

Habit or addiction?

A qualitative exploration of Instagram and addictive design characteristics

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Acknowledgement

I want to thank Professor Oscar Person and my thesis advisor Rebecca Jeong for their good advice and guidance.

I also want to thank all the participants that agreed to the interviews and shared their insights.

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Title of thesis Habit or addiction? A qualitative exploration of Instagram and addictive design characteristics.

Department Aalto University School of Arts, Design and Architecture

Degree programme Bachelor's Programme in Design

Thesis supervisor Oscar Person

Thesis advisor Rebecca Jeong

Year 2023

Number of pages 38

Language English

1 Abstract

Instagram is one of the world's most popular social media platforms, with approximately 1.3 billion monthly users spending an average of 11.75 hours per week on the application (Prosser, 2021). Many people may be habituated to using social media on a regular basis. Habit-forming design practices are embraced in the world of business and are acknowledged as one of the primary drivers for increasing companies' revenue (Eyal & Hoover, 2014). For example, Designers may adopt a hooked cycle model filled with triggers and rewards in developing a habit-forming product, such as social media platforms, to ensure that users spend increasingly long periods of time using the product (Eyal & Hoover, 2014). However, spending extended periods of time on the social media platforms, such as Instagram, may negatively impact individuals' daily lives and personal relationships and lead to addiction (Serenko & Serenko, 2020). Social media addiction is a form of behavioural addiction involving the intense desire to repeat a pleasurable action perceived to improve well-being or relieve stress (Karim & Chaudhri, 2012). There has been an extensive discussion about the consequences of Instagram addiction and the severe psychological impact it may have, such as anxiety, depression, and eating disorders. However, there has not been enough exploration that may provide an understanding of how certain design features make Instagram addictive (Sun & Zhang, 2021). Therefore, this thesis addresses the question of how to identify addictive Instagram design features.

The aim of the research is to gather information and establish a template for the characteristics of addictive Instagram design features . A literature review was conducted to identify user motivations for Instagram use, such as social needs, recognition needs, need for relatedness, and fear of missing out (FOMO). In addition to the literature review, semi-structured interviews were conducted for data analysis. The data collection was separated into two stages. The first stage of data collection included interviews with psychologists and sociopsychologists to identify Instagram features that may satisfy the user needs determined by the literature review. The second stage of data collection involved semi-structured interviews with user experience designers to determine repetitive design characteristics present in the addictive Instagram features identified in the first stage of data collection.

The results show that feedback, references to infinite and new content, and continuous service updates are the most prominent Instagram addiction motivators. It was determined that continuous service updates and references to infinite and new content may function as the first compulsive use trigger in the user journey on the social media platform, whereas feedback may provoke the feeling of reward for the user. It can be theorized that the identified characteristics may motivate and reinforce addictive behaviour by creating a loop of triggers and rewards. This also corresponds with the hooked cycle model by offering consumers a sense of involvement and unfinishedness, motivating them to return for more. The findings may lead to speculation that Instagram addiction drivers and habit-forming design practices share a significant amount of parallels.

Keywords Instagram addiction, behavioural addiction, user needs, user experience design, addictive Instagram design features, addiction motivators.

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1 Introduction

Instagram is one of the world's most popular social media platforms, with roughly 1.3 billion monthly users spending an average of 11.75 hours per week on the application (Prosser, 2021). Individuals who spend extended periods on social media platforms such as Instagram may develop an addiction that can affect their daily lives and personal relationships (Serenko & Serenko, 2020). Addiction to social media, such as Instagram, falls under the umbrella of behavioural addiction, which can be defined as an intense desire to repeat a pleasurable action perceived to improve well-being or relieve stress (Karim & Chaudhri, 2012).

Terms such as social media addiction, problematic social media use, and compulsive social media use are synonymous in research, referring to addiction-like symptoms (Sun & Zhang, 2021). Research suggests that rewarding behaviour releases a neurotransmitter called dopamine, which motivates one to repeat the same behaviour (Serenko & Serenko, 2020). Although the rewarding feeling of repetitive behaviour may provide satisfaction at first, the dopamine release decreases over time (Nasti, Michienzi, & Guidi, 2020), resulting in higher tolerance and increased behaviour craving, thus leading to addiction (Karim & Chaudhri, 2012). At first, such behaviour may be described as habitual (Sun & Zhang, 2021).

Habit-forming design practices are widely embraced in the business world and are recognized as powerful tools for increasing companies' revenue and user engagement (Eyal & Hoover, 2014). Designers may adopt a hooked cycle model filled with triggers and rewards in developing a habit-forming product, such as social media platforms, to ensure that users spend increasingly long periods of time using the product (Eyal & Hoover, 2014). The hooked cycle model consists of four key phases: trigger, action, variable reward, and investment. These stages are strategically incorporated to keep users continuously engaged with the product.

Triggers are the initial inputs that motivate users to engage with a specific product in the context of habit-forming design practices. Triggers can be categorized as either external, such as notifications, or internal, which may be emotional or psychological cues that arise within the user. Triggers may encourage users to engage in specific behaviours within the product, for example, scrolling through social media, liking posts, or sharing content (Eyal & Hoover, 2014). Designers may utilize variable rewards to establish a sense of anticipation and enjoyment for the user to guarantee that users develop a habit of regularly participating in the social media platform (Eyal & Hoover, 2014). This may encourage users to engage their time and effort in the social media platform, creating a sense of ownership and attachment that raises the possibility of long-term and consistent usage (Eyal & Hoover, 2014).

Designers employ the hooked cycle model to establish a feedback loop that keeps users engaged with the platform (Eyal & Hoover, 2014). Each interaction strengthens the habit and makes breaking away increasingly difficult. The ultimate goal of social media platforms is for users to spend more time on the site, which results in higher user retention, more ad revenue,

and other monetization options (Eyal & Hoover, 2014). While habit-forming design methods can benefit businesses by driving growth and revenue, they can also lead to the development of addictive behaviours and have a detrimental impact on the well-being of users.

Studies have shown a correlation between compulsive social media use and reduced life satisfaction, mental health issues and decreased productivity (Sun & Zhang, 2021). There has been an extensive discussion about the consequences of Instagram addiction and the severe psychological impact it may have, such as anxiety, depression and eating disorders. However, there has not been enough exploration that may provide an understanding of how certain design features make Instagram addictive (Sun & Zhang, 2021). A suggestion to not use Instagram may not be a suitable solution, as some occupations may necessitate social media presence. Thus, this thesis addresses the question of how to identify addictive Instagram design features.

The research aimed to gather information and establish addictive Instagram design features' characteristic templates. To identify addictive behaviour, an extensive literature review was conducted on social media addiction mechanisms, its causes, and consequences (see Chapter 2). The literature review provided an understanding of social media and Instagram addiction from users' perspective, as well as possible psychological and neurobiological causes for behavioural addiction. In addition to the literature research, semi-structured interviews for data collection and analysis were performed. The data-gathering process was split into two sections. The first stage of data collecting (see chapter 3.1.1) featured interviews with psychologists and sociopsychologists to determine Instagram features that might meet the user needs identified by the literature research, while the second stage involved semi-structured interviews with user experience designers. The second stage of the data collection (see Chapter 3.1.2) sought to uncover Instagram design characteristics that promote social media addiction. The decision to collect data in two stages was adopted to build a coherent research path that begins with understanding Instagram users, their motivations for using social media, and the development of compulsive Instagram use from the perspectives of individual users as well as societal prospects.

The findings of this study may assist in developing addictive social media evaluation criteria and help users to identify design practices that motivate compulsive behaviour on social media. Therefore, with this knowledge users could advocate for ethical designs in social media. Further research may assist in establishing counter actions for addictive social media design features, thus improving an online environment, and promoting user well-being. As the research topic is strongly connected to design, human psychology and social psychology, the thesis may act as a supporting agent for acknowledging and building knowledge of the link between these fields of study.

2 Literature review

The relevant literature for the project was chosen to identify and explore research containing information related to social media addiction, and behavioural addiction including not only psychological mechanisms but also neurological brain response to addictive stimuli. The literature was selected to build the basis of knowledge and gather an in-depth understanding of behavioural addiction and compulsive Instagram use. Furthermore, the literature selection was based on identifying addictive behaviour tendencies, psychological and sociopsychological drivers and users' motivations that may lead to Instagram addiction.

The literature was searched mainly on google scholar using keywords, such as behavioural addiction to deepen the general understanding of addiction-forming and neurobiological mechanisms involved. To sift the research towards Instagram addiction, the keywords such as Instagram addiction and Instagram addiction drivers were used to search for research papers on google scholar.

Ponnusamy et al. (2020) have provided a foundation for understanding and identifying psychological and sociopsychological motivations for Instagram addiction. Saletti et al. (2022) and Sun & Zhang (2021) has helped to expand the knowledge and help understand Instagram addiction drivers from users' perspective.

The selected literature consists of research papers and literature reviews. The majority of the literature selected are research articles chosen from scientific journals related to psychology and social psychology. These sources were preferred due to their credibility, relevance to the project and information-gathering proficiency.

2.1 The purpose of the literature review

The key literature provides an understanding of social media and Instagram addiction from users' perspectives, as well as possible psychological and neurobiological causes for behavioural addiction. In addition, the review focuses on identifying addictive behaviour patterns, psychological and sociopsychological motivations that may lead to Instagram addiction and the underlying consequences of developing Instagram addiction.

Although the key literature does not discuss addictive design features or identification criteria, it serves as the building blocks for the project and provides an in-depth understanding of the research areas. The literature review aims to extend the understanding of compulsive Instagram use by analysing and developing the existing research.

The literature research defines Instagram addiction (see section 2.2) and provides an overview of possible cognitive symptoms, biological processes involved in the development of addiction, and the consequences of a developed Instagram addiction. In sections 2.3, 2.4 and 2.5, the

review examines social psychology theories to understand the underlying motives for social media use. The key literature review findings are presented in section 2.6.

2.2 Instagram addiction

Compulsive Instagram use falls under the definition of behavioural addiction (Karim & Chaudhri, 2012), which can be defined as a specific group of behavioural and mental disorders that do not include ingesting any substances (Serenko & Serenko, 2020). Social media addiction, problematic social media use, and compulsive social media use are terms used synonymously in research (Sun & Zhang, 2021). It may present itself as a compulsive or uncontrollable dependency on the use of social media that results in typical behavioural addiction symptoms (Cao, Gong, Yu, & Dai, 2020), such as incentive salience, mood modifications, tolerance, and withdrawals (Serenko & Serenko, 2020). Although social media addiction is not recognized by the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*), research suggests that any stimuli that trigger reward systems and lead to repeating or craving certain behaviours may result in addiction, even in the absence of substances (Karim & Chaudhri, 2012). In addition, Sun and Zhang, (2021) suggest that certain upbringing may have an impact on one’s likelihood of developing compulsive social media use.

From a biological perspective, the stimuli activate a group of cells known as the dopamine system (DS) (Nasti, Michienzi, & Guidi, 2020). Dopamine is a neurotransmitter that is released under external (sensory) or internal (mental) stimuli, or when one is engaged in pleasurable, rewarding behaviour (Serenko & Serenko, 2020). After being activated, dopaminergic neurons send a signal through a complex pathway in the brain leading to the prefrontal cortex resulting chain-like reaction, where dopamine cells bind to dopamine receptors activating them, resulting in more release of neurotransmitters, continuing the reaction until the signal reaches terminal brain area (Serenko & Serenko, 2020). This reaction happens almost immediately in the brain and the person feels a sense of reward, with the strength depending on the amount of dopamine released (Serenko & Serenko, 2020). Over time the dopamine release caused by the same stimuli decreases, resulting in increased tolerance, which consequently motivates cravings and more frequent addictive behaviour (Nasti, Michienzi, & Guidi, 2020).

A developed addiction to social media may start affecting individuals’ everyday lives. Studies show that compulsive Instagram use leads to a negative impact on users’ job performance (Zivnuska, Carlson, Carlson, Harris, & Harris, 2019) and academic performance, which consequently lowers life satisfaction (Foroughi, Griffiths, Iranmanesh, & Salamzadeh, 2021). The research has also found increased feelings of loneliness and shyness among compulsive Instagram users (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). The excessive use of Instagram has negative psychological health implications, such as anxiety, depression, and low self-esteem (Sun & Zhang, 2021). In addition, research suggests that Instagram addiction

has an increased risk of low body esteem, which may result in body dysmorphia and eating disorders for female users (Simon, et al., 2022).

For the development of addictive behaviour, an individual must engage in such behaviour with the idea of gaining certain goals, such as gaining information or a desired sensory stimulation (Robbins & Clark, 2015). In the case of Instagram use these goals may present themselves as goals to satisfy certain psychological and sociopsychological needs. Due to the variety of design features, Instagram can gratify one’s specific needs, which may lead to addiction (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). Based on the literature it can be theorized that design practices used to encourage habit formation of using social media, such as incorporating certain triggers and rewards in the interface design, overlap with psychological and sociopsychological needs responsible for encouraging compulsive Instagram use.

2.3 Uses and gratification theory

The uses and gratification (U&G) theory, also known as the use and demand theory, was proposed by Bulmer and Katz in 1940 as a tool to understand the underlying reasons for media use (Ko & Yu, 2019). The theory explores motivations and gratifications from a user-centred perspective, which encourages mass media use and possible addiction (Ko & Yu, 2019). The theory argues that media use is goal-directed, meaning that individuals choose to participate in social media use with a motivation to satisfy desired interpersonal, psychological, or sociopsychological needs (Saletti, Broucke, & Beggelaer, 2022). The uses and gratification theory includes social, recognition, entertainment, and information needs (Sun & Zhang, 2021). It is possible to speculate that the major drivers of compulsive Instagram use are design features that offer the greatest levels of recognition and social. Some studies suggest that information and entertainment needs do not have a significant impact on the development of Instagram addiction (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). Nevertheless, due to a variety of different features, Instagram can satisfy certain and possibly multiple users’ needs, which makes it inclined in promoting compulsive use and addictive behaviour (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020).

With the increased popularity of social media, the U&G theory has been applied in exploring the motivations and gratifications not only for using but additionally for choosing specific social media platforms (Ko & Yu, 2019). The use and gratification theory is considered a micro-level theory, as it focuses on individual users’ motivations and desires (Saletti, Broucke, & Beggelaer, 2022). Due to the theory’s user-centred focus, it is a great tool for understanding user perspective and potentially identifying addiction-encouraging Instagram design features. As Instagram user interface design is different from other social media platforms, such as Facebook or Twitter, the addiction drivers may also differ (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). Prior studies by Ponnusamy et al. (2020) have investigated user needs that are satisfied specifically by Instagram use.

2.3.1 Social needs

Social needs may be defined as a need for socialization. It may include an urge to share one's immediate feelings, thoughts, emotions, current activities, and experiences (Saletti, Broucke, & Beggelaer, 2022). Social needs also imply the need to check on others' current life events and experiences (Saletti, Broucke, & Beggelaer, 2022). Communication and social interaction between individuals are also referred to as a part of social needs (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). With this definition in mind, individuals may use Instagram as a form of socialization network to satisfy their social needs, by engaging in communication with their peers. Research suggests that the link between social needs and Instagram addiction is stronger in individuals with high psychological well-being (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020).

2.3.2 Recognition needs

Recognition needs may be defined as a need for validation from one's peers (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). It may be interpreted as an individual seeking admiration from other users on Instagram (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). Recognition needs also include showcasing one's interests, individuality, uniqueness, and passions (Saletti, Broucke, & Beggelaer, 2022). As with other needs, recognition needs do not only include showcasing users' own lives, but also receiving the approval and admiration from others to satisfy such needs (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). Research shows that compulsive Instagram users place more emphasis on their self-identity and self-promotion (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). This aligns with the idea that one may feel the urge to influence peers' perception of themselves to satisfy their recognition needs (Saletti, Broucke, & Beggelaer, 2022).

2.4 Need for relatedness.

The need of relatedness is an innate psychological need characterized in self-determination theory as one of three intrinsic needs that have a strong impact on individuals' psychological health and well-being (Masur, Reinecke, Ziegele, & Quiring, 2014). The need of relatedness refers to a need of feeling closeness and intimacy with others (Masur, Reinecke, Ziegele, & Quiring, 2014). The need of relatedness may present itself as a desire for emotional connection with other individuals (Masur, Reinecke, Ziegele, & Quiring, 2014), which in the case of Instagram use, are followers and other users. A satisfied need for relatedness may provide the user with a sense of belonging in a certain community or a group of other users that may express similar experiences or interests (Cao, Gong, Yu, & Dai, 2020). The sense of belonging to the social media platform may motivate the user in creating an emotional attachment to Instagram, thus encouraging compulsive Instagram use (Cao, Gong, Yu, & Dai, 2020).

2.5 Fear of missing out (FOMO)

Recently, the fear of missing out (FOMO) has been studied as one of the motivators for Instagram use and addictive behaviour (Moore & Craciun, 2021). FOMO is defined as a fear of loss of rewarding experiences that others may engage in, from which the user is absent (Moore & Craciun, 2021). It is a relatively new phenomenon that has been theorized to be combined of feelings of inadequacy, irritability, and anxiety (Moore & Craciun, 2021). Due to the tendency of overestimating the experiences and positive emotions of others, FOMO may act as a catalyst for more frequent social media use and increased anxiety (Moore & Craciun, 2021). Some studies theorize that Instagram addiction comes from the fear of missing out, which leads to an increased frequency of checking one’s social media, thus compulsive use (Muhammad, 2018). Individuals who experience fears of missing out may be more susceptible to Instagram addiction, as it satisfies their needs for emotional connection and belonging (Moore & Craciun, 2021).

2.6 The key findings from the literature review

Instagram addiction is characterized as a behavioural addiction (Karim & Chaudhri, 2012), which presents as a compulsive or uncontrollable dependency on social media use that results in typical behavioural addiction symptoms (Cao, Gong, Yu, & Dai, 2020). These symptoms include incentive salience, mood modifications, tolerance, and withdrawal symptoms (Serenko & Serenko, 2020). Frequent use of Instagram triggers dopamine production in the brain resulting in feelings of pleasure and reward (Serenko & Serenko, 2020). Over time, the same stimuli such as Instagram, causes decreased dopamine release resulting in increased tolerance, cravings, and Instagram addiction (Nasti, Michienzi, & Guidi, 2020). A developed Instagram addiction has negative consequences that include increased feeling of loneliness, shyness (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020), anxiety, depression, low self-esteem (Sun & Zhang, 2021), body dysmorphia, and eating disorder (Simon, et al., 2022).

It has been discussed that for Instagram addiction development, the users engage in Instagram use to satisfy certain psychological and sociopsychological needs (Robbins & Clark, 2015). The use and gratification theory focuses on individual users’ motivations and desires (Saletti, Broucke, & Beggelaer, 2022), which makes it a great tool for understanding user perspective and potentially identifying addiction encouraging Instagram design features. The U&G theory includes social, recognition, entertainment, and information needs (Sun & Zhang, 2021), of which social and recognition needs are essential in the development of Instagram addiction (Ponnusamy, Iranmanesh, Foroughi, & Hyun, 2020). It could be hypothesized that Instagram design features that provide the highest levels of recognition and social needs in the form of likes, comments, views, and other forms of engagement are the key drivers of compulsive Instagram use. In addition to social and recognition needs, the research has found that the need of relatedness (Cao, Gong, Yu, & Dai, 2020) and fear of missing out (Moore & Craciun, 2021)

are compelling drivers of compulsive Instagram use. It can be speculated that design strategies used to promote habit formation of social media usage, such as integrating various triggers and rewards in the user interfaces, align with psychological and sociopsychological demands that support compulsive Instagram use.

The key findings from the literature review provide a great understanding of psychological and neurological Instagram addiction mechanisms and examine user-centered motives and drivers to compulsive Instagram use; however, there has not been a lot of exploration that may provide an understanding of how certain design features make Instagram addictive. This research aims to expand on Instagram addiction drivers from a user experience design perspective and identify Instagram design features that satisfy above mentioned psychological and sociopsychological user needs that motivate compulsive Instagram use.

3 Research Approach

In addition to the literature review, semi-structured interviews were conducted for data analysis. The data collection was separated into two stages. This decision to pursue a two-fold approach for data collection was made to build a coherent research process that builds the knowledge of design involvement in the potential development of Instagram addiction. To fulfil the goal of this thesis, the research must begin by understanding Instagram users, their motivations for using social media, and the development of compulsive Instagram use from users' perspective as well as social perspective. Once such data is gathered and analysed the research can build knowledge upon it and gather information on user experience design practices related to user retention and potential addiction from a design perspective. Thus, the second stage of data collection is crucial for comprehending the relation between design decisions for user retention and the potential behavioural addiction it may trigger for the end users. As the research topic is focused on behavioural addiction and addiction motivators, the research findings may raise some ethical concerns. To avoid the negative impact the results may potentially generate, the findings were presented and discussed on an abstract level. The identification of addictive Instagram design characteristics may help in finding necessary actions to avoid compulsive Instagram use. This may limit ethical concerns and potentially facilitate a discussion of design ethics on social media.

3.1 Data collection

To gather information that may provide additional understanding of the topic, collecting primary data is crucial. Qualitative research interviews were chosen as a data collection tool to gather experts' perspectives on Instagram addiction and identify addictive user experience design features and their characteristics. This data collection method is appropriate for the research due to its ability to gain insights and in-depth understanding from experts practising in the field relevant to this research (McGrath, Palmgren, & Liljedahl, 2019). Semi-structured interviews were used as a tool for information collection. The interview guide was prepared to address the objectives of the project and facilitate the discussion and insights provided by the participants (Baumbusch, 2010). The interviews included a set of predetermined open-ended questions, with a perception of an opportunity for more in-depth questions arising from the participants' answers (DiCicco-Bloom & Crabtree, 2006).

The data collection was separated into two stages. This decision to pursue a two-stage approach for data collection was made to build a coherent research path that begins with understanding the Instagram users, their motivations for using social media, and the development of compulsive Instagram use from users' perspective as well as social perspective. Once such data is gathered and analysed the research can build knowledge upon it and gather information on

user experience design practices related to user retention and potential addiction from a design perspective.

The first stage (see section 3.1.1) involved interviews with psychologists and social psychologists. As the research aimed to understand needs and motivations from the users' perspective, recruiting psychologists and sociopsychologists was the most beneficial approach. The experts may provide an in-depth understanding of human social and psychological desire, online behaviour, and the psychological development of behavioural addiction. The aim of the first data collection stage was to identify addictive Instagram design features that are based on satisfying user needs defined in previous research and discussed in the literature review (see section 2). In addition, the first data collection stage may provide in-depth understanding on user motivations for Instagram use and development of Instagram addiction.

The second stage of data collection (see section 3.2.2) involved interviews with user experience designers. As the research focuses on the design aspect of Instagram addiction, the interviews with designers may provide a better understanding of user experience design practices that may trigger the development of addiction. The interviews with user experience design experts focused on user retention and evaluation of Instagram features identified in the first stage of data collection. The goal of the second stage was to identify design characteristics that encourage compulsive Instagram use. The ideation for increasing user retention of Instagram design features identified in the first stage of data collection may help to determine the most crucial design characteristics that provoke addictive behaviour.

3.1.1 The first stage of data collection

To identify addictive design features, psychologists and social psychologists were recruited to participate in the semi-structured interviews. The participants were found online by searching current or past researchers involved in studies related to behavioural addiction. The participants were contacted via email and were informed about the scope of the research and the interview structure, including the discussion topics. A total of 23 psychologists and social psychologists were contacted. The contacted participants were chosen based on the relevance of research on behavioural addiction and online behaviour.

The interview guide included questions related to Instagram addiction development and symptoms from the participant's field of study and personal perspectives. It also included questions concerning users' needs gratification influence and motivations for developing compulsive Instagram use. And lastly, identification of addictive Instagram features categorized by specific user need gratification. The identification of addictive design features was performed using a demo Instagram account as a probe for the participants to explore the platform and provide the most authentic and detailed assessment. The majority of the interviews were transcribed using Microsoft transcribe software. If the interviews were conducted face to face or via Zoom meeting, the interviews were transcribed in Microsoft

Word, whereas the interviews conducted via Microsoft Teams meeting were transcribed on the platform during the interview.

Participant identifier	Participant description	Recruitment fit	Interview location & duration	Transcribed pages
Participant 1 (P1)	Social psychologist	Research in online behaviour	Online (zoom meeting), 1 hour	8
Participant 2 (P2)	Psychologist	Studies in human psychology and addiction mechanisms	Online (Microsoft Teams meeting), 1 hour	24
Participant 3 (P3)	Social scientist	Research in addiction and internet addiction culture	Face-to-face, 1 hour	8

Table 1: The participant list of interviews conducted to identify addictive Instagram design features.

3.1.2 The second stage of data collection

The aim of the second stage of the interviews was to identify design characteristics of Instagram design features that encourage social media addiction. The features discussed and evaluated by designers were determined by the first stage of data collection. For this part of the research, semi-structured interviews were conducted with user experience designers and researchers. The participants were located on the Aalto University website while searching for user experience designers and researchers, as well as human-computer interaction researchers. The participants were contacted via email and were informed about the scope of the research and the interview structure. A total of 11 experts were contacted. The participants were chosen based on their occupation, research into user experience and user needs.

The prepared interview guide focused on design ideation for increasing user retention while using the Instagram design features identified in the first stage of the research. The ideation for increasing user retention on social media sites, in particular, Instagram, may help to point out the characteristics that enforce addictive user behaviour. In addition, the participants were asked to evaluate the current Instagram interface design features. The evaluation of the

addictive Instagram features was performed using the same demo account as in the first stage of the project. The evaluation of existing Instagram design features was performed with the intention to gather knowledge from experts on current design practices related to promoting user engagement and prolonged usage of Instagram. The majority of the interviews were transcribed using Microsoft Teams meeting provided software. If the interviews were conducted face to face or via Zoom meeting, the interviews were transcribed in Microsoft Word.

Participant identifier	Participant description	Recruitment fit	Interview location & duration	Transcribed pages
Participant 4 (P4)	Design researcher	Research in user needs and use-centred design	Online (zoom meeting), 45 minutes	8
Participant 5 (P5)	Researcher and teacher	Research in user experience design	Online (Microsoft Teams meeting), 45 minutes	24
Participant 6 (P6)	Designer and teacher	Face-to-face	Face to face, 55 minutes	11
Participant 7 (P7)	User experience designer	6 years of experience working as a UX designer	Online (Microsoft Teams meeting), 45 minutes	12

Table 2: The participant list of interviews conducted to identify design features for user retention.

3.2 Data analysis

The collected data were analysed using a thematic data analysis method. It is a method used to identify, analyse, and report patterns reoccurring in the gathered information (Braun & Clarke, 2006). Thematic interview analysis may help to capture crucial information (Braun & Clarke, 2006), which could help to interpret and identify the most addictive features. The thematic analysis may provide a deeper understanding of the underlying reasons for the perceived appeal of Instagram, as well as which addiction patterns are most common among the users. As there are no predetermined analysis processes, the thematic interview analysis allows flexibility in uncovering crucial themes related to the overall research (Braun & Clarke, 2006). However, to

ensure that the findings are objective and adequately represented, the data analysis followed the coding manual for qualitative researchers (Saldaña, 2009).

3.2.1 The first cycle of qualitative data analysis

In vivo coding method was chosen for the first cycle of qualitative data analysis (Saldaña, 2009). It is commonly called natural coding, since it is used as an effective initial coding cycle that leads to a more advanced data coding with an opportunity to preserve raw, unfiltered data (Manning, 2017). The analysis was performed by first filtering the interview information and gathering crucial elements from each participant. The code was chosen based on the relevance of the topic, such as addiction development, and addiction motivators, and identified addictive features in the first stage of data collection. 69 codes were separated from the interviews at this stage in data collection.

For the second stage of data collection, the code was chosen based on the relevance of user retention, such as design characteristics, reasons for the proposed design by the experts, and participants' opinions of the current design practices by Instagram. The in vivo method provided 95 codes for the second stage of data collection. The data was kept true to the phrases and terminology that participants used during the interview, therefore reducing the chances of bias and misrepresentation of the data (Manning, 2017). In vivo coding method was used as the first cycle of qualitative data analysis for both sets of data gathered from the interviews.

3.2.2 The second cycle of qualitative data analysis

3.2.2.1 *Data collected from the first stage.*

For the second cycle of qualitative data analysis focused coding method was used to unveil the most significant information (Saldaña, 2009). The initial data of the first data collection was grouped based on the interview topics – discussion, social user needs, user recognition needs, the user needs for relatedness, and fear of missing out; to search for repetition and to get an overall idea of the possible themes. The code was then colour-coded based on the user needs that are satisfied and marked to which Instagram design feature they belong. Reoccurring themes and repeating participants' testimonies were then gathered to identify addictive Instagram features. In addition, some topics discussed in the discussion category, although not included in the final finding table, are discussed in the findings from the first data collection stage analysis chapter (see 4.1.1). The discussion helped to deepen the understanding of social media addiction development from an individual level and uncovered addiction drivers and their mechanisms. The data of the first stage of data collection, gathered by interviewing psychologists and social psychologists, suggests that there are four most prominent design feature categories that may contribute to addiction development based on user need satisfaction. They include stories, reels, posts, and notifications. The notification category includes comments, likes, and replies to stories. However, posts are mainly focused on user

mannerisms in the pictures and are difficult to analyse without focusing on the content of the picture. In addition, the user needs identified by the experts, social and recognition, are satisfied through comments and likes, which first obtain users' attention through notifications. Due to these factors, posts were excluded from further analysis, as the features that were identified to satisfy user needs related to posts were grouped under the notification category.

3.2.2.2 Data collected from the second stage.

For the second cycle of the data collected from the second stage, the focused method (Saldaña, 2009) was used to analyse the data and identify the most significant findings of the research. The initial data analysed using in vivo method in the first cycle were grouped based on the discussion topics – discussion, ideation for increasing user retention in stories, ideation for increasing user retention in reels, ideation for increasing user retention in notifications, and Instagram evaluation. The data was then sorted by looking for overlapping themes within the discussion topics to get an overview of the gathered data. In the next step, the analysis focused on searching for the overlapping themes throughout the entire data and unveiled four reoccurring themes. The data was then further analysed by arranging some data in sub-categories within the established themes. This helped to broaden the understanding of design practices that aim to increase user retention. The focused data coding method was chosen due to the ability to compare the data gathered from all the participants to reach the most analytical sense (Saldaña, 2009). In addition, the ability to compare participants' testimonies across the interview topics allowed us to uncover repetitive themes that occur in most addictive Instagram design features identified by the experts from the first stage of data collection.

4 Findings

4.1 Findings from the first data collection stage

Design features	Frequency in interviews	User needs	Distribution in interviews	Participants' testimonies	Characteristics
Stories	22	Social needs	2	“I usually comment stories because this story is like a message to you, but with a picture instead of a text and you feel the urge to communicate” – P2	Time limiting Straight path to direct messages
		Fear of missing out	2	“Is the only feature on Instagram that has like the limit of time” – P2	
		Relatedness	2	“A friend that lives abroad, then I can't see her every day, but I can see her story” – P2	
Reals	5	Relatedness	1	“It also brings a sense of community like yes, this person from the real things like the same way just like	Short, Straight path to sharing with others,

				me. We are so similar.” – P2	
Notifications	30	Social needs	2	“Most often you go on an adventure together with other people, messages, it's quite obvious notifications like a symbol of a heart symbol of a connection.” – P1	Encourages interaction with other users,
		Recognition needs	1	“I will just ask my audience to prove to me that I'm beautiful, that I'm pretty” – P2	

Table 3 findings from the first stage of data collection.

4.1.1 Findings from the first data collection stage analysis

The above-identified features satisfy one or more user needs, thus motivating them to use Instagram more frequently. The identified features have subcategories that identify which user needs they satisfy. During the interviews some participants raised concerns about labelling compulsive Instagram use as an addiction due to the lack of official recognition of a disorder by the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*).

“...the World Health Organization, for instance, and the Diagnostic Statistical manuals of diseases and equivalent domes here in Europe, do not recognize any such thing as an Internet addiction. It's a highly contentious issue, whether such a thing like exists in reality and because [of it], how should we frame this?” (P1, social psychologist).

The interviews uncovered that a combination of entertainment and social comparison may influence the development of compulsive Instagram use. In discussing entertainment and social comparison participants have noted that social media may provide individuals with a sense of control in how they choose to showcase their own lives.

“The need to show people that you have a good life, that you are. You do everything right. For example, I will not post a photo of me crying. I will post the photo of me smiling, living a good life, like having a nice coffee.” (P2, psychologist).

The participants discussed that accessibility to Instagram plays a role in the beginning of addiction development. Easy and perpetual access to Instagram on users’ smartphones allows them to build a habit of frequent application visits fuelled by the sense of entertainment, fostering the development of addiction. Habit forming and habitual addiction has been determined to be a frequent theme across the interviews.

“I really think that one important part is how we see addiction. How we talk about addiction today is this kind of habitual addiction” (P3, Social scientist).

The results show that stories, reels, and notifications were identified as the most addictive Instagram design features by psychologists and sociopsychologists, as participants have identified their ability to satisfy one’s needs and provoke a fear of missing out.

4.1.1.1 Stories

Stories are an Instagram design feature that allows users to share pictures or short videos for 24 hours (see Figure 1). The users have the option to add the stories to the highlights in their profiles, which then allows for the content to stay visible for as long as the user chooses to display it (Meta, 2023).

Stories were identified to satisfy users’ social needs, needs of relatedness, and provoke a fear of missing out. The participants identified that the needs are met based on the ability for social interaction, such as direct replies to stories, prompting interaction between users, limited time of access to the content, evoking a fear of missing out on the content produced by others, and relatedness to the content, which may promote a sense of closeness and intimacy to other users (see Table 3). Due to these factors, Instagram stories were determined to enhance the motivation of Instagram addiction.

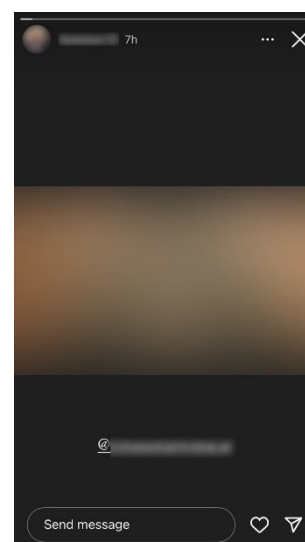


Figure 1 Instagram Story

4.1.1.2 Reals

Reals is an Instagram design feature that allows users to edit and share short videos or picture compilations (see Figure 2). The users have the option to edit sound, and add voiceovers, and video effects. In addition, the users are provided with an option to choose who can view their reals or use their produced audio (Meta , 2023).

Reals were identified to satisfy users’ needs for relatedness (see Table 3). In addition, the results show that the need for entertainment, the length of the videos, and a supply of infinite content to the user play a role in compulsive Instagram use development. The participants noted that short videos require little to no mental effort for the users to consume the content and the infinite supply of new content as well as entertainment promotes a formation of habit. Due to these reasons, reals were identified as Instagram addiction motivators.

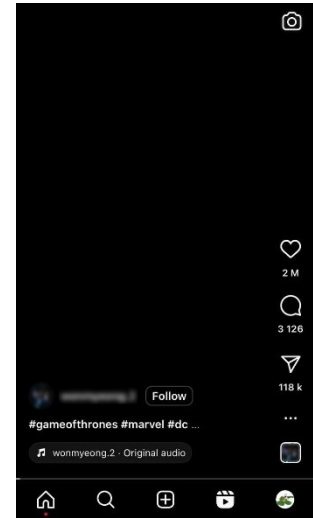


Figure 2 Instagram Reals

4.1.1.3 Notifications

The notification category includes comments, likes, and replies to stories. Notifications are usually the first interaction point between the user and the platform (see Figure 3). The users receive notifications when someone likes or comments on their content, mentions them in content produced by others, starts following the user or requests to follow them, or tags the user in the content produced by other users (Meta , 2023). In addition, Instagram sends automated notifications to update users on the new content produced by other users they follow.

Notifications were identified to satisfy users’ social, and recognition needs (see Table 3). Interviewees have noted that notifications are usually the first interaction point for users in the journey of social interaction with others on the platform. As provided in Table 3 this may motivate the user to interact more frequently with the social media platform to satisfy the needs of social interaction, thus leading to compulsive use of Instagram. As notifications often involve feedback to the users of the content they produce, in the form of likes, reactions, or comments, it satisfies the need for recognition and motivates users to spend more time on Instagram and produce more content to receive more positive feedback.

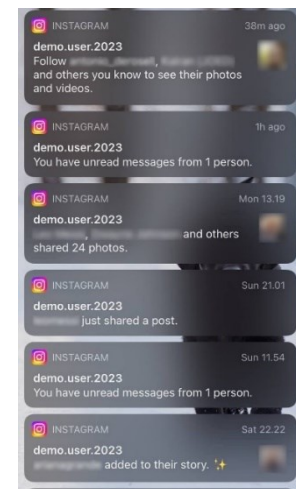


Figure 3 Instagram Notifications

“...when I see comments on my photo or on any other people's photo, I think that, yeah, this is what people really like. I feel admired. I feel that the person liked my photograph so much that

he or she stopped to leave a comment under my post, even after he or she put a like to it. So, it's like a need for it more to be admired, to be kind of worshipped.” (P2, psychologist).

Due to these factors, experts have identified notifications as one of the motivators for Instagram addiction development.

4.1.2 Further handling of the findings from the first stage of data collection

Stories, reels, and notifications were identified as the most addictive Instagram design features by psychologists and sociopsychologists. Therefore, these features were used in the second stage of data collection to identify design characteristics of Instagram design features that encourage social media addiction. The results of the first data collection stage were used to understand which aspects of the design motivate addictive behaviour and what characteristics of user experience design features to look for in order to identify addictive Instagram features.

4.2 Findings from the second data collection stage

Addictive design attributes	Frequency in interviews	Sub-categories	Design features	Distribution in interviews	Participants' testimonies	Notes
Feedback	57	Multi-layer feedback	Stories	2	“There has to be some kind of an immediate response that as soon as I have posted my story for others to see, then the people are watching it and then I see that” – P6	Different forms of feedback, including likes, reactions, comments, and direct messages.
			Reels	3	“Best kind of feedback is that your friends and also some kind of strangers are liking or reacting” – P6	
			Notifications	4	“People are addicted to getting more and	

					more likes and comparing in a way it's kind of positive thing” – P4	
		Users’ options depend on feedback	Stories	3	“Good stories, they would probably wish to keep them for themselves. Maybe share them again at a later time.” – P6	Users have multiple options for further handling of their content, based on the feedback they get from other users. It may include keeping the content to themselves, transferring it to highlights (stories), or deleting it.
			Reals	2	“Creating remixes or something like the best parts of old videos.” – P6	
			Notifications	3	“I could watch like which were the most successful one last year, at the same time, or something that I posted and others like.” – P6	
Infinite and new content	25	References to infinite content	Reals	2	“Should be displayed so that the next one is a little bit peeking kind of in the view with moving content so that you want to lift the kind of swipe up so that that becomes fully visible” – P6	The interface displays visual attributes that refer to infinite content, such as infinite

		References to new content	Stories	2	“There should probably be some information that these are the stories that will be disappearing within the next hour. There would always be some stories that would be disappearing. So then that would make you return to the service every hour, because there's next hour, there's again a set of stories that you have not watched.” – P6	scroll and display of multiple content options at once. In addition, references to new content, for example through notifications, may motivate users to come back to the platform.
			Reals	1	“So, in order to make it such that you get a lot of attention, it should appear as notifications for others.” – P6	
			Notifications	2	“The notification itself should be as addictive as possible, so it should provide rich material already. But not too rich.” – P6	
Continuous service updates	14	New feature introduction	Stories	2	“Road map of that. I predict that next we will be we need to	Continuous changes to the service,

					roll out this feature and then probably that one. But I wouldn't start doing a very detailed plan or rather I would wait.” – P6	such as integrating a new feature and making old features easier to use.
		New feature integration	Stories	2	“It wouldn't be in a different tab, for instance, that there is just normal stuff.” – P6	

Table 4 findings from the second stage of data collection.

4.2.1 Findings from the second data collection stage analysis

The aim of the data collection was to gather information and establish addictive Instagram design features’ characteristics. During the interviews, the participants raised ethical concerns related to user retention and addiction-forming design practices. For example, in discussing increasing user retention on social media platforms, the participants emphasized that such practices should be done only to benefit the users and their well-being, as without considering the end user such practices may lead to harmful outcomes.

“I wouldn't design for somebody looking for as long as possible. That would not be good for anybody.” (P4, Design researcher).

This may have restricted the ideation process for increasing user retention for social media design features. However, once the goal of the interview was explained the participants were more comfortable to ideate for increasing user retention related to Instagram features identified in the first stage of data collection. The results show that feedback, infinite and new content, and continuous service updates are the leading characteristics of compulsive Instagram use. From a design perspective, these characteristics work as triggers for the users to come back and spend an extensive period on the social media platform. The participants theorized that triggering users’ fear of missing out through notifications may increase user retention.

“Of course, now if we think about increasing the addiction. There should probably be some information that these are the stories that will be disappearing within the next hour. Watch them before they disappear.” (P6, Designer).

Throughout the interviews, the topic of feedback was largely prevalent. The participants have noted that feedback, most commonly in the form of notifications, is an effective way to increase

user retention. The interviewees noted that notifications are usually the first interaction point in the user journey and are a great tool for making users to come back to the platform.

“I guess the best kind of or if we’re thinking that addiction is good, so the best kind of feedback is that your friends and also some kind of strangers are liking or reacting. So, in order to make it such that you get a lot of attention, it should appear as notifications for others.” (P6, Designer).

In addition to the above-identified addictive Instagram design attributes, the research uncovered that algorithms contribute to the promotion of compulsive Instagram use by offering infinite and new content based on user’s preferences. The algorithm curates and recommends the content that users are most likely to enjoy and interact with, therefore encouraging them to spend more time and keep returning to Instagram.

“Usually it’s all about, I think, the recommendations, if you more often, find something interesting, you keep scrolling to find more.” (P7, User experience designer).

However, as algorithms are not a tangible design feature, they were excluded from the results of this research.

Moreover, during the ideation phase of the interviews, the participants hypothesized that for the established platform, such as Instagram, the changes must be made gradually and observe the first users of the design changes. As noted in the interviews, this approach would ensure a lower learning curve for the users and would allow designers to adjust the design of the social media platform based on user needs.

“Hard to say I would. I would probably try and see how the users start using it and then I would change it based on the kind of interactions that I see by the first adopters of that feature. So, I wouldn’t try to design it upfront. [...] But I wouldn’t start doing very detailed plans or rather I would wait.” (P6, Designer).

5 Conclusion

From the first stage of data collection, the results show that stories, reels, and notifications were identified as the most addictive Instagram features by psychiatrists and social psychologists. The results are based on the design features' capabilities to satisfy user social and recognition needs, need for relatedness, and provoke a fear of missing out. The findings show that stories and notifications satisfy more than one user's needs, where in reels the need for relatedness was determined to be most significant in the development of Instagram addiction. The results were used in the second stage of data collection to determine Instagram design characteristics that motivate compulsive social media use. The results of the second set of data show that feedback, references to infinite and new content, and continuous service updates are the most prominent Instagram addiction motivators. It was determined that continuous service updates and references to infinite and new content may function as the first compulsive use trigger in the user journey on the social media platform, whereas feedback may provoke the feeling of reward for the user. It may be theorized that the identified characteristics may motivate and reinforce addictive behaviour by creating a loop of triggers and rewards.

The aim of the thesis was to gather information and establish addictive Instagram design features' characteristic template. A literature review was conducted to identify user motivations for Instagram use. It was determined that social needs, recognition needs, need for relatedness and fear of missing out (FOMO) were the main contributors to encouraging compulsive social media use. In addition to the literature review, semi-structured interviews were conducted for data collection and analysis. The data collection was divided into two stages. The decision to pursue a two-stage approach for data collection was made in order to build a coherent research path that begins with understanding Instagram users, their motivations for using social media, and the development of compulsive Instagram use from individual users' perspectives as well as societal prospect.

The first stage of data collection included interviews with psychologists and sociopsychologists to identify Instagram features that may satisfy the user needs determined by the literature review. The results of the first stage of data collection show that stories, reels, and notifications were identified as the most addictive Instagram features. The results were based on the design features' capabilities to satisfy user social, and recognition needs, need for relatedness and ability to provoke a fear of missing out. Experts determined that stories and notifications satisfy more than one user's needs, where as in reels the need for relatedness was identified to be most significant in motivating the development of Instagram addiction. The results were used in the second stage of data collection to determine Instagram design characteristics that motivate compulsive social media use. This allowed the researchers to build knowledge upon the findings of the first stage of data collection and gather information on user experience design practices related to user retention and potential addiction development from a design perspective.

The second stage of data collection involved semi-structured interviews with user experience designers. The aim of the second stage of the interviews was to identify design characteristics of Instagram design features that encourage social media addiction. The second stage of data collection focused on gathering knowledge from experts on current design practices related to promoting user engagement and prolonged usage of social media, as well as attempting to identify repetitive design characteristics present in addictive Instagram design features. The results show that feedback, references to infinite and new content, and continuous service updates are the most prominent Instagram addiction motivators. It was determined that continuous service updates on the platform and references to infinite and new content through notifications and implicit design references may function as the first trigger in the user journey on Instagram leading to compulsive use, whereas feedback may provoke the feeling of reward for the user (see *Figure 4*). It may be theorized that the identified characteristics may motivate and reinforce addictive behaviour by creating a loop of triggers and rewards.

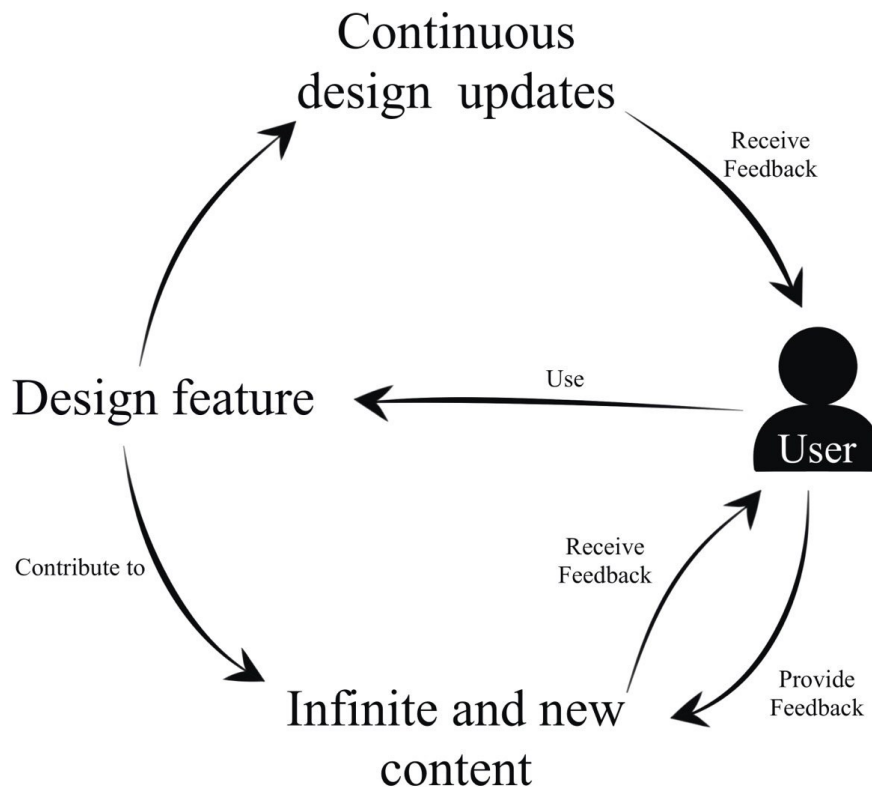


Figure 4 Loop of user’s actions and feedback

5.1.1.1 *Feedback*

Feedback can be defined as a variable reward phase, in which the interface rewards the user reinforcing the motivation to repeat the same action and receive more rewards (Eyal & Hoover, Variable Reward , 2014). In the case of Instagram, the users can provide and receive multi-layer feedback and choose their further actions based on it.

Multi-layer feedback requires different levels of user mental effort. For example, in the case of Instagram stories, watching someone else’s story requires the least amount of effort for the user watching, however, the content provider still gets the feedback of who has watched their content. The next level of feedback is likes, which requires little mental effort for the user to decide if they want to click on the icon or not. The third layer of feedback is reacting, which involves two clicks to provide feedback. Reacting to others’ content, in this case, requires a bit more mental effort than previously mentioned feedback layers. The fourth layer is sharing the content with another user, which satisfies social needs for the sender and recognition needs for the receiver, as well as a need for relatedness for both users. And the last layer of feedback is commenting, which requires the largest amount of mental effort for the user. Nevertheless, each layer provides feedback to the content creator, thus reinforcing the motivation to repeat the action and receive more feedback. This attribute was found in Instagram stories and reels. Apart from the first layer, feedback is usually delivered to users via notifications, including all three identified addictive design features.

In addition, the users are provided with options for further actions depending on the feedback they receive. For example, if the content of their Instagram story is perceived well and provides positive feedback, they may choose to keep the content for themselves with a possibility to use it later, transfer it to story highlights, where the content is available for everyone to see for as long as the user wants to, or if the feedback is negative, they are capable of deleting the story before the 24-hour deadline. These options provide the user with a sense of control as well as encourage them to come back to the social media platform to evaluate the feedback for further decision-making, thus motivating the development of habit and thus addiction.

5.1.1.2 *Infinite and new content*

Infinite and new content provides users with a sense of exploration and unfinishedness, which signals to users that there is always something more to discover encouraging them to come back and stay longer on the social media platform. Instagram may achieve such user behaviour by employing certain design aspects that reference the infinite new content.

Implicit references may be used in the social media interface design to signal the user about infinite content to discover. Implicit references can be defined as design attributes that users may associate with a specific concept without being consciously aware of it (Karjalainen & Snelders, 2009). In the case of Instagram, the infinite scrolling feature may be recognized as an implicit reference to the infinite content. Moreover, the Instagram Explore tab contains not only the infinite scrolling feature but also displays a large amount of content at once and leads

to additional infinite scroll once the user clicks on any of the displayed options. These design attributes, although not readily distinguishable, evoke a sense of exploration for the user, as well as a sense of unfinishedness that keeps them coming back to the social media platform for more unseen content. This may lead to habit forming and thus addiction.

In addition to references to infinite content, signals to new content may also play a role in the development of Instagram addiction. This may be done more noticeably, most commonly through auto-update notifications. These types of references signal to users that there is activity on the social media platform by other users. This may trigger a fear of missing out for the user motivating them to visit the platform and explore new content. These references may work as the first trigger that leads the user to interact with other addictive Instagram design features, which rewards the user for such behaviour by providing new content. If the user chooses to interact with the content, they may also receive feedback which may motivate them to repeat the behaviour. Consequently, the feedback strengthens the appeal of the initial new content signal and creates a vicious cycle of triggers, a sense of exploration and rewards, motivating a compulsive use of Instagram.

5.1.1.3 Continuous service updates

Continuous service updates may provide users with different forms of interaction and self-expression. However, it may also provoke a sense of exploration and unfinishedness, which may lead to compulsive use of Instagram. To ensure a low learning curve for the users, the social media platform design changes are usually small and gradual. This allows users to learn how to use new features or adjust to the updated ones quickly and with minimal mental effort. Although such practice is performed to ensure smooth usability, the continuous updates and introduction of new features may evoke excitement or unease. To minimize user avoidance of new features, integration is crucial. Social media platforms may incorporate new features together with the old ones, instead of creating new dedicated tabs for them. This ensures that users are exposed to the new feature and adapt to the changes easier. In combination with the continuity of the updates and well-done integration, the users may become accustomed to regular design changes, forming a habit of exploring new designs and their aspects. This may prompt them to use Instagram more often and for longer periods of time interacting with habit-forming features, thus developing an addictive behaviour.

5.2 Addressing addictive Instagram design features

To address addictive Instagram design features some regulatory policies and design guidelines could be introduced to the platform. For example, the amount of feedback the user is provided with can be limited. This could be done by removing the numeric value from the views and likes. The limitation would still satisfy the recognition needs of the users but would limit the aspects of social comparison. This may improve user well-being by reducing the potential for compulsive behaviour yet still providing user gratification on the platform. In addition, the

option for infinite scroll should be regulated by limiting the amount of content the user can scroll through and reorganizing the explore tab to provide less content within one screen. This potentially could reduce the risk of addiction, yet still provide a possibility for a habit-forming design. These changes would force the user to click out of the feed, making the user interaction with the content more intentional. However, these are only brief design suggestions, and further research and user analysis may provide more in-depth and detailed design guidelines.

5.3 Discussion

Instagram stands out as one of the most widely used social media platforms across the globe with roughly 1.3 billion monthly users (Prosser, 2021). Individuals who spend prolonged periods of time on social media platforms, such as Instagram, may develop addiction and experience adverse effects on their personal relationships and daily lives (Serenko & Serenko, 2020). Social media addiction is a form of behavioural addiction that may be defined as an intense desire to repeat a pleasurable action perceived to improve well-being or relieve stress (Karim & Chaudhri, 2012). There has been an extensive discussion about the consequences of Instagram addiction and the severe psychological impact it may have, such as anxiety, depression (Sun & Zhang, 2021) and eating disorders (Simon, et al., 2022). However, there has not been a sufficient amount of exploration that may provide an understanding of how certain design features make Instagram addictive (Sun & Zhang, 2021). Therefore, the aim of the research was to gather information and establish addictive Instagram design features' characteristic template.

The research suggests that triggers in a form of feedback and a sense of exploration promote compulsive Instagram use. The design practices that are used to increase user retention seem to overlap with design characteristics that motivate Instagram addiction. Instagram notifications work as triggers that are used in the hooked cycle model, by providing external stimuli as well as an internal sense of social and recognition need satisfaction for the users. Variable rewards are also present in the form of multi-layer feedback, which provides users with varying levels of satisfaction, thus promoting repetitive behaviour. Engaging with Instagram design features by contributing to new content, for example, sharing stories, posts, or comments, users may feel a sense of investment, which aligns with habit-forming design practices and encourages to spend increasing amounts of time on the platform. In addition, a sense of infinite and new content, as well as continuous interface design updates, provide a sense of exploration encouraging users to engage with the platform more frequently. This also aligns with the hooked cycle model by providing users with a sense of investment and a feeling of unfinishedness, thus prompting them to come back for more. The results may help speculate that Instagram addiction drivers and habit-forming design practices have extensive similarities.

The findings may help predict social media design features' susceptibility to addiction and assist in developing addictive social media evaluation criteria as well as addressing habit-forming design practices. In addition, the results may lay a foundation for developing design guidelines for social media platforms that would minimize and potentially eliminate addictive

design features. This thesis may work as a starting point for the users in helping them to identify design practices that motivate compulsive behaviour on social media. With this knowledge, users could advocate for ethical designs in social media. Further research may assist in establishing balanced regulations for user experience design practices for social media platforms such as Instagram, thus improving an online environment, and promoting user well-being. As the research topic is strongly connected to design, human psychology and social psychology, the thesis may function as a supporting agent for acknowledging and building knowledge of the link between these fields of study.

5.4 Limitations and suggestions for future research

The limitations in the literature review included the scarcity of social media addiction from a user experience design perspective and predominantly focused on human psychology and social psychology. This may have influenced the course of the research planning. Although a thorough literature review was conducted and produced compelling insights, literature related to user experience design research in social media addiction may have provided a more comprehensive understanding of the topic. The emphasis on human psychology and social psychology literature had a considerable influence on how interviews were conducted, and the sorts of questions asked. The interviews probed deeper into the subject of social and human psychology. With a thorough literature investigation into social media addiction from the perspective of user experience design, the study emphasis may have been refined and the questions more direct. Furthermore, a more comprehensive assessment of user experience design literature might have impacted the data analysis and offered a more extensive knowledge of habit-forming design approaches and their role in Instagram addiction development. Moreover, the leading limitation of the thesis is the sparse number of participants. This may be due to time constraints during the recruitment process. In addition, as the topic of Instagram addiction has not been thoroughly studied, many experts restrained from participating in the interviews leading to a small sample size in both stages of data collection. Therefore, further research with a larger participant group may provide more detailed results. In addition, involving compulsive Instagram users may be beneficial in producing counter actions from a human-centred design perspective. By addressing these limitations, further research may provide the basis for developing an extensive design guide for minimizing and potentially eliminating addictive design features on Instagram and other social media platforms.

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6 Appendix

6.1 Interview guides

6.1.1 First stage of data collection

I am working on my Bachelor thesis concerning addictive Instagram user experience design features. The research aims to focus on Instagram addiction interventions from user experience design perspective.

This interview is conducted in strict confidentiality and interviews are anonymized. You can end an interview at any point and do not have to answer any questions you do not want to; however, any answers are highly appreciated. I would like to ask for your permission to record the session. It will be a backup in case I need to recall something. Please note, after the analysis of the answers the recording will be deleted. Do you give permission to record this interview? X2

1. Warm-up

- Can you tell me a bit about your occupation related to Instagram addiction?
- How long have you been involved in this field?

2. Questions

- Can you describe what is compulsive social media use/social media addiction? What are the signs?
- Can you explain how does Instagram addiction works from a (social) psychology perspective?
- Why do you think people develop addictive Instagram use?
- Does users' need satisfaction play a role in addictive behavior?
- What are specific needs that users satisfy when using Instagram?
- There is some discussion that entertainment needs have no influence on Instagram addiction, what is your opinion about it today?

3. Probe

- If you open the app, can you point out what features may satisfy social needs?
- Can you point out features that satisfy recognition needs?
- Can you name Instagram features that may satisfy needs for belonging and need for relatedness?
- Can you name Instagram features that may promote fear of missing out (FOMO) for users?

6.1.2 The second stage of data collection

I am working on my Bachelor thesis concerning addictive Instagram user experience design features. The research aims to focus on Instagram addiction from user experience design perspective.

This interview is conducted in strict confidentiality and interviews are anonymized. You can end an interview at any point and do not have to answer to any questions you do not want to, however, any answers are highly appreciated. I would like to ask for your permission to record the session. It will be a backup in case I need to recall something. Please note, after the analysis of the answers the recording will be deleted. Do you give permission to record this interview? X2

1. Warm-up

- Can you tell me a bit about your occupation related to user experience design?
- How long have you been involved in this field?
- What do you think is important when designing for social media/ Instagram?
- What aspects of design do you consider important when trying to increase user retention on SNS?

2. Ideation

- How would you design SNS stories to increase user retention?
- How would you design SNS reels to increase user retention?

- How would you design notifications that involve interactions with other users (likes, comments, replies to stories) to increase user retention?

3. Instagram design features evaluation

- In your opinion, why do Instagram stories have high user retention? Is there anything you add or change to increase retention?

- Why do you think Instagram Reels have a high user retention? Is there anything you add or change to increase the retention?

- Why do you think Instagram notifications, such as likes, comments, and replies to stories are so engaging? Is there anything you add or change to increase the retention?

6.2 Interview sample

6.2.1 The first stage of data collection

Accessibility – sample

Addiction development reasons – sample

Addiction drivers – sample

Elaboration – sample

Transcript

Speaker 1

From a previous research and some papers research papers, there has been a lot of talk about. User satisfaction when it comes to social media addiction, what role does user need satisfaction play in? Instagram addiction.

Speaker 2

Yeah, to be honest, I I'm true. I I, I. Think that that. That, that addiction, if they look at from this kind of a social and and habitual point of view. Point of view, of course. What you do with what becomes your habit, what becomes your reality? It has to give you some kind of a satisfaction. It might be. There might be something else. So so there is definitely for that element of satisfaction and and possibly feelings. I I I can't see you but becoming even if you were substance, substance you. People don't speak. It don't nobody uses substances because they make. You feel bad. So we'll store this inspection star. Do they have to? Be the most satisfying game that. You know you know and also I think that they have to feel some kind of a void in your in your life, for example joking. This is what would be a good example that that that you're for example you are 50 and feel that you have to do some physical exercise and start running and then you find out that. Actually this is something. This is the practice that becomes. You may become too obsessive. With us, with us. So I think the satisfaction is 1. Supporting something. The satisfaction is so huge, so big. For example, I think in digital media is a good example that you might get so stuck with it that it's so satisfying that it gets kind of a reason. Wanting to rule the reasons for this, but you know to be more general way I think yes, you have to have satisfaction, but satisfaction is only. Only part of.

There so.

Speaker 2

Because otherwise we would all humanity would only be using heroin, for example, which is going to be the most satisfaction of all things, and it won't exist.

Speaker 2

They they have been described it being million million times better than your better organs and that's how how you describe heroin. So it can be kept. It that's so basically it would be always. Or the addiction would be then to do with things that the most. So, so. So the satisfaction is of course partners and it has to be. But the amount if you could. If you're a good kind of a senior. What amount of satisfaction it gets? That's not the only factor in the.

Speaker 1

Well, what? What would you think would be other factors than satisfaction and let's say habit?

Speaker 2

I think you have to have it. It it has to be realistically averaged. You also have to be familiar how to do this. There's a paper in from 1963. I think color picker. Howard Becker. Well, well, the the paper called how to become a marijuana user. And it was a brilliant paper because he described very thoroughly. He can't become American. Just by thinking that. I'm like you with. Maria, you have to know how to inhale. You have to. Know how to get it? Somebody had. To tell you how. You feel about it, so basically you. You have to have some kind of connection to think become addicted. You just don't become addicted to something that is in the store. If you don't know it exists. But definitely the cases of these kind of social or habits or addictions it it has to be some way your own life of living world or living. That you trust. Of course, that's one thing you have to try it. It has to be something, for example like. Be addicted for life. Which is.

Speaker

Alright, thank you.

Speaker 2

It has to be something that I try that I do when I feel the satisfaction. You have to try to feel the satisfaction that. Why don't any test that happens on social? Show some. Of course not in the substance use, but also actually the substance. So quite often it include some kind of a social thing that you can share it with somebody else. What else? You have to be able. To do it constantly, that's of course one thing that's that. You can't be elected Pro Springsteen concerts because they don't just go with them once in every five years they come, it has to be something.

Speaker 2

That you can do.

Speaker 1

Do you? I mean, that's kind of an easy question, but do you think that the simple fact that we have it in our hands all the time plays a role in the level of addictiveness that there's?

Speaker 2

Yeah, yeah, definitely. As I said here, when if you think about, for example, because I really think that that, one important part is how we see addiction. **How we talk about addiction today is this kind of habitual addiction.** Habits are the basic elements. Of of human behavior. We have poor habits that we do every morning we wake up, we do things with our lives. **We wouldn't have those habits we would. Feel really, really lost.** **And and I think that something that is. Easily accessible as part of our everyday practices** that can be constantly done or definitely the one things that become can become more easy. I would could even even go as far as saying I can hear five times. A week, if you have a cup of coffee. Maybe twice a day. It's very close, of course, being able to see the card, addicted to coffee or coming to [REDACTED] because if I wouldn't have written me, it would be the heaviest. I would have close and I would really kind of like Oh my God, I have to go back through that. So, so social media or something. We have. **We have the access all the time. We are able to constantly go.**

6.2.2 The second stage of data collection

Feedback – sample

Infinite and new content – sample

Continuous service updates – sample

Elaboration – sample

Transcript

Speaker 1

Are you familiar with or do you know what stories are?

Speaker 2

Are stories? So I know that there are story. In some of those services. There are stories also in WhatsApp actually, but something like. That at least. But no, I have never created one myself.

Speaker 1

Yeah, but so the idea behind it that you can post a short video or a picture and stays online. For 24 hours. So my question would be is how would you increase user retention in those cases? For using and also viewing stories.

Speaker 2

It should probably seem simple to do them. So that the. I have a. Kind of a feeling that when I see that, ah, I can create a story. It should seem something that I'm I'm interested to try and. And if it? Would seem something like that. Now I have to Start learning something. Quite comprehensive. Then I might not be interested in starting to do that because I postponed that decision later and later. All the time. That if I now need to put half an hour into learning how to create stories. That half an hour will never come, basically because I always kind of come up with something else once I have get gotten started and I notice that it's not that bad and kind of it meets my expectations that it was easy to get started and then there should be some kind of. Well, two things. First, there has to be some kind of a immediate response that as soon as I have posted my story for others to see, then the people are watching it and then I see that, uh, I'm getting not being notified by this, but also there should be some. I have a feeling that now I want to do an even better story. So so I know the basics, but I know already how to make them even more kind of better so that there would be some additional features whatever. Filters or something that I can start using to improve the visuality of the story

Speaker 1

UM. How far would you go with the filters and improving the? Do you think something like? Full on image editing on stories would be too much or that would be something that.

Speaker 2

Hard to say I would. I would probably try and see how the users start using it and then I would change it based on the kind of interactions that I see by the first adopters of that feature. So I wouldn't try to design it upfront. But I would maybe create some kind of a road map of that I predict that next we will be we need to roll out this feature and then probably that one. But I wouldn't start doing very detailed plans or rather I would wait. A couple of weeks see which ones are which kinds of things. Patterns more popular, and then I will be building on that. Or then I would steal from the others. Kind of if there are some stories that are seemingly seemingly. Popular I would use those features of.

Speaker 1

How about from the viewers perspective, the how to increase people who are watching other people's stories and how to increase the interaction?

Speaker 2

Well, first I would be. Well, if there's a service where, for instance, you normally see some kind of a feed of what's going on with everyone or kind of what types of stuff people have been lately doing. Interleaved with that there should be these stories, so people will be noticing and they wouldn't help. Be kind of they. Wouldn't be able to even avoid seeing stories. Because then that would be kind of becoming normal. Part of their browsing that now there's a story, then there's some other post and so on. Then that would be becoming a kind of a natural thing that everyone does, stories, and then people would get used to it. So it wouldn't seem like a new feature anymore. So then people would have an idea that, OK, part of this service is these stories and I'm going. To do them as well. So it wouldn't be in a different tab, for instance, that here are just normal stuff. Here are the stories, but they would be kind of all together. Then what was the question? This was the first thing. That I want. To say that it have to be integrated. Into all of your experience.

Speaker 1

Yeah. From the viewer's perspective, how to increase the viewing, yeah, and the interaction.

Speaker 2

Yeah, yeah. So the viewing, I, I. Think I answered already so it. Has to be kind of. Interleaved with other content. There probably has to be. Different kinds of reactions to it. So that our creator gets some feedback. And the interactions of the response methods that there should be different ones, kind of different levels, so that some of them would be very simple and easy to do, such as some kind of emoji that OK, this is lots of thumbs ups and a few hearts as well and so on and that you would be able to see that they are kind of. The numbers

are growing. That would that would be a simple, fast reaction that would require much from the Earth to to spend. But then there should probably be some kinds of. Other ways like commenting, sharing, you should maybe be able to create your response kind of or link your earlier story to the current one. So that so it would be enable a bit more elaborate kinds of responding as well. So that it would not be reactions, but it would be actually becoming more like a conversation. So for those who are interested, different levels of of responding.

6.3 Codebooks

First stage of data collection

Design features	Frequency in interviews	User needs	Distribution in interviews	Participants' testimonies	Characteristics
Stories	22	Social needs	2	<p>“I usually comment stories because this story is like a message to you, but with a picture instead of a text and you feel the urge to communicate” – P2</p> <p>“I see here it is a person looking at you having an open gesture sharing a coffee with you, it's an intimate surrounding, looking at the camera, showing indeed the names here. Like almost everything” – P1</p>	Time limiting Straight path to direct messages
		Fear of missing out	2	<p>“Is the only feature on Instagram that has like limit of time” – P2</p>	

				<p>“And who wins is the platform that hooks you in to this situation, then you're not doing what you're supposed to do studying on an exam, or you're not doing what you're supposed to do, writing your master's thesis or whatever it is, because you are spending time on site. Because you didn't go to a social event that you wanted to go.” – P1</p>	
		Relatedness	2	<p>“A friend that lives abroad, then I can't see her every day, but I can see her story” – P2</p> <p>“You have chosen it to be thinking about something right there in the profile picture you already present yourself in a way that you have thought beforehand of what it is that you want to achieve.” – P1</p>	
Reals	5	Relatedness	1	<p>“It also brings a sense of community like yes, this person from the real things like the</p>	<p>Short, Straight path to sharing with others,</p>

				same way just like me. We are so similar.” – P2	
Notifications	30	Social needs	2	<p>“Most often you go to an adventure together with other people, messages, it's quite obvious notifications like a symbol of a heart symbol of a connection.” – P1</p> <p>“And these are replies to my story or my publication. I will see what they sent me. I will look for like the Approval in their messages. They improve.</p> <p>Well, usually there is approval in their messages.” – P2</p>	Encourages interaction with other users,
		Recognition needs	1	<p>“I will just ask my audience to prove to me that I'm beautiful, that I'm pretty” – P2</p>	

The second stage of data collection

Addictive design attributes	Frequency in interviews	Sub-categories	Design features	Distribution in interviews	Participants' testimonies	Notes
Feedback	57	Multi-layer feedback	Stories	2	<p>“There has to be some kind of an immediate response that as soon as I have posted my story for others to see, then the people are watching it and then I see that” – P6</p> <p>“Yes, I feel good. I get a direct feedback.” – P5</p>	Different forms of feedback, including likes, reactions, comments, and direct messages.
			Reals	3	<p>“Best kind of feedback is that your friends and also some kind of strangers are liking or reacting” – P6</p> <p>“Like when they share certain reals with my friends, which means like I it's not that just mass posting or just giving you know the link or just forwarding to everyone like I choose whom I</p>	

					should write” – P5	
			Notifications	4	<p>“People are addicted to getting more and more likes and comparing in a way it's kind of positive thing” – P4</p> <p>“So what I meant, yeah, too much of notifications, meanwhile, that sometimes. And I may miss out. The notification which I should look at it.” – P5</p> <p>“See that there's content. It kind of immediately when I turn on the screen in the phone, I can see that there's some content and I now I want to see what” – P6</p> <p>“Probably you can add also some images” – P7</p>	
		Users’ options depending	Stories	3	“Good stories, they would probably wish to keep them for	Users have multiple options

		on feedback			<p>themselves. Maybe share them again at a later time.” – P6 “If it is liked very much. And then maybe. Some option to like you know keep it, or just go back” – P5 “Maybe some users could increase the amount of looking time” – P4</p>	<p>for further handling of their content, based on the feedback they get from other users. It may include keeping the content to themselves, transferring it to highlights (stories), or deleting it.</p>
			Reals	2	<p>“Creating remixes or something like the best parts of old videos.” – P6 “The system can intelligently like see that you know how many times it's been viewed. How much time this they spent on this particular? Uh video on the footage or? And that other is like as a user I view it, then I make my comments.” – P5</p>	

			Notifications	3	<p>“I could watch like which were the most successful one last year, at the same time, or something that I posted and others like.” – P6</p> <p>“It demotivates our discourages me to look at it.” – P5</p> <p>“I’m checking if somebody has for example commented on something that I mean for example my. My content,” – P4</p>	
Infinite and new content	25	References to infinite content	Reals	2	<p>“Should be displayed so that the next one is a little bit peeking kind of in the view with moving content so that you want to lift the kind of swipe up so that that becomes fully visible” – P6</p> <p>“So it's like perfect up for procrastination. You know, if you have free</p>	Interface displays visual attributes that refer to infinite content, such as infinite scroll and display of multiple content options at once. In addition, references to new

					time, you can sit and scroll.” – P7	content, for example through notifications, may motivate users to come back to the platform.
		References to new content	Stories	2	<p>“There should probably be some information that these are the stories that will be disappearing within the next hour. There would always be some stories that would be disappearing. So then then that would make you return to the service every hour, because there's next hour, there's again a set of stories that you have not watched.” – P6</p> <p>“Even some kind of, you know, relation and this emotional connection to the the people place and the what are the action that's taking place” – P5</p>	
			Reals	1	“So, in order to make it such that that you get a lot of attention, it	

					should appear as notifications for others.” – P6	
			Notifications	2	<p>“The notification itself should be as addictive as possible, so it should provide rich material already. But not too rich.” – P6</p> <p>“The notification should be very specific to my interest if some kind of.</p> <p>A filter option should be given to me so that.” P5</p>	
Continuous service updates	14	New feature introduction	Stories	2	<p>“Road map of that. I predict that next we will be we need to roll out this feature and then probably that one. But I wouldn't start doing a very detailed plans or rather I would wait.” – P6</p> <p>“There could be less. I'm kind of no scalability in terms of extend the time maybe” P5</p>	Continuous changes to the service, such as integrating a new feature and making old features easier to use.

		New feature integratio n	Stories	2	<p>“It wouldn't be in a different tab, for instance, that here is just normal stuff.” – P6</p> <p>“Seems to be interesting because the way the moves I like. The sliding. The flight left to right and then the middle.” – P5</p>	
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