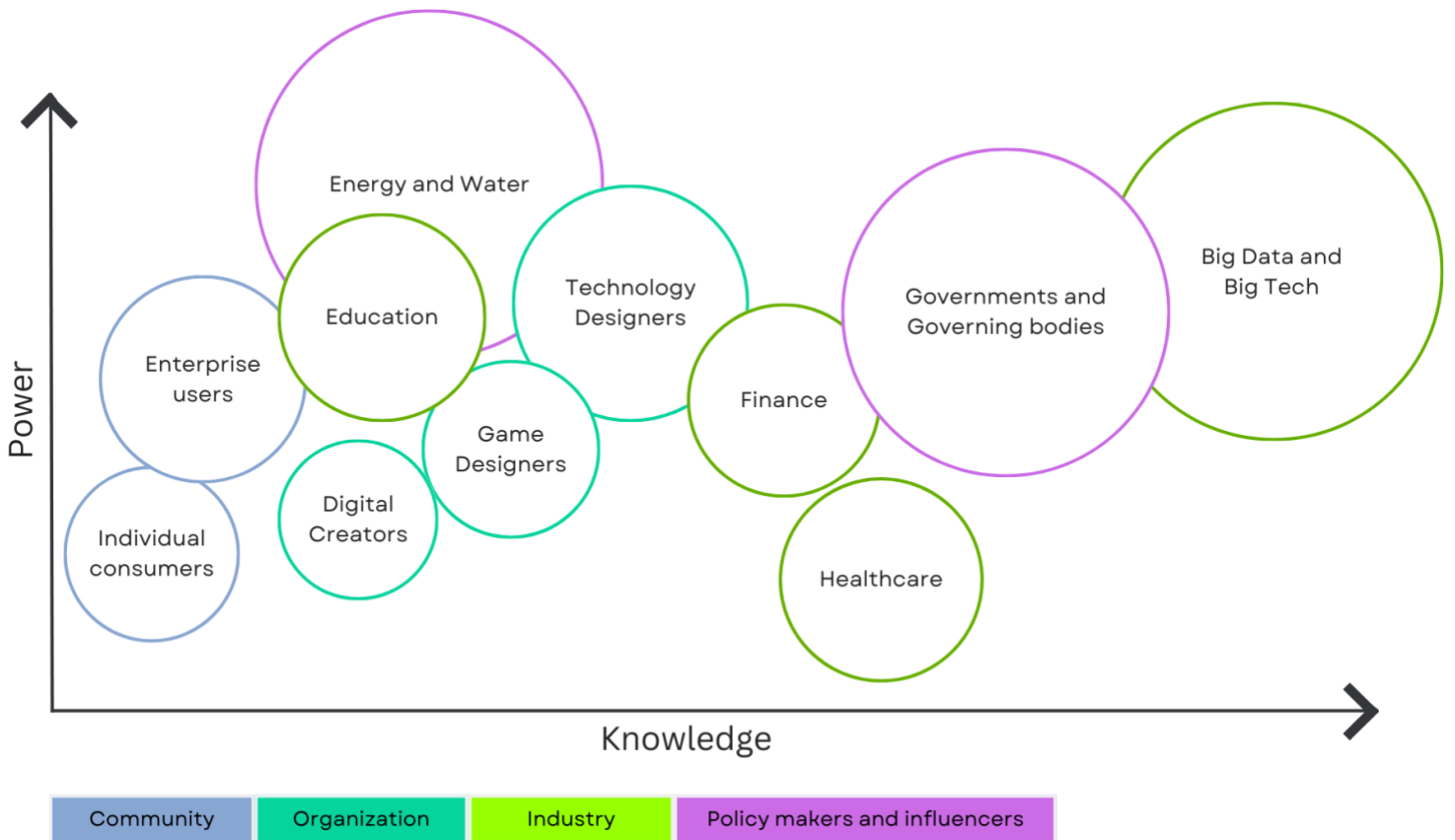
Taking the Actors map further, I plotted those actors on the matrix of knowledge of virtual technologies and their level of influence (power) in shaping the system in Fig.15.

The framing of the system indicates that the knowledge gap amongst the key stakeholders is a major barrier to reaching solutions in mindful design. Overall adoption of virtual technologies and its impact on psychological well-being is more of an ecology due to the potential power of collective action of communities. Therefore, the proposed solutions in the next chapter are effective only when the communities are active participants in the co-creation and implementation of these solutions.

The key stakeholders function as complete social systems that are interdependent. In the mindful and ethical design of technology, collective action is related to power and influence, and some stakeholders such as the media, users, and industry actors have the power to bridge the knowledge gap between policymakers and the communities. Gaps between most actors include adaptation and education of mental health and mindful use of technology. Although actors at the community level may appear to be self-educating and speaking up against harmful use of these technologies in a mutually beneficial way, there may also be missed opportunities for deeper coordination and missing information that could result in a deeper design and educational impact.

Technology adaptation will, in some cases, require substantial changes in local practices of education, healthcare and design. Such changes have a much better chance of being accepted and consistently maintained if they originate in a process that involves engagement rather than a “top-down” process where adaptation is imposed from outside without consultation or interaction.

This mapping is the first insight into the interactions that can be leveraged to bring about social change. Based on these insights, the research identified a list of stakeholders that affect the development of virtual technologies.



[Fig.15] Stakeholders Mapping of Virtual Technology Systems

Chp. 4 - Potential Solutions

This paper proposes 3 unique and innovative solutions to the problem of problematic virtual use: User quadrants, Affinity Profile, and the Attachment Blueprint. These solutions are developed for the purposes of assessing risk of problematic behavior, building self-awareness within an individual about their technology use so they may become agents of action, and creating a curriculum that targets such problematic behavior at its root cause by promoting healthy attachment patterns.

USER TYPE QUADRANT

A proposed frame to identify the 4 user types using the intrinsic and extrinsic motivation factors: user's attachment style and UX design of the social platform or virtual world.

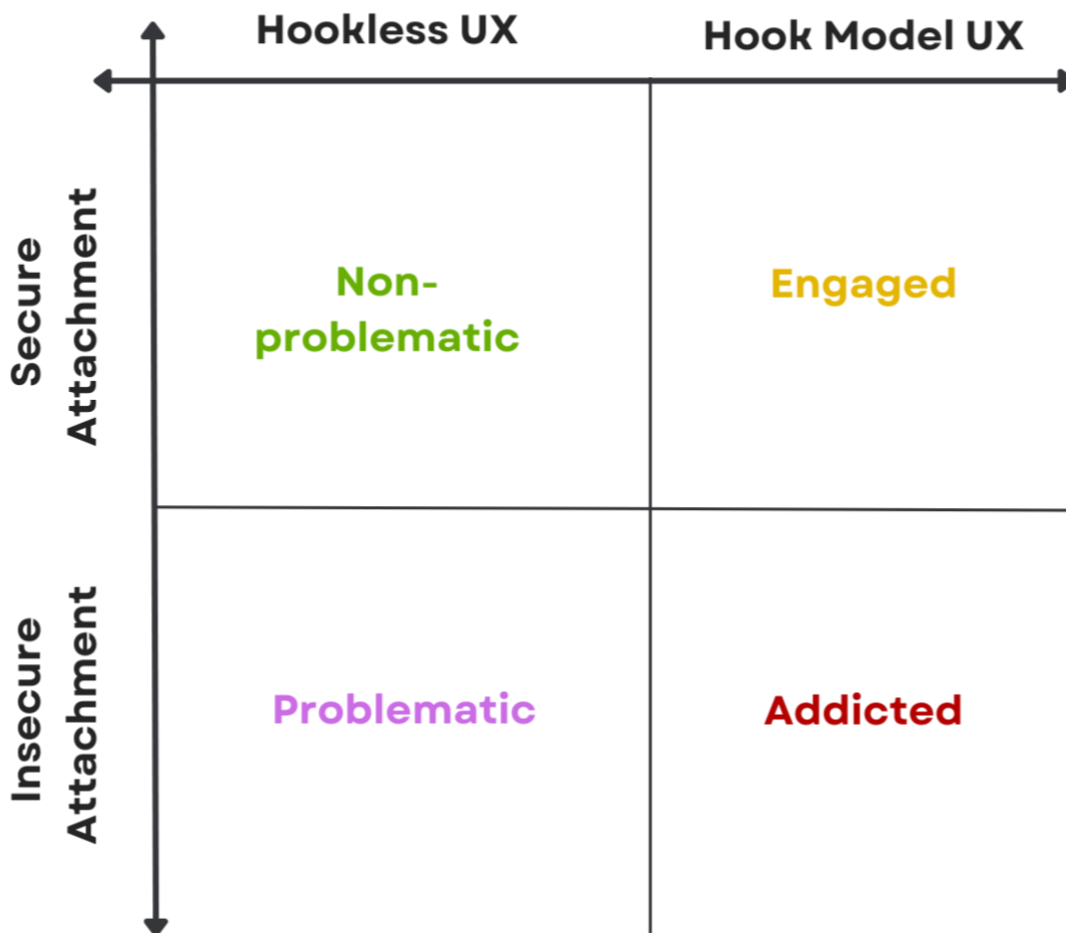
OBJECTIVE:

1. To assess user's risk of problematic virtual use
2. To proactively identify and mitigate the leading causes
3. To develop a framework in the field of cyber-security and cyber-psychology
4. To demonstrate the characteristics of users within the 4 quadrants

The proposed online user type model is designed to identify four different user types (that lie on a spectrum) based on intrinsic and extrinsic motivation factors, including the user's attachment style and the user experience (UX) design of the social platform or virtual world. The two primary factors, Hook model of UX and Attachment theory, are known to significantly affect user behavior and predict problematic virtual world use.

The two motivations are used as factors falling on the proposed X and Y graph in the fig.16 below to define four user types: **Non-problematic user**, **Engaged user**, **Problematic user**, and **Addicted user**.

[Fig.16] Proposed User Quadrant of Virtual Worlds



User Type: Non-problematic

This user type has a secure attachment pattern and is not subjected to or not strongly motivated by the Hook model (The designed loop of trigger, action, variable reward and investment). They engage with the platform or virtual world casually and do not feel compelled to spend excessive amounts of time there. They are able to balance their online and offline lives and maintain healthy relationships both on and off the platform. An example of a non-problematic user is someone who occasionally uses social media to keep in touch with friends and family but is not overly invested in the platform.

Potential Characteristics:

- Well-being status unaffected or positively affected by virtual worlds (VW)
- Preference of In-real-life (IRL) over virtual world relationships
- Socialization, work, education and entertainment predominantly offline
- More intrinsically motivated
- Mostly self-deterministic
- High levels of empathy towards IRL Nature and active in global issues
- High level of outdoors time in sun and nature
- Healthy immunity, sleep quality and cycle and exercise
- Healthy intimate relationships and support system
- Complete data ownership
- Increased mindful practices
- Higher developed social skill

User Type: Engaged

This user type also has a secure attachment pattern but is strongly motivated by the Hook model. They are heavily invested in the virtual world or social platform and may spend significant amounts of time there. However, they are still able to maintain a healthy balance between their online and offline lives and do not experience problematic virtual world use. An example of an engaged user is an avid gamer and

spends several hours each week playing their favorite game but is still able to maintain healthy relationships and responsibilities in their offline life.

Potential Characteristics:

- Mental health status positively & negatively affected by virtual worlds
- Preference of both IRL and virtual worlds relationships
- Socialization, work, education, and entertainment carried out actively hybrid.
- Extrinsically and intrinsically motivated
- Mostly self and occasionally algorithmic determinism
- Healthy levels of empathy towards IRL Nature and aware or active in global issues
- Moderate level of outdoors time in sun and nature
- Decent immunity, sleep quality and cycle and exercise
- Decent productivity or output
- Healthy intimate IRL and virtual world relationships and support system
- Complete data ownership
- Occasional mindful practices
- Higher engagement and social skill

User Type: Problematic

This user type has an insecure attachment pattern and is not subjected to a hookless model on the platform. They may engage with the platform or virtual world casually but still experience negative consequences such as social isolation or neglect of real-world responsibilities. An example of a problematic user is someone who uses social media to compensate for their lack of real-world social connections and spends hours scrolling through their feeds each day, leading to a negative impact on their mental health.

Potential Characteristics:

- Reduced well-being status affected by virtual worlds
- Preference of virtual worlds over IRL relationships

- Socialization, work, education, and entertainment VW dependent
- More extrinsically than intrinsically motivated
- Gradual algorithmic determinism
- Low empathy or hope towards IRL Nature and aware or active in global issues
- Low level of outdoors time in sun and nature
- Decent immunity, low sleep quality and off-cycle and increasingly sedentary
- Low productivity or output
- IRL and virtual world relationships and support system
- Unowned and centralized data
- Rare mindful practices
- low social skill deficit

User Type: Addicted

This user type has an insecure attachment pattern and is strongly motivated by the Hook model. They may spend excessive amounts of time in the virtual world or social platform and experience negative consequences such as social isolation, neglect of real-world responsibilities, or even physical health problems. An example of an addicted user is someone who spends hours each day playing an online game and neglects their relationships, work, and personal health, leading to significant negative consequences in their life.

Potential Characteristics:

- Well-being status critically affected by virtual worlds
- Complete immersion into VW relationships leading to IRL disconnection
- Socialization, work, education and entertainment, shopping, exercise, other services mostly on virtual worlds
- Mostly extrinsically motivated
- Algorithmically determinist
- Hopelessness towards IRL Nature and unaware or inactive in global issues
- Almost no outdoors time in sun and nature, cocooning
- Low immunity, low sleep quality and off-cycle and mostly sedentary
- High productivity or output

- Virtual world relationships and support system only
- Unowned and centralized data
- Rare or no mindful practices
- Critically low social skill deficit

Overall, the differences between the four user types lie in their attachment style and motivation towards the platform or virtual world. Non-problematic and engaged users have a secure attachment pattern and are motivated by different levels of the Hook model of UX, whereas problematic and addicted users have an insecure attachment pattern and may struggle to form healthy relationships both on and offline.

The proposed model has several potential benefits. By identifying user types based on attachment style and the Hook model of UX, social platforms and virtual world designers can better understand user behaviour and create more intentional and effective designs that reduce the risk of problematic use. The model can also be used by educators and therapists to identify users at risk of problematic virtual world use and provide targeted interventions.

However, the proposed model has some limitations. The model relies heavily on self-reported attachment patterns, which may not accurately reflect an individual's attachment style. Additionally, the model does not take into account other individual and environmental factors that may contribute to problematic virtual world use. Despite these limitations, the proposed model provides a valuable framework for identifying user types and understanding how attachment patterns and UX design impact user behavior.

The proposed user quadrant model can be used in the emerging field of cognitive security within cybersecurity to detect user risk of problematic virtual world use (PVU). This can be useful in detecting and mitigating risks associated with PVU on a mass scale such as weakening social cohesion, mental health issues, and neglect of real-world responsibilities. Furthermore, this model can be used to develop algorithms and machine learning models that can automatically detect the user's risk of PVU based on their behavior and attachment style.

AFFINITY PROFILE

A tool that can assess a person's risk of problematic internet use as they enter virtual worlds and provide real-time feedback to help them better understand where they fall on the spectrum of non-problematic to addicted, accompanied by recommendations.

OBJECTIVE:

1. To build self-awareness within users
2. To help users understand and improve their internet and virtual world habits
3. To prevent or minimize PVU
4. To provide curated recommendations and emotional support

As the Metaverse and virtual realms continue to grow, it is crucial to create resources that assist people in comprehending and regulating their online activities. The proposed Affinity Profile serves this purpose. By integrating groundbreaking studies on internet addiction and associated disorders with real-time data monitoring, this novel instrument offers users a comprehensive understanding of their online behavior patterns and any possible hazards. By responding to a well-designed set of inquiries, users can obtain a tailored evaluation of their internet usage practices and gain immediate insight into their position on the scale from non-problematic to addicted. 6 such areas of inquiry are psychological predispositions, usage time, attachment pattern, life satisfaction, motivation for use, and stress coping. The selection of these components will be explained in the following section.

In terms of the assessment itself, there are a number of existing tools and questionnaires that can be adapted to this context. Assessments could be structured in a low-effort, high-fidelity format such as bi-annual objective assessment, 5 weekly self-reported questions and one daily fast prompt and tracking. The objective would be assessing indicators to identify a user's risk towards problematic virtual world use. 6 such indicators are psychological predisposition, attachment pattern, life satisfaction, motivation for use, stress coping and usage time. The selection of these components is explained in the following section.

The 6 areas of inquiry within the Affinity Profile and some examples of existing assessments and indicators that can be incorporated:

1) *Psychological Predispositions:*

Understanding users' psychological predispositions can provide valuable insights into their potential risk of problematic internet use in the virtual world. Personality assessments, such as the I-PACE (Interaction of Person-Affect-Cognition-Execution) model, can help identify users with traits that may make them more susceptible to developing problematic virtual world use.

I-PACE Model:

The I-PACE framework highlights the interplay among predisposing elements, emotional and cognitive reactions, and executive functioning. This model identifies

particular personality traits as general predisposing variables that contribute to the emergence of addictive media usage patterns (Brand et al., 2016; Brand et al., 2019). A considerable amount of research investigating the connection between personality characteristics and Social Media Disorders (SMD) has centered on the five-factor personality model. Several studies have discovered a link between neuroticism, extraversion, and SMD (Andreassen et al., 2012; Lee, 2019). Neuroticism is a personality trait marked by a propensity to feel anxiety, fear, and depression. Those with high neuroticism levels are more inclined to use social media as a means of alleviating their negative emotional tendencies (Andreassen et al., 2012). Extraversion, on the other hand, is characterized by sociability and the desire to seek stimulation in the presence of others. Individuals with low extraversion turn to social media to escape the discomfort of face-to-face interactions, while those with high extraversion engage in more social exchanges (Marino et al., 2018). However, a meta-analysis determined that neuroticism has a weak positive correlation with SMD, while extraversion shows no significant association (Marino et al., 2018).

Similar to the undesirable tendencies of neuroticism, narcissism is characterized by tendencies for excessive self-promotion, entitlement and grandiosity (Paulhus & Williams, 2002). Studies found associations between narcissism and the frequency in seeking and obtaining positive feedback (e.g., "likes") on social media (Dumas et al., 2017), frequency for self-promotion (Carpenter, 2012), and posting selfies (Fox & Rooney, 2015). Likewise, studies have found narcissism is associated to SMD as social media is reinforcing narcissists' sense of idealized self and social gratifications (Andreassen et al., 2017; Casale et al., 2016).

Additional, personality assessments can also be incorporated such as the Big Five Inventory or the HEXACO model, to gain a broader understanding of users' psychological predispositions. These assessments can provide insights into traits like extraversion, openness, and conscientiousness, which may influence users' virtual world behavior.

2) Attachment Pattern:

Assessments that can be used to accurately measure an individual's attachment style include the Adult Attachment Scale (AAS) and the

Experiences in Close Relationships (ECR) questionnaire. To measure attachment style the dashboard could prompt users to answer a few questions (directly or indirectly) about their attachment pattern on a weekly basis. The questions could be adapted from the AAS or ECR, and could be presented using a simple rating scale (e.g. 1-5) or visual analog scale. The results could be identified on a spectrum from "secure" to "insecure," with different subcategories for each attachment style.

Visually, the results could be presented using a color-coded graph or chart, with different colors representing different attachment styles. For example, a green color could represent a "secure" attachment style, while a red color could represent an "anxious" attachment style. The graph or chart could also include personalized feedback and recommendations based on the user's attachment style, such as tips for improving their relationships or reducing feelings of anxiety or insecurity.

3) Life Satisfaction (social support, self-esteem, IRL life satisfaction)

The tool will assess users' overall life satisfaction through a series of questions. A low life satisfaction score may indicate a user is using the virtual world as an escape from real-world problems. The tool will provide feedback and suggest resources for improving life satisfaction outside the virtual world.

Social Support:

One factor to consider is the individual's level of social support and social connectedness, which has been found to be related to internet addiction in various studies (Chou et al., 2019). One way to assess an individual's level of social support and social connectedness is to use a questionnaire or survey that asks about their social relationships and support networks. The Multidimensional Scale of Perceived Social Support (MSPSS) is a questionnaire that has been widely used in research to assess perceived social support across different domains, including family, friends, and significant others. Social Provision Scale (SPS) and the Social Network Index (SNI) measures the extent to which individuals feel that their social relationships meet their needs for support, while the SNI assesses the size and diversity of an individual's social

network. The UCLA Loneliness Scale measures an individual's subjective feelings of loneliness and social isolation.

Self-Image:

Self-esteem and self-image play a significant role in determining an individual's life satisfaction. Higher self-esteem and a positive self-image are generally associated with increased life satisfaction, as individuals with a strong sense of self-worth tend to have a more optimistic outlook on life. Assessing self-esteem and self-image can help identify users who may be at risk for low life satisfaction and provide targeted recommendations for improvement. Assessments that can be used to measure an individual's level of self-esteem and life satisfaction for the purposes of preventing problematic internet use include the Rosenberg Self-Esteem Scale (RSES) and the Satisfaction With Life Scale (SLS).

It may also incorporate other self-report measures or methods that assess self-image and related constructs, such as self-compassion, self-efficacy, or body image. Self-Compassion Scale (SCS): Measures an individual's ability to be kind and understanding toward themselves in times of failure or difficulty. General Self-Efficacy Scale (GSES): Assesses an individual's belief in their ability to handle various situations and challenges.

4) Motivation Metrics:

Understanding users' motivations for engaging in virtual worlds can help identify problematic use patterns. To determine the motivation behind a user's engagement with the virtual world or platforms, the assessment tool could incorporate a combination of questionnaires, in-world behavior monitoring, and emotion recognition techniques. These methods would help identify users' primary motivations, such as achievement, socialization, exploration, or escapism, and how their mood and emotions influence their virtual world usage. High levels of escapism may indicate an unhealthy reliance on the virtual world.

Questionnaire: Developing a questionnaire based on established motivation theories, such as Self-Determination Theory (SDT) and the Uses and Gratifications Theory could help assess:

1. Users' goals and objectives within the virtual world (e.g., leveling up, completing tasks, exploring new areas, etc.).
2. The importance of social interaction and forming connections with other users.
3. The degree to which users find the virtual world immersive and engaging.
4. Users' tendency to use the virtual world as a means of escape from real-world problems or stressors.

Emotion Self-reporting: Ask users to periodically self-report their emotions and mood while using the virtual world. This can be done through simple questionnaires, sliders, or emoji-based scales that allow users to express their current emotional state.

Gamified Emotion Assessment: Create engaging, game-like experiences within the virtual world that encourage users to express their emotions in a non-invasive manner. These experiences can help assess users' mood and emotions without collecting sensitive personal data. By utilizing these non-invasive and data-secure emotion recognition methods, users can maintain their privacy while still providing valuable insights into their mood and emotions within the virtual world.

5) Stress levels assessment:

Another factor to consider is the individual's level of stress and coping skills, as stress and poor coping skills have been found to be associated with problematic internet use (Xu et al., 2014). Some assessments that can be used to measure an individual's level of stress and coping skills include the Perceived Stress Scale (PSS), the Brief Coping Orientation to Problems Experienced (COPE) scale, and the Ways of Coping Questionnaire (WCQ).

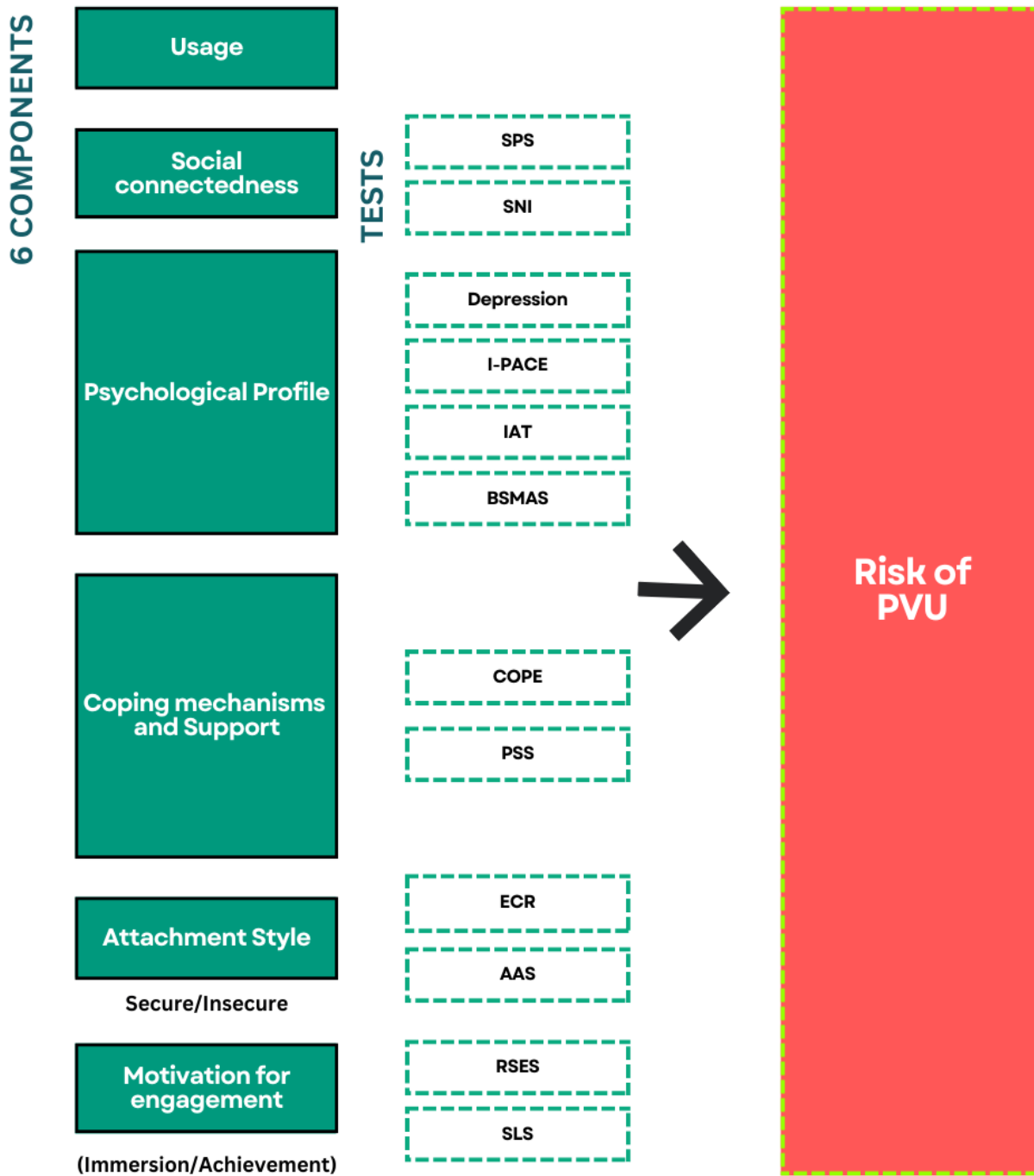
The component could use a combination of self-reported data and objective data to measure an individual's level of stress and coping skills on a daily or weekly basis.

6) Usage time

The tool could track the time users spend in the virtual world, monitoring their total hours spent and frequency of usage. This data can be compared to established norms to identify patterns that may indicate problematic use. Real-time feedback would be

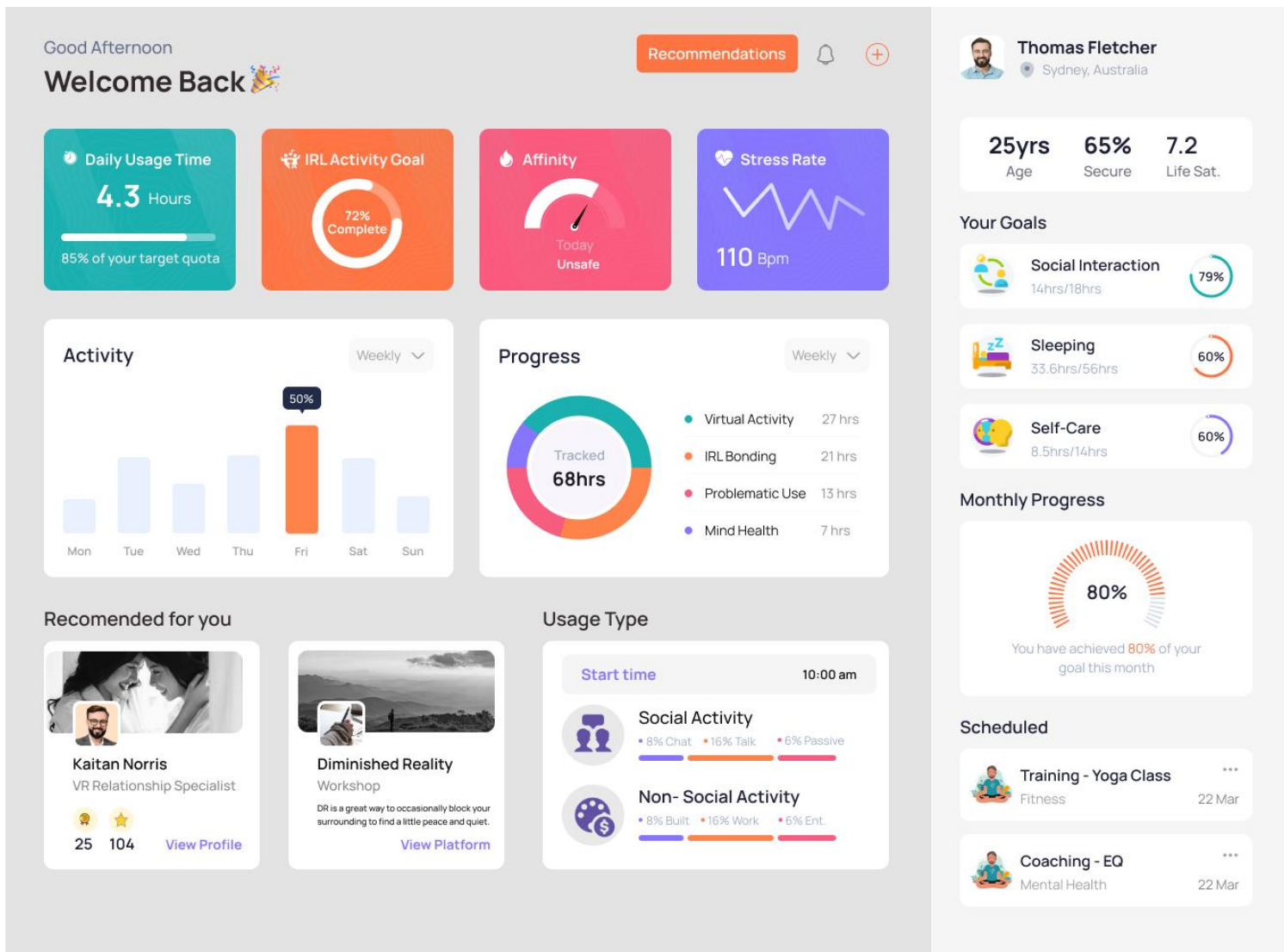
provided, alerting users when their usage time exceeds healthy limits and recommending breaks or alternative activities.

[Fig.17] Affinity Profile Components of Inquiry to Detect PVU



THE DASHBOARD

The Affinity Profile can be projected in the form of a user-friendly dashboard that uses various components and indicators to identify a user's risk towards problematic virtual world use as shown in Fig.18.



[Fig.18] Affinity Profile Dashboard Prototype

When it comes to visualizing attachment style on a dashboard for an online user, there are a few things to keep in mind.

Firstly, it is of paramount importance that the dashboard be extremely user-friendly, have a seamless user experience and easy to understand data and metrics and feedback. One way we can do this is by using a color-coded system to represent different indicators. For example in the total affinity scale, we could use green for secure attachment, yellow for anxious attachment, and red for avoidant attachment. This way, users can easily see where they fall on the attachment spectrum and how it may have changed over time.

Another thing to consider is the types of interactions a user has with the technology. For example, if a user has a history of anxious attachment and tends to engage in a lot of compulsive checking behaviors, we could track their usage patterns and display it on the dashboard. This could help them become more aware of their behaviors and work towards developing a more secure attachment style.

It's important to understand that attachment style lies on a spectrum and can fluctuate throughout the user's journey interacting with the technology. Therefore, we need to ensure that the dashboard is able to capture these changes in a user's attachment style over time.

Real-time Data Tracking: Continuous monitoring of an individual's online and gaming activities can significantly improve the precision and impartiality of an Affinity Profile, as opposed to solely relying on self-disclosed data. Here are some elements that could potentially be tracked in real time to provide data-driven answers for the Affinity Profile assessment:

1. Time spent on social media platforms, gaming platforms, or other internet-based activities.
2. Frequency and duration of breaks taken during internet or gaming sessions.
3. Types of activities engaged in during internet or gaming sessions (e.g. browsing, socializing, gaming, streaming)
4. Response time to notifications or alerts from social media or gaming platforms
5. Patterns of activity during different times of the day or week

6. Patterns of activity before, during, and after stressful or emotional events or situations
7. Changes in mood or affect as indicated by device sensors (e.g. changes in heart rate, sleep patterns, or activity levels)

To incorporate real-time feedback, we could use data from the person's virtual world activities, such as how much time they spend in the virtual world, what types of activities they engage in, and how frequently they engage in these activities. One challenge in this type of design is making sure that the feedback is presented in a way that is understandable and actionable for the person. We may need to experiment with different ways of presenting the feedback, such as visualizations or gamification elements, to find what resonates best with our target audience.

More importantly, addressing the privacy concerns that arise from collecting such information is of paramount importance. It is crucial to guarantee that users are well-informed and have granted permission for their data to be tracked. Additionally, a thorough exploration of the ethical consequences of utilizing this information for assessing or advising on a user's actions is essential.

Providing Recommendations

This data could generate personalized feedback and provide recommendations for how they can reduce this risk. When it comes to making recommendations for features like usage time, doom scrolling, and content curation based on the user's attachment style, there are a few things to consider.

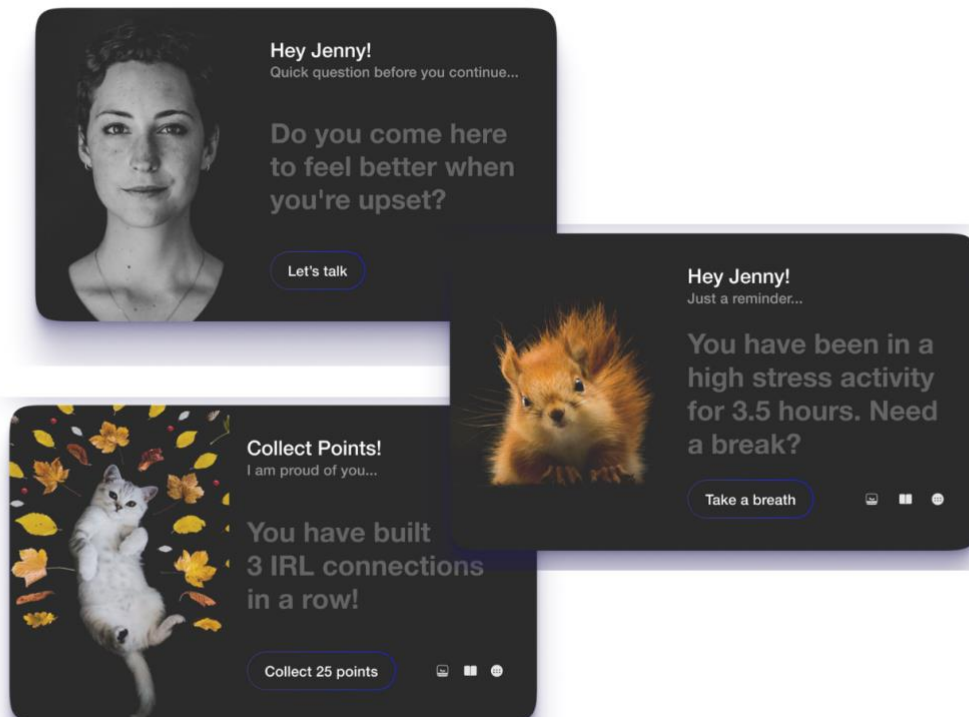
For users with a more secure attachment style, we could recommend features that encourage them to take breaks and limit their usage time. This could include setting reminders or using features that track usage and provide notifications when they've been online for too long.

For users with anxious attachment styles, we could focus on reducing doom scrolling by prioritizing content that is uplifting and positive. We could also recommend features that encourage users to take breaks and engage in other activities, such as going for a walk or spending time with friends and family.

For users with avoidant attachment styles, we could focus on promoting content that is more interactive and engaging. This could include features that encourage users to participate in online communities or engage in activities that promote social interaction and connection.

In addition to usage time, doom scrolling, and content curation, we could also consider other metrics such as the frequency of IRL interactions, the quality of those interactions, and the user's overall sense of wellbeing. By incorporating these metrics into our feature recommendations, we can create a more well-rounded experience that helps users minimize online addiction and incentivizes them to engage in more meaningful, fulfilling activities offline.

Overall, the key is to create a dashboard that is easy to use and understand, while also providing valuable insights that can help users develop healthier attachment styles. By keeping these factors in mind, we can create a tool that truly empowers users to improve their mental health and wellbeing. Fig. 19 shows examples of daily interventions and reminders that can be sent out by the application.



[Fig.19] Affinity Profile Daily Intervention Prototype

Benefits of the Tool

The Affinity Profile is a necessary tool for individuals who want **to understand and improve their internet and virtual world habits**. By providing personalized assessments and real-time feedback, it can help users recognize problematic patterns and make positive changes to their behavior.

The Affinity Profile would not be limited to identifying potential problems, but also be a **powerful prevention and intervention tool**. By tracking real-time data on user behavior, the Affinity Profile can help users recognize problematic patterns and make changes to their internet or VW use before it becomes a more serious issue. For those who do need help, the Affinity Profile can provide valuable insights that can inform treatment options and support.

The benefits of the Affinity Profile go beyond mitigating problematic and addictive internet use. It can also help **individuals build self-awareness and emotional intelligence**. By tracking and analyzing their usage patterns, users can gain a better understanding of their habits, triggers, and coping mechanisms. This self-awareness can lead to a better understanding of one's emotional state and how internet use affects it. By identifying problematic patterns and developing healthier habits, users can build emotional intelligence and develop better coping strategies for dealing with stress and negative emotions.

Risks and Mitigation

Various ethical implications and risks are associated with the implementation of the Affinity Profile. Addressing these concerns and mitigating potential risks is essential to ensure the responsible use of this technology.

Employing blockchain technology can be instrumental in tackling data privacy issues related to real-time tracking. By leveraging blockchain, data can be stored in a distributed and secure fashion, ensuring that users maintain control over their personal information. This technology enables data encryption, transparent data exchange, and user consent administration, instilling greater confidence in users regarding the handling and safeguarding of their data. Consequently, incorporating blockchain

technology can help mitigate privacy concerns while still allowing the advantages of real-time tracking to enhance user evaluations and suggestions.

1. Data Privacy and Security:

One of the primary ethical concerns with the Affinity Profile is the collection and storage of sensitive user data. Ensuring that users' data remains private and secure is crucial.

Mitigation Strategies:

- Implement robust encryption and security measures to protect user data.
- Use decentralized storage solutions, such as blockchain technology, to give users more control over their data.
- Establish transparent data-sharing policies and obtain explicit user consent for data collection and usage.

2. Informed Consent and User Autonomy:

Users must have the right to decide whether they want to participate in the Affinity Profile assessments, and they should be fully informed about how their data will be used.

Mitigation Strategies:

- Provide clear, accessible information about the purpose of the assessments, the data collected, and how it will be used.
- Obtain informed consent from users before collecting any data or conducting assessments.
- Allow users to opt-out of assessments or data collection at any time.

3. Bias and Fairness:

There is a risk of potential biases in the algorithms and assessments used in the Affinity Profile, which may lead to unfair or inaccurate evaluations of users' behavior.

Regularly review and update assessment tools and algorithms can minimize biases and ensure fairness. Utilize diverse datasets for algorithm training may also reduce the

impact of inherent biases. It would be crucial to engage in ongoing research and collaboration with experts in the field to improve the accuracy and fairness of the Affinity Profile.

4. Stigmatization and Labeling:

The Affinity Profile may unintentionally contribute to the stigmatization or labeling of users based on their risk levels for problematic internet use.

Mitigation Strategies:

- Emphasize the importance of treating users with respect and empathy, regardless of their risk levels.
- Use non-stigmatizing language when providing feedback and recommendations to users.
- Encourage users to seek professional help if needed, rather than relying solely on the Affinity Profile for self-diagnosis or treatment.

Risks to Developers:

1. **Legal risks:** Collecting user data for the purposes of assessing addiction or problematic internet use could potentially expose developers to legal liability if the data is misused or mishandled.
2. **Ethical risks:** Developers must carefully consider the potential ethical implications of collecting and using sensitive user data for the Affinity Profile assessment, including issues of informed consent and the potential for harm to users.
3. **Reputational risks:** If the Affinity Profile is not perceived as accurate or effective, or if users perceive it as intrusive or unethical, it could harm the reputation of the developers and their associated brands or products.
4. **Technical risks:** Developing a complex assessment tool like the Affinity Profile requires technical expertise and resources, and there is a risk of technical failure or data breaches if the tool is not properly designed and maintained.

In essence, the creation and application of the Affinity Profile tool call for a thorough examination of the possible hazards and advantages for both the users and creators.

Meticulous preparation and supervision, with an emphasis on user confidentiality and ethical matters, can aid in lessening these threats and guarantee that the tool is fashioned and utilized in a conscientious and efficient way.

Some considerations and recommendations for developing an assessment or feature that identifies and captures a user's affinity to problematic use:

1. **Validity and reliability:** It's important to ensure that the assessment or feature is valid and reliable in identifying attachment styles. This means that the questions or indicators used should be well-researched and tested to accurately capture attachment style.
2. **User-friendly design:** The assessment or feature should be user-friendly and easy to use. Users should be able to complete it without feeling overwhelmed or confused. Consider using visual aids, clear instructions, and a simple interface.
3. **Integration with social platforms:** To maximize the reach of the assessment or feature, consider integrating it with popular social platforms. For example, users could be prompted to complete the assessment when creating a profile on a social media platform or when creating an avatar in a virtual world.
4. **Feedback and recommendations:** After completing the assessment, users should receive feedback and recommendations based on their affinity profile. This could include tips for improving their relationship and use cases or resources for to prevent entering problematic zones
5. **Privacy and security:** It's important to ensure that user data is kept private and secure. Consider using encryption and other security measures to protect user information.
6. **Incentives:** To encourage users to complete the assessment, consider offering incentives such as personalized recommendations or access to exclusive content.

Differentiating Factors:

Various solutions and resources address digital well-being and challenging online habits, yet the Affinity Profile stands apart by fusing instantaneous data gathering with psychological and sociological evaluations of technology use.

A few notable digital wellness offerings are:

1. Moment: A mobile application that monitors phone activity and delivers daily summaries of screen time, pickups, and unlocks.
2. Forest: An application designed to promote focus by "growing trees" during designated timeframes.
3. Freedom: An app that restricts access to attention-diverting websites and applications for predetermined intervals.
4. Screen Time: An in-built functionality in Apple devices that observes device usage and shares weekly analyses.

Regarding adjacent apps, the digital wellness sector is experiencing rapid expansion, with novel solutions and resources constantly arising. Nevertheless, the Affinity Profile's distinctive fusion of immediate data procurement and psychological and sociological appraisals offers a more all-encompassing and tailored strategy for coping with problematic internet consumption and dependency. This distinction separates it from other available tools, establishing a solid competitive edge.

THE ATTACHMENT BLUEPRINT

A project to help individuals discover how early childhood experiences impacted their self-esteem, ability to develop relationships, emotional intelligence, decision-making and coping mechanisms.

OBJECTIVE:

5. To build healthier relationships with our inner selves
6. To build healthier relationships with others
7. To prevent or minimize PVU
8. To bring up our next generation to be more resilient

THE IMPORTANCE OF TARGETING ATTACHMENT PATTERNS

Attachment style education could play a critical role in mitigating internet and virtual world addiction by helping individuals develop healthier relationship patterns and coping strategies. Research suggests that attachment styles can impact a person's emotional regulation and social support network, which in turn can impact their risk for addictive behavior.

From the view of *stress diathesis perspective*, the theory that mental and physical disorders develop from a genetic or biological predisposition for that illness (diathesis) combined with stressful conditions that play a precipitating or facilitating role (American Psychological Association, 2014), insecure attachment is associated with difficulties in emotion regulation which cannot be regarded as psychopathology per se, rather seems to be a robust vulnerability for development of psychological disorders (Boysan & Çam, 2016). With respect to the relations between attachment and addiction, Flores (2004) posited that addictive behaviours can be regarded as a counterproductive strategy in dealing with emotion regulation problems emerged from attachment insecurities. Individuals with insecure attachment styles, particularly those with anxious and avoidant attachment styles, may be more likely to use the internet or virtual worlds as a way of coping with loneliness, anxiety, or stress. For example, they may seek out social connection online as a way of compensating for unfulfilling relationships in their offline lives or use virtual environments as a way of escaping from reality.

Attachment insecurities seem to exert influence on online interpersonal behavioral patterns such that insecurely attached individuals are less likely to expand their social networks and social ties in real-life (Jenkins-Guarnieri, Wright, & Hudiburgh, 2012; Lee, 2013), and are concerned about their perceived images (J. H. Lin, 2015, 2016). Nevertheless, attachment insecurities particularly attachment anxiety were significantly associated with fear of missing out (FOMO) in online relations that predicted more frequent social media use (Blackwell, Leaman, Tramposch, Osborne, & Liss, 2017).

ATTACHMENT DIRECTLY AFFECTS RESILIENCE

Attachment also plays a critical role in determining how we mobilize social resources in response to experiences of distress and is thus connected to the promotion of resilience. Similar to attachment theory, theories of resilience also conceptualize how youth perceive and cope with stressful situations. Although there is not a universally recognized definition of resilience, it is commonly defined as the dynamic processes and ability to mobilize resources to overcome hardship and trauma (Connor & Davidson, 2003; Brendtro, Brokenleg, & Van Bockern, 2005; Wagnild & Young, 1993). Theories of resilience and attachment are posited to influence the capacity for establishing interpersonal relationships thereby playing a key role in how youth overcome distress and seek help from others (Bowlby, 1969; Rutter, 2012).

A systematic review and meta-analysis of existing literature found that secure attachment significantly contributes to an individual's resilience. (Darling Rasmussen et al., 2018) The findings indicated that individuals with secure attachment patterns exhibit higher levels of resilience compared to those with insecure attachment styles. Securely attached individuals tend to have more positive expectations about themselves and others, better emotional regulation, and more effective coping strategies, which collectively enhance their ability to adapt and recover from adversity.

In contrast, insecure attachment styles (anxious, avoidant, and disorganized) are associated with lower levels of resilience. These individuals often struggle with self-esteem, emotional regulation, and interpersonal relationships, making it more challenging for them to cope with stress and adversity.

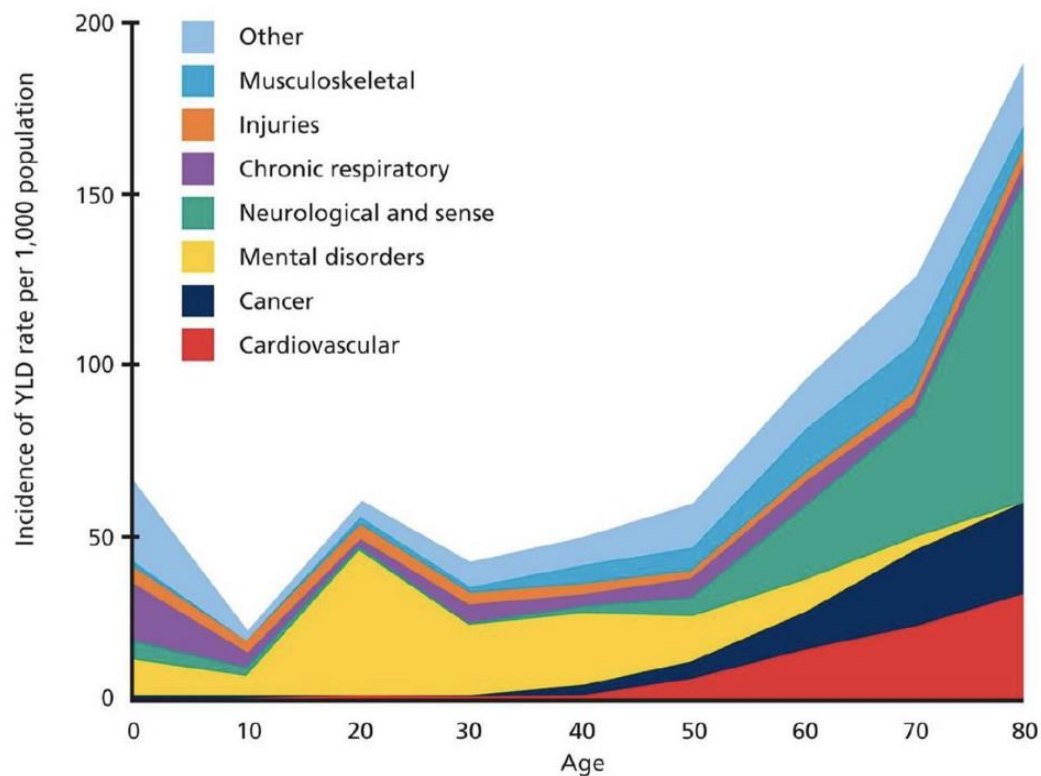
Overall, the study highlights the critical role of attachment patterns in determining an individual's resilience, suggesting that secure attachment may serve as a protective factor against various stressors and adversities. This underscores the importance of promoting secure attachment in early life and incorporating attachment-focused interventions into resilience-building programs.

IMPORTANCE OF PROACTIVE MENTAL HEALTH

Typically, efforts focused on preventing mental illness can be classified into one of three levels: primary, secondary and tertiary prevention (WHO, 2014). The levels of prevention reflect the stage of the mental health condition that is being targeted. For instance, primary prevention aims to prevent mental illnesses from occurring whereas the aim of secondary prevention is to identify and treat mental illnesses early in the course of disease (WHO, 2014). Lastly, the goal of tertiary prevention is to develop treatments for individuals with a diagnosed mental illness that minimizes the impact of the disease on their health and quality of life (WHO, 2014).

When identifying priorities for health system planning, consideration of all three aspects of mental health prevention (i.e., primary, secondary and tertiary) across all stages of the lifespan has been identified as an important means of improving health outcomes (Department of Human Services, 2005). For example, understanding how and when threats to mental health and wellbeing begin to emerge across the lifespan is essential for guiding primary prevention-oriented research (Department of Human Services, 2005).

The shift towards a prevention oriented public health perspective has prompted researchers to identify and promote a wide range of practices that help youth populations become and stay as healthy as possible as they transition into adulthood (WHO, 2014). Although mental health is an important domain of health to consider across the lifespan, studies indicate that many of the most common mental illnesses emerge during adolescence.



[Fig.20] Disease Emergence Across Life Span, (Sam, n.d.)

Research evidence indicates the brain frontal lobe synaptic network also changes during adolescence, albeit at different rates among individual youth (Jetha, & Segalowitz, 2012). The brain continues to form new synaptic connections which refine language and communication skills. These physical and neurological changes can be viewed as neurocognitive capacities that influence the development of social behaviors. Psychosocial development in response to the neurological changes during adolescence are marked by engagement in activities that increasingly emphasize autonomy, emotional stability, and behavioral regulation. This shift in social functioning leads to opportunities to hone the social and behavioral skills necessary for managing adult responsibilities and stresses and navigating their social world (Jetha, & Segalowitz, 2012).



[Fig.21] How Attachment Pattern Could Affect Resilience

COMPONENTS OF THE PROGRAM

1. **Curriculum:** The program should be built around a comprehensive curriculum that covers the different attachment styles and the impact they have on our relationships and mental health. This curriculum could include video lectures, interactive exercises, and quizzes to reinforce learning.
2. **Assessment tools:** The program should include assessment tools to help users identify their attachment style. This could be done through questionnaires or interactive exercises.
3. **Personalized feedback and guidance:** Once users have identified their attachment style, the program should provide personalized feedback and guidance on how to move towards a more secure attachment style. This could include exercises and activities to practice more secure behaviors and thought patterns.

4. **Community support:** Building secure attachment styles is not something that can be done in isolation. The program should include a community support element, such as online forums or peer mentorship, to help users connect with others who are going through the same process.
5. **Gamification elements:** To make the learning process more engaging and fun, the program could incorporate gamification elements, such as rewards and badges for completing certain exercises or achieving certain milestones.

IMPORTANT FEATURES OF THE PROGRAM

These features include scalability, personalized training, age-agnosticism, decentralization, empowerment, and value-based approaches. Each feature has its importance backed by academic research:

Scalability is crucial to ensure that attachment-focused interventions can reach a broad audience and effectively address attachment-related issues on a societal level (Ainsworth et al., 1978).

Personalized training recognizes that individuals have unique attachment styles and experiences, requiring tailored approaches to address their specific needs (Bowlby, 1988). Research suggests that personalized interventions lead to better outcomes and more significant improvements in emotional and relational well-being (Norcross & Wampold, 2011).

Age-agnostic interventions can address attachment issues across the lifespan, recognizing that attachment patterns can change and evolve over time (Mikulincer & Shaver, 2016). This approach acknowledges that attachment-based interventions can be beneficial for individuals at any age, from early childhood to adulthood, and even older age (Sroufe et al., 2005).

Decentralized interventions promote a more accessible and community-based approach, allowing for more widespread access to attachment-focused support (Lieberman et al., 2011). This approach can help reduce the barriers to seeking help, fostering greater engagement in attachment-related interventions (Kazdin, 2019).

A value-based approach prioritizes the quality of interventions and the meaningful impact on individuals' lives over sheer numbers or volume (Porter, 2010). This perspective emphasizes the importance of long-lasting and transformative change in attachment patterns, leading to sustained improvements in emotional and relational well-being (Johnson, 2004).

USING TECHNOLOGY FOR SCALIBILITY, PERSONALIZATION AND DECENTRALIZATION

Some possible ways to leverage technology could include:

- 1. Creating a digital platform:** The program could be hosted on a digital platform that is accessible to users from anywhere in the world. The platform could include features like video conferencing for online group sessions, one-on-one coaching and forums for community support.
- 2. Mobile app:** To make the program more accessible and convenient, it could be developed as a mobile app that users can access on-the-go.
- 3. Virtual and augmented reality:** To create a more immersive, personalized learning experience, the program could be developed as a virtual reality experience. This could be particularly useful for interactive exercises and simulations. In addition, by capturing and making sense of attachment styles in the Metaverse or on social platforms, we may be able to create a more personalized and effective user experience. For example, if we know that a user has an anxious attachment style, we could design features that provide more reassurance and support, or prompt users to seek out social connections.
- 4. Gamified platform:** Designed to offer rewards and recognition for users who consistently demonstrate secure attachment behaviors.
- 5. Machine learning:** Machine learning algorithms could be used to analyze user data and provide personalized recommendations and feedback on how to improve attachment styles.
- 6. Chatbot Best Friend:** Develop an interactive chatbot that engages with users in a conversational manner and provides personalized guidance on how to improve attachment styles situationally and over a period of time.

- 7. Blockchain technology:** Blockchain technology could be used to secure user data and enable users to own their data, giving them control over who has access to it.

Designing a program for different age demographics would require a tailored approach that considers the unique needs and interests of each group.

For kids, the program could incorporate interactive games and activities to help them understand attachment styles in a fun and engaging way. It could also include age-appropriate materials such as cartoons, stories, and songs to make the learning process more accessible and enjoyable. The program could also involve parents, providing them with resources and information to help them better understand their child's attachment style and how to support them in developing a secure attachment.

For youth, the program could be designed to address the challenges they face in building healthy relationships and coping with stress. It could incorporate mindfulness practices, self-reflection exercises, and opportunities for peer discussion and support. The program could also include guidance on setting healthy boundaries, communication skills, and conflict resolution.

For parents, the program could provide information on the different attachment styles and how they impact parenting practices. It could include guidance on how to foster a secure attachment with their child, how to recognize and address attachment-related challenges, and how to build resilience in themselves and their children to prevent future mental health issues and in turn, PVU.

For working employees, the program could be designed to address the impact of attachment styles on workplace relationships and performance. It could provide guidance on effective communication, teamwork, and conflict resolution, as well as strategies for managing stress and maintaining a healthy work-life balance.

SUMMARY

It is possible that addressing attachment styles and working towards a more secure attachment could be helpful in addressing issues such as anxiety, insecurity, loneliness, and internet addiction. However, it is important to note that addressing

attachment styles alone may not be sufficient to fully resolve these issues. Other factors, such as environmental stressors, past trauma, and genetic predispositions, can also play a role in the development of mental health problems and behavioral issues. A comprehensive approach that addresses all relevant factors may be necessary to effectively address these issues.

The benefit is that users may be able to better understand themselves and their interpersonal patterns through an assessment of their attachment style. This could lead to greater self-awareness and potentially more secure attachment styles over time. By shifting our internal working models (IWM) through attachment training, we can set into motion large-scale changes within a community and globally.

CONCLUSION AND NEXT STEPS

This research project hopes to create a change in the way problematic online behavior is understood and responded to, considering advancing technologies.

One of the first limitations faced during the project was a shortage of research with sufficiently large datasets on impact of advancing technologies on humans' well-being, which made it harder to arrive at generalized results. I urge behavioral scientists to adopt more quantitative research designs and foresight methodologies.

The second limitation encountered was that the **definition** of 'internet' was not sufficient to cover behavior patterns emerging today, or in the future, given the advancing technologies of immersive reality and A.I. Technology is not just the internet anymore. Hence, this research proposes a more concurrent definition of 'Problematic Virtual Use (PVU)'. This new definition expands to include the vast spectrum of maladaptive online behaviors that are detrimental to well-being- such as Problematic Internet Use, Gaming Disorder, Social Media Addiction, Online Shopping Addiction and any future Immersive Technology dependency. These behaviors have been studied in disaggregated silos which we are now unifying under the PVU framework.

The third limitation was that new arenas of psychology such as 'cyber-psychology' are more focused on mental disorders and pathologies rather than overall psychological well-being and social cohesion.

The understanding of psychological well-being in the context of maladaptive behavior and its root causes is important and is the focus of this research.

Not all problematic behavior is pathological. E.g., Cybercrimes which can range from rational theft to pathological stalking. The reason it is important to look beyond pathology is because behavior has two sides:

- **External** (born out of environmental interactions) and
- **Internal** (born out of individual's compensatory mechanisms)

As shown in this project, it is critical to incorporate these two sides into systems of well-being in order to mitigate the detriments of maladaptation to these technologies.

Having demonstrated the true breath of the problem, this project proposes **three system-based solutions.**, The User Type Quadrant was created using the 2X2 matrix as a starting framework built on two axes that affect PVU - attachment patterns and hook model of technology design. This is used to assess User's position on the spectrum of problematic behavior. This framework may be expanded in the future to include other relevant axes of influence.

Using the double-diamond framework, this research explores the components influencing risk of problematic behavior (such as psychological pre-dispositions, life satisfaction, social support, coping mechanisms, motivation of use and usage time) along with various existing tests used to assess the same. This has evolved into an application referred to as the Affinity Profile. The utility of having such a profiling system is that it allows users to build self-awareness, improve their internet and virtual world habits, minimize PVU and gain ongoing and potentially real-time mental health support.

Finally, design thinking stresses on empathy, and so understanding individuals' attachment patterns and finding innovative ways to move towards secure styles is the solution to the long-term problem. This solution can be rolled out through the systems of education, technology design, existing models of psychotherapy and within the growing field of cyber-security.

Technology is just a tool, and it is easy for humans to get addicted to anything they interact with. Being mindful about how we design technology and how we educate our current and next generation to interact and integrate with technology is crucial for the long-term well-being of humanity. This project serves as a guide for all designers, software developers, psychologists, educators, corporate strategists, and others who deal with people's well-being in this technological era of the Metaverse.

REFERENCES

- Aardema, F., O'Connor, K., Côté, S., & Taillon, A. (2010). Virtual reality induces dissociation and lowers sense of presence in objective reality. *Cyberpsychology, Behavior and Social Networking*, 13(4), 429–435.
- Adler, A., Unanue, W., Osin, E., Ricard, M., Alkire, S., & Seligman, M. (n.d.). Chapter 7: Psychological Wellbeing.
<https://www.bhutanstudies.org.bt/publicationFiles/OccasionalPublications/Transforming%20Happiness/Chapter%207%20Psychological%20Wellbeing.pdf>
- Ahadzadeh, A. S., Sharif, S. P., & Ong, F. S. (2017). Self-schema and self-discrepancy mediate the influence of Instagram usage on body image satisfaction among youth. *Computers in Human Behavior*, 68, 8-16.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.
- Alter, A. (2017). *Irresistible: The rise of addictive technology and the business of keeping us hooked*. Penguin Books.
- American Psychological Association. (2014). Stress diathesis. In *APA dictionary of psychology*. American Psychological Association.
- Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors*, 30(2), 252–262.
- Andreassen, C. S., Pallesen, S., & Griffiths, M. D. (2017). The relationship between excessive online social networking, narcissism, and self-esteem: Findings from a large national survey. *Addictive Behaviors*, 64, 287–293.
- Armstrong, G., Daoust, M., Gil, Y., Seinen, A., Shedletzky, F., Gillies, J., Johnston, B., & Warwick, L. (n.d.). *Mental Health Models*. Opentextbc.ca.
- Bailenson, J. N., Yee, N., Blascovich, J., Beall, A. C., Lundblad, N., & Jin, M. (2008). The use of immersive virtual reality in the learning sciences: Digital transformations of teachers, students, and social context. *Journal of the Learning Sciences*, 17(1), 102-141.

Bandura, A. (1997). <i>Self-efficacy: The exercise of control</i> . W H Freeman/Times Books/Henry Holt & Co.
Barak, A., Boniel-Nissim, M., & Suler, J. (2008). Fostering empowerment in online support groups. <i>Computers in Human Behavior</i> , 24(5), 1867-1883.
Barak, A., Hen, L., Boniel-Nissim, M., & Shapira, N. A. (2008). A comprehensive review and a meta-analysis of the effectiveness of internet-based psychotherapeutic interventions. <i>Journal of Technology in Human Services</i> , 26(2-4), 109-160.
Barreda-Ángeles, M., & Hartmann, T. (2022). Hooked on the metaverse? Exploring the prevalence of addiction to virtual reality applications. <i>Frontiers in Virtual Reality</i> , 3. https://doi.org/10.3389/frvir.2022.1031697
Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. <i>Psychological Bulletin</i> , 117(3), 497-529.
Baumeister, R. F., & Vohs, K. D. (2016). <i>Handbook of self-regulation: Research, theory, and applications</i> . Guilford Publications.
Baumeister, R. F., & Vohs, K. D. (2016). Misguided effort with elusive implications. <i>Perspectives on Psychological Science</i> , 11(4), 574-575.
Bean, R. (2019). Why fear of disruption is driving investment in AI. <i>MIT Sloan Management Review</i> .
Benkler, Y. (2006). <i>The wealth of networks: How social production transforms markets and freedom</i> . Yale University Press.
Bente, G., Rüggenberg, S., Krämer, N. C., & Eschenburg, F. (2008). Avatar-mediated networking: Increasing social presence and interpersonal trust in net-based collaborations. <i>Human Communication Research</i> , 34(2), 287-318.
Blackwell, D., Leaman, C., Tramosch, R., Osborne, C., & Liss, M. (2017). Extraversion, neuroticism, attachment style and fear of missing out as predictors of social media use and addiction. <i>Personality and Individual Differences</i> , 116, 69-72.
Bostrom, N. (2014). <i>Superintelligence: Paths, dangers, strategies</i> . Oxford University Press.
Bowlby, J. (1969). <i>Attachment and loss: Vol. 1. Attachment</i> . Basic Books.

Bowlby, J. (1988). <i>A secure base: Parent-child attachment and healthy human development</i> . New York, NY: Basic Books.
Boyd, D. M., & Ellison, N. B. (2008). Social network sites: Definition, history, and scholarship. <i>Journal of Computer-Mediated Communication</i> , 13(1), 210-230.
Boysan, M., & Çam, Z. (2016). Insecure attachment styles and theory of mind in avoidant coping: Empirical investigations of a proposed path model. <i>Archives of Neuropsychiatry</i> , 53(4), 353–362.
Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. <i>Neuroscience and Biobehavioral Reviews</i> , 104, 1–10.
Brendtro, L. K., Brokenleg, M., & Van Bockern, S. (2005). The Circle of Courage and Positive Psychology. <i>Reclaiming Children and Youth</i> , 14(3), 130–136.
Brown, R. I. F. (1997). A theoretical model of the behavioural addictions—Applied to offending. In J. E. Hodge, M. McMurran, & C. R. Hollin (Eds.), <i>Addicted to crime?</i> (pp. 13–65). John Wiley & Sons.
C. Steinkuehler and D. Duncan, "Scientific Habits of Mind in Virtual Worlds," <i>Journal of Science Education and Technology</i> , vol. 18, no. 5, pp. 487-497, 2009.
Canada, K. (2009). Internet Addiction: a review of associated health hazards. <i>Journal of Environmental Health</i> , 72(3), 46-51.
Canada, O. of the P. C. of. (2009, March 3). <i>Second Life: Privacy in Virtual Worlds</i> - April 2008. Www.priv.gc.ca . https://www.priv.gc.ca/en/opc-actions-and-decisions/research/explore-privacy-research/2008/sl_080411/
Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic internet use and psychosocial well-being. <i>Communication Research</i> , 30(6), 625-648.
Caplan, S. E. (2005a). A social skill account of problematic internet use. <i>Journal of Communication</i> , 55(4), 721-736.
Caplan, S. E. (2005b). Preference for online social interaction. <i>Communication Research</i> , 32(6), 625-648.

Caplan, S. E. (2010). Theory and measurement of generalized problematic Internet use: A two-step approach. <i>Computers in Human Behavior</i> , 26(5), 1089–1097.
Caplan, S. E., Williams, D., & Yee, N. (2009). Problematic internet use and psychosocial well-being among MMO players. <i>Computers in Human Behavior</i> , 25(6), 1312-1319.
Caplan, S., et al. Problematic Internet use and psychosocial well-being among MMO players. <i>Computers in Human Behavior</i> (2009), doi:10.1016/j.chb.2009.06.006
Carpenter, C. J. (2012). Narcissism on Facebook: Self-promotional and anti-social behavior. <i>Personality and Individual Differences</i> , 52(4), 482–486.
Casale, S., Fioravanti, G., & Rugai, L. (2016). Grandiose and vulnerable narcissists: Who is at higher risk for social networking addiction? <i>Cyberpsychology, Behavior, and Social Networking</i> , 19(8), 510–515.
Chotpitayasunondh, V., & Douglas, K. M. (2016). How “phubbing” becomes the norm: The antecedents and consequences of snubbing via smartphone. <i>Computers in Human Behavior</i> , 63, 9-18.
Chou, H. T. G., & Edge, N. (2012). "They are happier and having better lives than I am": The impact of using Facebook on perceptions of others' lives. <i>Cyberpsychology, Behavior, and Social Networking</i> , 15(2), 117-121.
Christman, J. (1991). <i>The inner citadel: Essays on individual autonomy</i> . Oxford University Press.
Citton, Y. (2017). <i>The ecology of attention</i> . Polity Press.
Citton, Y. (2017). <i>The ecology of attention</i> . Polity Press.
Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). <i>Depression and Anxiety</i> , 18(2), 76–82.
Darling Rasmussen, P., Storebø, O. J., Rasmussen, S. S., & Simonsen, E. (2018). The role of attachment in the relationship between childhood adversity, psychological distress and subjective well-being. <i>Child Abuse & Neglect</i> , 76, 104–113.
Davis, R. A. (2001). A cognitive-behavioral model of pathological internet use. <i>Computers in Human Behavior</i> , 17(2), 187-195.
de Castro, S. (2023). <i>My Physical-Digital Self: Exploring the Detrimental Effects of the Metaverse on Relationship & Identity Development</i> . CMC Senior Theses. https://scholarship.claremont.edu/cmc_theses/3188/

Deci, E. L. (2012, August). Promoting Motivation, Health, and Excellence: Ed Deci at TEDxFlourCity. TED Conferences.
Deci, E. L. (2017, October). Edward Deci - Self-Determination Theory. The Brainwaves Video Anthology
Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.
Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. United States: Springer US.
Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. <i>Psychological Inquiry</i> , 11(4), 227-268.
Deci, E. L., & Ryan, R. M. (2010). Intrinsic motivation and self-determination in human behavior. Plenum Press.
Department of Human Services. (2005). A Public Health Approach to Mental Health Planning. Department of Human Services.
Dolezal, L. (2015). The phenomenology of self-presentation: describing the structures of intercorporeality with Erving Goffman. <i>Phenomenology and the Cognitive Sciences</i> , 16(2), 237–254.
Dumas, T. M., Maxwell-Smith, M., Davis, J. P., & Giulietti, P. A. (2017). Lying or longing for likes? Narcissism, peer belonging, loneliness and normative versus deceptive like-seeking on Instagram in emerging adulthood. <i>Computers in Human Behavior</i> , 71, 1–10.
Dunford, B. B., & Tippett, N. (2020). The impact of remote work on innovation: A strategic HR perspective. <i>Strategic HR Review</i> .
Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., & Janssen, M. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. <i>International Journal of Information Management</i> , 66 (66), 102542. https://doi.org/10.1016/j.ijinfomgt.2022.102542
Eyal, N. (2014). <i>Hooked: How to build habit-forming products</i> . Penguin.

Festinger, L. (1954). A theory of social comparison processes. <i>Human Relations</i> , 7(2), 117-140.
Festinger, L. (1954). A theory of social comparison processes. <i>Human Relations</i> , 7(2), 117-140.
Field, T. (2010). Touch for socioemotional and physical well-being: A review. <i>Developmental Review</i> , 30(4), 367-383.
Flores, P. J. (2004). Addiction as an attachment disorder: Implications for group therapy. <i>International Journal of Group Psychotherapy</i> , 54(3), 297-312.
Flynn, M. A., Park, S. Y., Morin, D. T., & Stana, A. (2020a). The role of body surveillance and body shame in college women's social media use and appearance satisfaction. <i>Computers in Human Behavior</i> , 104, 106173.
Flynn, M. A., Stana, A., Park, S. Y., & Morin, D. T. (2020b). Who's comparing? Social comparison orientation moderates the effects of social media use on well-being. <i>New Media & Society</i> , 22(8), 1386-1405.
Fogg, B. J. (2002). <i>Persuasive technology: Using computers to change what we think and do</i> . Morgan Kaufmann Publishers.
Ford, M. (2015). <i>Rise of the robots: Technology and the threat of a jobless future</i> . Basic Books.
Forum, W. E. (n.d.). Strategic Intelligence World Economic Forum. Strategic Intelligence. Retrieved March 6, 2023, from https://intelligence.weforum.org/topics/a1Gb0000001k6I0EAI/key-issues/a1Gb0000001kJw1EAE
Foucault, Michel. <i>Technologies of the Self: A Seminar with Michel Foucault</i> . University of Massachusetts Press, 1988.
Fox, J., & Rooney, M. C. (2015). The Dark Triad and trait self-objectification as predictors of men's use and self-presentation behaviors on social networking sites. <i>Personality and Individual Differences</i> , 76, 161-165.
Frankfurt, H. G. (1971). Freedom of the will and the concept of a person. <i>Journal of Philosophy</i> , 68(1), 5-20.

Frederick, S., & Loewenstein, G. (1999). Hedonic adaptation. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), <i>Well-being: The foundations of hedonic psychology</i> (pp. 302-329). Russell Sage Foundation.
Fried, J., & Hansson, D. H. (2018). <i>It doesn't have to be crazy at work</i> . HarperBusiness.
Frith, C. D. (2007). The social brain? <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> , 362(1480), 671-678.
Fuchs, C. (2017). <i>Social media: A critical introduction</i> . Sage.
Gagne, R. M. (1970). <i>The conditions of learning</i> . Holt, Rinehart & Winston.
Gawlick, D. (2021). Video game playtime and distress-and wellbeing-related associations over time: an experience sampling method study. http://essay.utwente.nl/87660/1/Gawlick_MA_BMS.pdf
Goffman, E. (1959). <i>The presentation of self in everyday life</i> . Doubleday.
Gonzales, A. L., & Hancock, J. T. (2011). Mirror, mirror on my Facebook wall: Effects of exposure to Facebook on self-esteem. <i>Cyberpsychology, Behavior, and Social Networking</i> , 14(1-2), 79-83.
Grieve, R., Indian, M., Witteveen, K., Tolan, G. A., & Marrington, J. (2013). Face-to-face or Facebook: Can social connectedness be derived online? <i>Computers in Human Behavior</i> , 29(3), 604-609.
Griffiths, M. (2000). Internet addiction - Time to be taken seriously? <i>Addiction Research</i> , 8(5), 413-418.
Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial framework. <i>Journal of Substance Use</i> , 10(4), 191-197.
Griffiths, M. D., Kuss, D. J., & Demetrovics, Z. (2014). Social networking addiction: An overview of preliminary findings. In <i>Behavioral addictions</i> (pp. 119-141). Academic Press.
Guerra-Bustamante, J., León-del-Barco, B., Yuste-Tosina, R., & Mendo-Lázaro, S. (2019). Online gaming and the 6 dimensions of psychological well-being. <i>Computers in Human Behavior</i> , 97, 146-150.
Guerra-Bustamante, J., León-del-Barco, B., Yuste-Tosina, R., López-Ramos, V. M., & Mendo-Lázaro, S. (2019). Emotional Intelligence and Psychological Well-Being in

Adolescents. <i>International Journal of Environmental Research and Public Health</i> , 16 (10), 1720. https://doi.org/10.3390/ijerph16101720
Hancock, J. T., & Rickman, L. C. (2021). Digital wellness: A research agenda for improving human well-being in the digital age. <i>Journal of Computer-Mediated Communication</i> , 26(1), 1-15.
Hancock, J., & Rickman, A. (2021). Designing for the greater good: Ethical considerations in digital well-being. In L. Reinecke & M. B. Oliver (Eds.), <i>The Routledge handbook of media use and well-being</i> (pp. 139-151). Routledge.
Heng, C. S., Tan, B. C. Y., & Wei, K. K. (2021). Psychological ownership, technology readiness, and the adoption of mobile and social media technologies. <i>Information & Management</i> , 58(1), 103289.
Heng, S., Zhao, H., & Wang, M. (2021). In-game Social Interaction and Gaming Disorder: A Perspective From Online Social Capital. <i>Frontiers in Psychiatry</i> , 11. https://doi.org/10.3389/fpsy.2020.468115
Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. <i>Psychological Review</i> , 94(3), 319-340.
Higgins, G., Kross, Tice, Hazel Markus, Tory. (n.d.). <i>The Self II & Self-Regulation</i> - ppt download. Slideplayer.com. Retrieved March 25, 2023, from https://slideplayer.com/slide/12628436/
Hofmann, W., Reinecke, L., & Meier, A. (2017). Of sweet temptations and bitter aftertaste: Self-control as a moderator of the effects of media use on well-being. In L. Reinecke & M. B. Oliver (Eds.), <i>The Routledge handbook of media use and well-being</i> (pp. 211-222). Routledge.
Hou, Y., Xiong, D., Jiang, T., Song, L., & Wang, Q. (2020). Social media addiction: Its impact, mediation, and intervention. <i>Cyberpsychology: Journal of Psychosocial Research on Cyberspace</i> , 14(1), article 4.
Hu, C., Cao, R., Huang, J., & Wei, Y. (2022). The Effect of Self-Discrepancy on Online Behavior: A Literature Review. <i>Frontiers in Psychology</i> , 13, 883736. https://doi.org/10.3389/fpsyg.2022.883736
Hussain, Z., & Griffiths, M. D. (2009). Excessive use of Massively Multi-Player Online Role-Playing Games: A Pilot Study. <i>International Journal of Mental Health and Addiction</i> , 7(4), 563–571. https://doi.org/10.1007/s11469-009-9202-8

Hussain, Z., Griffiths, M. D., & Baguley, T. (2012). Online gaming addiction: Classification, prediction and associated risk factors. <i>Addiction Research & Theory</i> , 20(5), 359-371.
Ibid, 228.; McLeod, Saul. Maslow's Hierarchy of Needs. 2007. Simply Psychology. https://www.simplypsychology.org/maslow.html .
Inayatullah, S. (2008). Six pillars: Futures thinking for transforming. <i>Foresight</i> , 10(1), 4-21.
Jenkins-Guarnieri, M. A., Wright, S. L., & Hudiburgh, L. M. (2012). The relationships among attachment style, personality traits, interpersonal competency, and Facebook use. <i>Journal of Applied Developmental Psychology</i> , 33(6), 294–301.
Jeong, E. J., & Kim, D. H. (2011). Social activities, self-efficacy, game attitudes, and game addiction. <i>Cyberpsychology, Behavior, and Social Networking</i> , 14(4), 213-221.
Jetha, M. K., & Segalowitz, S. J. (2012). <i>Adolescent brain development: Implications for behavior</i> . San Diego, CA: Academic Press.
Jin, S. A. A. (2012). "Toward integrative models of flow": Effects of performance, skill, challenge, playfulness, and presence on flow in video games. <i>Journal of Broadcasting & Electronic Media</i> , 56(2), 169-186.
Johnson, S. M. (2004). <i>The practice of emotionally focused couple therapy: Creating connection</i> . New York, NY: Brunner-Routledge.
K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. <i>Computers in Human Behavior</i> , 29(4), 1841-1848.
Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. <i>Computers in Human Behavior</i> , 31, 351–354.
Kardefelt-Winther, D. (2014). Problematizing excessive online gaming and its psychological predictors. <i>Computers in Human Behavior</i> , 31, 118-122.
Kato, T. A., Kanba, S., & Teo, A. R. (2020). Hikikomori: Multidimensional understanding, assessment, and future international perspectives. <i>Psychiatry and Clinical Neurosciences</i> , 73(8), 427-440.

<p>Kazdin, A. E. (2019). Annual research review: Expanding mental health services through novel models of intervention delivery. <i>Journal of Child Psychology and Psychiatry</i>, 60(4), 455-472.</p>
<p>Kim, H., & Damhorst, M. L. (2010). The relationship of body-related self-discrepancy to body dissatisfaction, apparel involvement, concerns with fit and size of garments, and purchase intentions in online apparel shopping. <i>Clothing and Textiles Research Journal</i>, 28(4), 239-254.</p>
<p>King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2010). The role of structural characteristics in problematic video game play: An empirical study. <i>International Journal of Mental Health and Addiction</i>, 8(3), 320-333.</p>
<p>King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2017). Trajectories of problem video gaming among adult regular gamers: An 18-month longitudinal study. <i>Cyberpsychology, Behavior, and Social Networking</i>, 20(1), 17-24.</p>
<p>King, D. L., Delfabbro, P. H., Wu, A. M. S., Doh, Y. Y., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2017). Treatment of Internet gaming disorder: An international systematic review and CONSORT evaluation. <i>Clinical Psychology Review</i>, 54, 123-133.</p>
<p>Koohsari, M. J., McCormack, G. R., Nakaya, T., Yasunaga, A., Fuller, D., Nagai, Y., & Oka, K. (2023). The Metaverse, the Built Environment, and Public Health: Opportunities and Uncertainties. <i>Journal of Medical Internet Research</i>, 25(1), e43549. https://doi.org/10.2196/43549</p>
<p>Koohsari, M., McCormack, G., Nakaya, T., Yasunaga, A., Fuller, D., Nagai, Y., & Oka, K. (n.d.). The Metaverse, the Built Environment, and Public Health: Opportunities and Uncertainties.</p>
<p>Korsgaard, C. M. (1996). <i>The sources of normativity</i>. Cambridge University Press.</p>
<p>Kowert, R., Domahidi, E., & Quandt, T. (2014). The relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. <i>Cyberpsychology, Behavior, and Social Networking</i>, 17(7), 447-453.</p>
<p>Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Jonides, J., & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. <i>PloS one</i>, 8(8), e69841.</p>

Kurzweil, R. (2005). <i>The singularity is near: When humans transcend biology</i> . Penguin Books.
Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction—A review of the psychological literature. <i>International Journal of Environmental Research and Public Health</i> , 8(9), 3528-3552.
Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. <i>International Journal of Mental Health and Addiction</i> , 10(2), 278-296.
Kuss, D. J., & Griffiths, M. D. (2017). Social networking sites and addiction: Ten lessons learned. <i>International Journal of Environmental Research and Public Health</i> , 14(3), 311.
Kuss, D. J., & Lopez-Fernandez, O. (2016). Internet addiction and problematic Internet use: A systematic review of clinical research. <i>World Journal of Psychiatry</i> , 6(1), 143. https://doi.org/10.5498/wjp.v6.i1.143
Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. <i>Computers in Human Behavior</i> , 29(3), 959-966.
Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. <i>Current Pharmaceutical Design</i> , 20(25), 4026-4052. https://doi.org/10.2174/13816128113199990617
Kuss, D. J., Louws, J., & Wiers, R. W. (2017). Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. <i>Cyberpsychology, Behavior, and Social Networking</i> , 20(8), 480-485.
Kuss, D. J., Pontes, H. M., & Griffiths, M. D. (2017). Neurobiological correlates in internet gaming disorder: A systematic literature review. <i>Frontiers in Psychiatry</i> , 8, 1-14. https://doi.org/10.3389/fpsyt.2017.00204
Lanier, J. (2018). <i>Ten arguments for deleting your social media accounts right now</i> . Henry Holt and Company.
Larivière, B., et al. (2022). Children's Perspectives on Friendships and Socialization during the COVID-19 Pandemic: A Qualitative Approach. <i>Child: Care, Health & Development</i> , 48(6), 1017-30. doi:10.1111/cch.12998.

Leary, M. R. (2001). The nature and function of self-esteem: Sociometer theory. In M. R. Leary & J. P. Tangney (Eds.), <i>Handbook of self and identity</i> (pp. 1-23). The Guilford Press.
Leary, M. R. (2001). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. <i>Psychological Bulletin</i> , 117(3), 497-529.
Lee, A. (2013). Attachment as a predictor of friendship qualities in college youth. <i>Social Development</i> , 22(4), 821–835.
Lee, C., Chen, T. H., Chen, H. Y., Chang, C. Y., & Hsieh, H. L. (2021). Gaming disorder and its relationship with online gaming motivations, mental health, and problematic Internet use among first-year college students in Taiwan. <i>International Journal of Environmental Research and Public Health</i> , 18(16), 8507.
Lee, J. H. (2019). Narcissism, extraversion, and the preference for Instagram over Facebook. <i>Personality and Individual Differences</i> , 139, 81–85.
Lee, J., Park, E., Kwon, M., & Chang, H. (2021). Explaining the addictive use of smartphone games: A uses and gratifications approach. <i>Telematics and Informatics</i> , 58, 101554.
Leménager, T., Hoff, R. A., Dieter, J., Reinhard, I., Mann, K., & Kiefer, F. (2018). The links between healthy, problematic, and addicted Internet use regarding comorbidities and self-concept-related characteristics. <i>Journal of Behavioral Addictions</i> , 7(1), 31-43.
Lemenager, T., Hoffmann, S., Dieter, J., Reinhard, I., Mann, K., & Kiefer, F. (2020). The links between healthy, problematic, and addicted Internet use regarding comorbidities and self-concept-related characteristics. <i>Journal of Behavioral Addictions</i> , 9(1), 77-90.
Levine, L. E., Waite, B. M., & Bowman, L. L. (2012). Electronic media use, reading, and academic distractibility in college youth. <i>Computers & Education</i> , 58(4), 1095-1104.
Levine, L. E., Waite, B. M., & Bowman, L. L. (2012). Electronic media use, reading, and academic distractibility in college youth. <i>Cyberpsychology, Behavior, and Social Networking</i> , 15(6), 303-307.
Lieberman, A. F., Van Horn, P., & Ippen, C. G. (2011). Toward evidence-based treatment: Child-parent psychotherapy with preschoolers exposed to marital violence. <i>Journal of the American Academy of Child & Adolescent Psychiatry</i> , 44(12), 1241-1248.

Lin, J. H. (2016). Need for relatedness: A self-determination approach to examining attachment styles, Facebook use, and psychological well-being. <i>Asian Journal of Communication</i> , 25(2), 153–173.
Lin, L., Sidani, J. E., Shensa, A., Radovic, A., Miller, E., Colditz, J. B., ... & Primack, B. A. (2016). Association between social media use and depression among US young adults. <i>Depression and Anxiety</i> , 33(4), 323-331.
Lloyd, M., & Friedel, T. (2018). It's complicated: The social lives of networked teens. <i>Journal of Youth and Adolescence</i> , 47(8), 1795-1797.
M. W. Johnson, "Facebook Takes Its First Steps Toward a Metaverse," <i>Wired</i> , Sep. 2020. [Online]. Available: https://www.wired.com/story/facebook-takes-first-steps-toward-metaverse/ . [Accessed: 15-Feb-2021]
Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). A comprehensive meta-analysis on problematic Facebook use. <i>Computers in Human Behavior</i> , 83, 262–277.
Mark Zuckerberg outlines his vision for a Ready Player One-like metaverse and it sounds wild. (n.d.). <i>GameSpot</i> . https://www.gamespot.com/articles/mark-zuckerberg-outlines-his-vision-for-a-ready-player-one-like-metaverse-and-it-sounds-wild/1100-6494443/
Maslow, A. H. (1943). A theory of human motivation. <i>Psychological Review</i> , 50(4), 370-396.
Maunder, R. G., & Hunter, J. J. (2001). Attachment and psychosomatic medicine: Developmental contributions to stress and disease. <i>Psychosomatic Medicine</i> , 63(4), 556–567.
McKnight, P. E., & Kashdan, T. B. (2009). Purpose in life as a system that creates and sustains health and well-being: An integrative, testable theory. <i>Review of General Psychology</i> , 13(3), 242-251.
Meadows, D. (1999). <i>Leverage points: Places to intervene in a system</i> . The Sustainability Institute.
Meshi, D., Tamir, D. I., & Heekeren, H. R. (2013). The emerging neuroscience of social media. <i>Trends in Cognitive Sciences</i> , 19(12), 771-782.
Mikulincer, M., & Shaver, P. R. (2007). <i>Attachment in adulthood: Structure, dynamics, and change</i> . Guilford Press.

Mikulincer, M., & Shaver, P. R. (2016). Attachment in adulthood: Structure, dynamics, and change. Second Edition. Guilford Press.
N. Stephenson, Snow Crash. New York: Bantam Books, 1992.
Nadkarni, A., & Hofmann, S. G. (2012). Why do people use Facebook? Personality and Individual Differences, 52(3), 243-249.
Nafus, D., & Sherman, J. (2014). Big data, bigger dilemmas: A critical review. Journal of the Association for Information Science and Technology, 66(8), 1523-1545.
Noble, S. U. (2018). Algorithms of oppression: How search engines reinforce racism. NYU Press.
Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. Journal of Abnormal Psychology, 109(3), 504-511.
Norcross, J. C., & Wampold, B. E. (2011). Evidence-based therapy relationships: Research conclusions and clinical practices. Psychotherapy, 48(1), 98-102.
Novak, K., & Adamskaya, Y. (2017). Armenia 2030: Transforming the Development Landscape. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3094257
Oldmeadow, J. A., Quinn, S., & Kowert, R. (2013). Attachment style, social skills, and Facebook use amongst adults. Computers in Human Behavior, 29(3), 1142-1149.
Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. Personal and Ubiquitous Computing, 16(1), 105-114.
Owens, J., Teens, M., & Behavior, S. (2018). Insufficient sleep in adolescents and young adults: An update on causes and consequences. Pediatrics, 134(3), e921-e932.
P. S. R. Arora and E. L. Arora, "Virtual Worlds and Their Educational Potential," Journal of Educational Technology Development and Exchange, vol. 1, no. 1, pp. 1-14, 2008.
Paquin, V., Ferrari, M., Sekhon, H., & Rej, S. (2022). Time to Think "Meta": A Critical Viewpoint on the Risks and Benefits of Virtual Worlds for Mental Health (Preprint). JMIR Serious Games. https://doi.org/10.2196/43388
Parke, M. (2017, August 2). Thomas Friedman: Technology is accelerating faster than our ability to adapt. We can catch up. WorkingNation.
Patel, M., Shangkuan, J., & Thomas, C. (2019, December 23). What's new with the Internet of Things? McKinsey & Company.

<p>Paulhus, D. L., & Williams, K. M. (2002). The dark triad of personality: Narcissism, Machiavellianism, and psychopathy. <i>Journal of Research in Personality</i>, 36(6), 556–563.</p>
<p>Porter, M. E. (2010). What is value in health care? <i>New England Journal of Medicine</i>, 363(26), 2477-2481.</p>
<p>Primack, B. A., Shensa, A., Escobar-Viera, C. G., Barrett, E. L., Sidani, J. E., Colditz, J. B., & James, A. E. (2017). Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among US young adults. <i>Computers in Human Behavior</i>, 69, 1-9.</p>
<p>Primack, B. A., Shensa, A., Sidani, J. E., Whaite, E. O., Lin, L. Y., Rosen, D., ... & Miller, E. (2017). Social media use and perceived social isolation among young adults in the US. <i>American Journal of Preventive Medicine</i>, 53(1), 1-8.</p>
<p>Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. <i>Computers in Human Behavior</i>, 29(4), 1841-1848.</p>
<p>Ra, M. (n.d.). Council Post: The Metaverse And Mental Health: Supporting Employees In Virtual Environments. <i>Forbes</i>. Retrieved March 27, 2023, from https://www.forbes.com/sites/forbesbusinesscouncil/2022/08/17/the-metaverse-and-mental</p>
<p>Rose, S., & Dhandayudham, A. (2014). Towards an understanding of Internet-based problem shopping behaviour: The concept of online shopping addiction and its proposed predictors. <i>Journal of Behavioral Addictions</i>, 3(2), 83–89.</p>
<p>Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. <i>Computers in Human Behavior</i>, 29(3), 1243-1254.</p>
<p>Rutter, M. (2012). Resilience as a dynamic concept. <i>Development and Psychopathology</i>, 24(2), 335–344.</p>
<p>Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. <i>Journal of Personality and Social Psychology</i>, 57(6), 1069-1081.</p>

Sahebi, A., & Formosa, P. (2022). Autonomy and the ethics of social platforms. Unpublished manuscript.
Sahebi, S., & Formosa, P. (2022). Social Media and its Negative Impacts on Autonomy. <i>Philosophy & Technology</i> , 35(3). https://doi.org/10.1007/s13347-022-00567-7
Sam, J. (n.d.). EXAMINING THE RELATIONSHIP BETWEEN ATTACHMENT STYLE AND RESILIENCE DURING ADOLESCENCE. Retrieved April 26, 2023, from https://open.library.ubc.ca/media/stream/pdf/24/1.0167256/1
Schimmenti, A., & Caretti, V. (2010). Video terminal dissociative trance: Toward a psychodynamic understanding of problematic internet use. <i>Psychoanalytic Psychology</i> , 27(3), 309-326. https://doi.org/10.1037/a0021170
Schimmenti, A., Passanisi, A., Caretti, V., La Marca, L., Granieri, A., Iacolino, C., Gervasi, A. M., Maganuco, N. R., & Billieux, J. (2017). Traumatic experiences, alexithymia, and Internet addiction symptoms among late adolescents: A moderated mediation analysis. <i>Addictive Behaviors</i> , 64, 314-320.
Seligman, M. E. P. (2002). <i>Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment</i> . Free Press.
Siibak, A. (2009). Constructing the self through the photo selection: Visual impression management on social networking websites. <i>Cyberpsychology: Journal of Psychosocial Research on Cyberspace</i> , 3(1), 1-9.
Skinner, B. F. (1938). <i>The behavior of organisms: An experimental analysis</i> . Appleton-Century.
Spiegel, R. (2018). The future of human relationships in virtual reality. <i>Psychology Today</i> . Retrieved from https://www.psychologytoday.com/us/blog/the-new-brain/201810/the-future-human-relationships-in-virtual-reality
Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). <i>The development of the person: The Minnesota study of risk and adaptation from birth to adulthood</i> . New York, NY: Guilford Press.
Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The meaning in life questionnaire: Assessing the presence of and search for meaning. <i>Journal of Counseling Psychology</i> , 53(1), 80-93.

Sternlicht, L., and Sternlicht, A. (2022). A new age of digital addiction - what the metaverse means for mental health and digital addiction. Available at: https://www.familyaddictionspecialist.com/blog/a-new-age-of-digital-addiction-what-the-metaverse-means-for-mental-health-and-digital-addiction .
Stockdale, L. A., & Coyne, S. M. (2018). Video game addiction in emerging adulthood: Cross-sectional evidence of pathology in video game addicts as compared to matched healthy controls. <i>Journal of Affective Disorders</i> , 225, 265-272.
Sundar, S. S., & Limperos, A. M. (2013). Uses and grats 2.0: New gratifications for new media. <i>Journal of Broadcasting & Electronic Media</i> , 57(4), 504-525.
Sundararajan, A. (2018). <i>The sharing economy: The end of employment and the rise of crowd-based capitalism</i> . MIT Press.
Susser, D., Roessler, B., & Nissenbaum, H. (2019). Technology, autonomy, and manipulation. <i>Internet Policy Review</i> , 8(2).
Swan, M. (2015). <i>Blockchain: Blueprint for a new economy</i> . O'Reilly Media, Inc.
Swan, M. (2020). <i>Defi and the future of finance</i> . Blockchain Research Institute.
Swann, W. B., Jr., Chang-Schneider, C., & McClarty, K. L. (2007). Do people's self-views matter? Self-concept and self-esteem in everyday life. <i>American Psychologist</i> , 62(2), 84-94.
Teo, A. R., & Gaw, A. C. (2010). Hikikomori, a Japanese culture-bound syndrome of social withdrawal? A proposal for DSM-5. <i>The Journal of Nervous and Mental Disease</i> , 198(6), 444-449.
Tufekci, Z. (2018). <i>Twitter and tear gas: The power and fragility of networked protest</i> . Yale University Press.
Turel, O., & Serenko, A. (2012). The benefits and dangers of enjoyment with social networking websites. <i>European Journal of Information Systems</i> , 21(5), 512-528.
Turel, O., He, Q., Xue, G., Xiao, L., & Bechara, A. (2014). Examination of neural systems sub-serving Facebook "addiction." <i>Psychological Reports</i> , 115(3), 675-695.
Turel, O., Serenko, A., & Giles, P. (2011). Integrating technology addiction and use: An empirical investigation of online auction users. <i>MIS Quarterly</i> , 35(4), 1043-1061.
Turkle, Sherry. "Growing Up Tethered." In <i>Why We Expect More from Technology and Less from Each Other</i> , 171-186. New York: Basic Books, 2011.

Twenge, J. M. (2013). Does online social media lead to social connection or social disconnection? <i>Journal of College and Character</i> , 14(1), 11-20.
Twenge, J. M. (2013). The evidence for generation me and against generation we. <i>Emerging Adulthood</i> , 1(1), 11-16.
Valdman, M. (2009). A theory of wrongful exploitation. <i>Philosophers' Imprint</i> , 9(6), 1-14.
Valkenburg, P. M., & Peter, J. (2009). Social consequences of the internet for adolescents: A decade of research. <i>Current Directions in Psychological Science</i> , 18(1), 1-5.
Van der Aa, N., Overbeek, G., & Engels, R. C. M. E. (2015). Time spent online: Good or bad for mental health? The role of effortful control. <i>Computers in Human Behavior</i> , 50, 262-266.
Van Rooij, A. J., & Prause, N. (2014). A critical review of "Internet addiction" criteria with suggestions for the future. <i>Journal of Behavioral Addictions</i> , 3(4), 203-213.
Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. <i>Psychology of Popular Media Culture</i> , 3(4), 206-222.
Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic advances from the brain disease model of addiction. <i>New England Journal of Medicine</i> , 374(4), 363-371.
Vorderer, P., & Klimmt, C. (2004). Interactive entertainment and beyond. In P. Vorderer, & J. Bryant (Eds.), <i>Playing video games: Motives, responses, and consequences</i> (pp. 21-36). Lawrence Erlbaum Associates Publishers.
Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the Resilience Scale. <i>Journal of Nursing Measurement</i> , 1(2), 165-178.
Wardle, C., & Derakhshan, H. (2017). <i>Information disorder: Toward an interdisciplinary framework for research and policymaking</i> . Council of Europe.
Watson, G. (1975). Free agency. <i>Journal of Philosophy</i> , 72(8), 205-220.
Watson. (n.d.). Watson.latech.edu . http://watson.latech.edu/book/future/futureMoores1.html
Weis, R., & Cerankosky, B. C. (2010). Effects of video-game ownership on young boys' academic and behavioral functioning: A randomized, controlled study. <i>Psychological Science</i> , 21(4), 463-470.

- WHO. (2020). Mental health and psychosocial considerations during the COVID-19 outbreak. World Health Organization. Retrieved from <https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf>
- Wood, A. W. (1995). Exploitation. *Social Philosophy and Policy*, 12(2), 136-158.
- World Health Organization. (2014). *Mental Health: A State of Well-being*. World Health Organization.
- Xu, J., Shen, L. X., Yan, C. H., Hu, H., Yang, F., Wang, L., Kotha, S. R., Ouyang, F., Zhang, L. N., Liao, X. P., & Zhang, J. (2014). Parent-adolescent interaction and risk of adolescent internet addiction: a population-based study in Shanghai. *BMC Psychiatry*, 14(1), 112.
- Yampolskiy, R. V. (2015). *Artificial intelligence safety and cybersecurity*. Chapman and Hall/CRC.
- Yoonhyuk Jung, Y. J. (2011). The influence of perceived ad relevance on social network site users' continued use of social virtual worlds. *Journal of Interactive Advertising*, 12(1), 30-42.
- Young, K. S. (2017). The evolution of Internet addiction disorder. In *Internet addiction* (pp. 3-17). Springer, Cham.
- Young, K. S. (2017). The evolution of Internet addiction. *Addictive Behaviors*, 64, 229-230.
- Zulli, D. (2018). Capitalizing on the look. *Critical Studies in Media Communication*, 35(2), 137-150.
- Zulli, D. (2018). The glance and the economy of attention: A critical analysis of digital media and attention economies. *Philosophy & Technology*, 31(2), 183-206.