# **UNIVERSITY OF TWENTE.**

# Exploration of Video-On-Demand Watching Behaviour on YouTube and PS-ODVSP

AN EXPERIENCE SAMPLING STUDY WITH REGARD TO INTENTIONALITY

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# Abstract

Binge-watching, which is usually defined as the 'consecutive watching of 2-6 episodes of a TVseries', is a novel media behaviour phenomenon facilitated by the rise of On-Demand Video Streaming Platforms (ODVSP). While the extensive consumption of video content is a frequently occurring behaviour (especially among students), research has failed to settle on a universal definition or measurements and struggled to identify whether excessive watching is a harmful or beneficial behaviour. Moreover, current research has neglected the various structural differences between streaming platform types, such as YouTube and Paid-Subscription On-Demand Video Streaming Platforms (PS-ODVSP) such as Netflix and Amazon Prime. Hence, there is a need to investigate the differences of peoples watching behaviour on the two platform types. Furthermore, Riddle et al. (2017) suggested to examine the prevalence rates of intentional ('conscious choice by individuals to watch multiple episodes of a TV-program') and unintentional ('watching multiple episodes of the same program without having the goal of doing so') watching behaviour, the latter being associated with addictive symptoms.

An app-based Experience Sampling Method (ESM) study with n = 45 participants was conducted in which respondents answered a daily questionnaire every day over the course of 15 days. On average participants watched 68 minutes (SD = 47.692) or 1.92 episodes of video on demand (VOD) content, while exerting the same degree of intentionality (about 70%) on YouTube and PS-ODVSP each day. According to the findings, there is a need to differentiate between the two, since most individuals tend to focus on one platform, PS-ODVSP being by far the more extensively and frequently utilized platform type in this sample. Inter-participant watching behaviour was immensely variant exposing VOD watching as an inconsistent behaviour on a group level. Also, there were some indications that intra-participant behaviour is variant as well. Still, there is no connection between participants intentionality across platforms, suggesting an individual's watching behaviour was not dependent on the day of study. Future studies are recommended to investigate individual cases of heavy and unintentional binge-watching to effectively examine whether it is a possibly damaging behaviour. Furthermore, upcoming studies should pay attention to the utilized streaming platform type since behaviour on them is likely to vary.

**Keywords:** binge-watching, watching-behaviour, intentionality, experience sampling method (ESM), students, YouTube, Netflix, Amazon Prime

# Introduction

The world's technological development and the resulting incorporation of technological devices into our everyday life has been moving ahead rapidly. One of the popular examples for this are the changes in people's media environment and the resulting behaviour (Rubenking, Bracken, Sandoval, & Rister, 2018; Steiner & Xu, 2018). While at the beginning of the past century owning a television was a privilege only available to a rich minority, watching movies, series, or videos in general has found its way into the daily habits of many. In 2018 the worldwide daily watching-time reached an average of 2 hours and 55 minutes per person (Benoit, 2019). Additionally, Knight (2018) stated that Britons spend around 10 years of their lifetime in front of the TV. It is obvious, that watching video content is a very important part of people's lives.

With most households connected to the internet (Lellouche Filliau, 2016), and increasingly diverse possibilities of usage, a TV is not the only way to consume video-content anymore. Several online-streaming platforms, such as YouTube and Netflix give viewers the opportunity to choose what, when, how, and how much to watch. The content provided on these platforms has been labeled as *'video-on-demand'* (VOD) content (Granow, Reinecke, & Ziegele, 2018). Even though among older generations ordinary and broadcasted TV-watching remains as one of the most frequently used content providers, younger peoples use of said streaming platforms is rising (Ericsson ConsumerLab, 2017; Riddle et al., 2017; Rubenking & Bracken, 2018).

A frequent utilization of above-mentioned services and the resulting change in watchingbehaviour has been accompanied by a widespread phenomenon: *binge-watching*. Reports of people binge-watching in populations vary from 44.6% (Ahmed, 2018) (n = 260) to even 80.6% (Exelmans & Van Den Bulck, 2017) (n=423). Plenty studies regarding binge-watching behaviour have exclusively been conducted on students (e.g. Exelmans & Van Den Bulck, 2017; Sung, Kang, & Lee, 2018). This is no wonder, since they have been indicated to be the main target group in this matter. On average, students have been found to binge-watched 2.59 series per month (Groshek, Krongard, & Zhang, 2018) and 1.42 days a week (Walton-Pattison, Dombrowski, & Presseau, 2018). Although it seems like the behaviour is known to the public, the field of science has struggled to settle on a universally applicable and satisfactory definition of binge-watching behaviour so far.

The most frequently established definition and measurement for binge-watching is via the number of consecutively watched episodes (Merikivi, Salovaara, & Zhang, 2016; Rubenking & Bracken, 2018; Steiner & Xu, 2018; Walton-Pattison et al., 2018). For instance, some studies settled on a cut-off score of *'two to three consecutive episodes of the same TV-show in one sitting'* (Walton-Pattison et al., 2018) or

'between 2-6 episodes of the same TV show in one sitting' (Davis, 2016). Even though this definition provides a measurable interval through the number of watched episodes, the term 'episodes' itself is not effectively generalizable. For example, an episode of a TV-show can vary from approximately 5 minutes, as in the 'Funny or Die' series 'Do you want to see a dead body' on YouTube, to approximately 90 minutes, as in the BBC series 'Sherlock'. Obviously, spending 10 minutes watching will hardly classify as bingewatching.

Due to the unsatisfactory definition, some have demanded less labeling terminologies such as heavy viewing (Horvath, 2004; Shim, Lim, Jung, & Shin, 2018) or marathon-viewing (Pittman & Sheehan, 2015). Accordingly, while most of the following findings have been made regarding 'binge watching', the term is substituted in the following with the less labeling terminology 'extensive watching behaviour' (EWB). Furthermore, the measurement of the watching behaviour via episodes will be discarded and substituted through the measurement via the total watching time instead as it has been commonly recommended in recent studies (Rubenking et al., 2018; Samuel, 2017; Sung et al., 2018; Vaterlaus, Spruance, Frantz, & Kruger, 2018).

It is a trend in watching behaviour studies to bundle together many different platforms, such as Netflix, Amazon Prime and Hulu (Groshek et al., 2018; Merikivi et al., 2016; Pittman & Sheehan, 2015; Sung et al., 2018) or solely focus on Netflix (Jenner, 2016; Matrix, 2014). Still, a differentiation of watching behaviour on streaming platforms might be crucial due to the structural differences in availability, type and quality of the narrative or characters across platforms. Flayelle, Maurage, and Billieux (2017) found in their focus group study that these structural factors influence a viewer's immersion with the watched content resulting in varying watching behaviour. This claim is supported through the discovery that the way content is presented hugely influences an individual's overall engagement with, and enjoyment of, the consumed medium (Horrath, Horton, Lodge, & Hattie, 2017; Katz, Blumler, & Gurevitch, 1973).

Netflix and Amazon Prime are market leader in the niche of paid-subscription on-demand videostreaming platforms (PS-ODVSP) with a total audience of 237 million viewers in November 2018 (Lovely, 2018). On the other hand, with approximately 1.9 billion users (Omnicore Agency, 2019), YouTube's range of influence is nearly ten times as high as both PS-ODVSP combined. Still, searching with the keywords 'binge', 'watching', and 'YouTube' on Scopus leads to only two sources, one of them being usable (Ahmed, 2018). To top it off Ahmed (2018) indicated that YouTube was the most used binge-watching medium among the investigated Arab population. The neglection of YouTube might be related to the definition of binge-watching via the amount of consecutively watched episodes. Just as other VOD contents providers, YouTube is a streaming platform but, due to its high variety of video content and length, it is not possible to apply a definition via the number of watched episodes. The need to investigate YouTube and other streaming platforms separately is underlined by their various structural differences. First, the content on YouTube is produced by its users as opposed to high budget cinematic companies, which has huge influences on the average video length, content, and professionality. For example, it has been indicated that most of the content on Netflix and Amazon Prime varies between 20 to 120 minutes (Volpe, 2017; Stephen Follows, 2017) while the average video length on YouTube is 4 minutes and 20 seconds (Minimatters, 2019). A possible explanation for this is that YouTube utilizes advertisements of third parties before and during videos while these advertisements are omitted on Netflix and Amazon Prime (Pittman & Sheehan, 2015). As Panda and Pandey (2017) indicated, advertisements interrupt the watching experience and might lead to a decreased watching time.

Moreover, YouTube offers its users the possibility to interact with each other on the platform (e.g. through the comment section), which might change their motivation to start and continue watching. Many of the YouTube-channels have a regular uploading schedule, which are integrated into the daily habits of their viewers. The daily social-mediasque interaction between content creators and viewers is another aspect which certainly discerns YouTube and PS-ODVSP in terms of motivation and involvement.

While an in-depth analysis and elaboration of structural discrepancies between YouTube and other VOD, such as in video length, content, and professionality would exceed the frame of this paper, it is obvious that watching behaviour on the two platform types might be significantly different. Still, the factors mentioned above are more than enough to doubt the current research approach of EWB.

Despite all the problems in current EWB research, there are several findings which most of the sources agree upon. A commonly established explanation (e.g. Horeck et al., 2018; Merikivi et al., 2016; Mikos, 2016) for peoples EWB is given through Csikszentmihalyi's theory or state of 'flow' (Csikszentmihalyi, 1991). As the psychologist elaborated the question 'What is a life worth living?' in one of his lectures (Csikszentmihalyi, 2004), '*flow*' is a state in which an individual becomes completely immersed in his or her action and loses his or her feeling of time. He claims that people repeatedly strive to achieve this state, since it creates meaning and happiness in life. While the initial theory concerned actions such as playing music, it currently has been applied to the VOD streaming context as well (Matrix, 2014; Pittman & Sheehan, 2015; Samuel, 2017). With regard to structural features Williams (1974) suggested, that the continuous availability and consecutive presentation of television content creates a big program block which is depriving people of moments in which they can reflect on whether they should continue watching consequently increasing the total watch time. Also, the resulting positive feelings which have been acquired with the immersion into the watched video content might prompt people to repeat the behaviour in the future. On the contrary, stopping a watching session has been associated with negative feelings (Panda & Pandey, 2017), since it disrupts the flow.

Besides the desire to reach a state of flow, there are some other motivation for EWB. Katz et al. (1973) presented five general goals for users' media consumptions indicated in research studies, namely: entertainment, information, escape from reality, social interactions and identification with the story or characters. These motivations have been reaffirmed through scientific studies (de Feijter, Khan, & van Gisbergen, 2016; Panda & Pandey, 2017; Pittman, M. & Tefertiller, 2015; Vaterlaus et al., 2018). Other possible motivational factors are hedonism and relaxation (Pittman & Sheehan, 2015) and the need for immediate gratification (Shim et al., 2018)

Other facilitating factors for EWB are the free time people have at their hands (de Feijter et al., 2016) and the accessibility and availability of video content (Panda & Pandey, 2017; Steiner & Xu, 2018). Also, general structural features of VOD platforms such as auto-play functions, cliff-hanger, or suggestions for related follow-up videos (Flayelle et al., 2017; Rubenking & Bracken, 2018) have been proven to influence the continuous watching process. All these features are present on YouTube, Netflix, and Amazon Prime. As Merikivi, Salovaara, Mäntymäki, and Zhang (2017) formulated it, to a binge watcher VOD streaming providers are what all-you-can-eat-restaurants is to a food addict.

Addiction seems to be the key word when it comes to EWB, especially for attempts of pathologization and the development of cut-off scores regarding 'binge-watching'. Video game addiction has recently been acknowledged as an independent diagnosis for addiction by the World Health Organization (Maeurer, 2019). Since EWB has been described as a similar dysfunctional coping strategy (Flayelle et al., 2018), it is reasonable to think that EWB or binge-watching are soon to be sorted to the group of addictive disorders as well. In fact, there have been attempts to pathologize EWB. Horvath (2004), for example, developed four factors for measuring television addiction based on the ordinary addiction index of the DSM-IV, namely 'heavy viewing', 'problematic viewing', 'craving for viewing', and 'withdrawal'.

According to the criterion of 'problematic viewing', binge-watching or EWB has been associated with physical, mental, and social problems (Shim et al., 2018). The presumably most common negative consequences associated with EWB are obesity, sleep deprivation, or insomnia (Exelmans & Van Den Bulck, 2017; Flayelle et al., 2018; Vioque, Torres, & Quiles, 2000). Additionally, there seems to be a link to depression (Ahmed, 2018), a shorter attention span, diminished self-restraint, less creative problem solving, and perseverance (Csikszentmihalyi & Kubey, 2002). Furthermore, EWB has been found to be leading to feelings of regret, creating a vicious cycle in which binge-watchers feel negatively about their watching behaviour and consume more VOD content to compensate their negative feelings (Panda & Pandey, 2017; Walton-Pattison et al., 2018). Furthermore, Ahmed (2018) indicated that there is an association between the extent of watching behaviour and depression and anxiety. Csikszentmihalyi and

Kubey (2002) reported that people who indicate themselves as addicted to video content usually have poorer attentional control than people who do not. Moreover, they suggested that a heightened watch time leads to a shorter attention span, diminished self-restraint, and eventually less creative problem solving and perseverance.

Despite all the negative associations with EWB, clear cut-off scores for a proper definition seem to be missing. For example, scores for the criterion of 'heavy viewing' have been varying between 2.5 hours (Walton-Pattison et al., 2018) and 6 hours (Foss & Alexander, 1996) of daily video content consumption. More importantly, the behaviour has been found to have several beneficial effects as well (Flayelle et al., 2017; Rubenking & Bracken, 2018; Steiner & Xu, 2018). For instance, Rubin (2008) suggested that the consumers need gratification for video content may result in relaxation and a positive disposition towards life. Also, the extent of watching behaviour seems to be influencing the emotional wellbeing to a certain degree (de Feijter et al., 2016). As participants indicated in a study by Vaterlaus et al. (2018), watching popular series can create inside jokes with old friends and help making new friends. Furthermore, by satisfying the needs of the viewer for entertainment, information, or story telling (Katz et al., 1973), EWB could be an activity to enhance or maintain a positive affect (Flayelle et al., 2019).

It is obvious that there is no consensus on whether VOD consumption is beneficial or destructive. The simple categorization into binging and non-binging behaviour proposed in the introduction seems to be unsatisfactory. Clearly there is a need for a more specific division of watching behaviors to indicate harmful watching behaviour. While it has been proposed to utilize a scale based on the number of watched episodes into regular, binge, and hyper-binge watching behaviour (Touleau, Ashkan, Ding, & Erikson, 2016) others have established a classification based on the watchers motivations (Kim & Lee, 2013).

A strikingly simple yet logical approach has been proposed by Riddle et al. (2017), who suggested a differentiation via the intentionality of the occurring watching-behaviour. The authors defined intentional binge-watching as a *'conscious choice by individuals to watch multiple episodes of a TVprogram'*, while characterizing unintentional binging as *'watching multiple episodes of the same program without having the goal of doing so'*. This definition seems to focus on the control one has over the decisions in his or her watching behaviour. Riddle et al. (2017) found that 78% of the initial 218 participants engaged in both kinds of binge-watching, while just 19% engaged in only one type of binge-watching. Furthermore, the researchers proposed that future studies should investigate the prevalence rates of intentional and unintentional binge-watching to find out which type is more common and whether it is a consistent behaviour. The differentiation is especially interesting for EWB research, since it has been found that higher levels of unintentional watching behaviour increase the likelihood of addictive symptoms (Riddle et al., 2017; Rubenking & Bracken, 2018; Walton-Pattison et al., 2018), while intentional watching

seems to be connected to factors of stress relief and emotional satisfaction (Rubenking & Bracken, 2018). Consequently, it is likely that the harmful effects might increase with the extent of an individuals unintentional watching behaviour.

The app-based Experience Sampling Method (ESM) is a novel way of data collection which is ideal for researching the ongoing EWB of participants with regard to the theory of flow (Hoffman & Novak, 2006; Valkenburg & Peter, 2013). In smartphone ESM studies, participants need to answer multiple identical questionnaires upon notification (e.g. smartphone notification) every day for several consecutive days (Berkel, Ferreira, & Kostakos, 2017; Stone, Kessler, & Haythomthwatte, 1991). ESM measurements has the advantage of tracking people in their everyday life rather than in artificial lab conditions (Csikszentmihalyi & Kubey, 2002). Through situational and long-term measurements, the ESM study accounts for variations over time, has a high ecological validity, and the ability to show a broad picture of participants behaviour rather than a mere momentary assessment (Berkel et al., 2017; Myin-Germeys et al., 2009). Also, the approach has been identified to be perfectly suited for within-person processes (Scollon, Kim-Prieto, & Diener, 2003). Since watching behaviour is likely to vary on an individual level and Riddle et al. (2017) suggested to study whether the intentionality of EWB is consistent across a longer time span, the ESM perfectly fits the requirements of this project as indicated above.

There are several conclusions to be drawn based on the state of EWB research emphasized above. It is obvious that the investigation of VOD watching behaviour has only just started and its antecedents and consequences are diverging across studies. Furthermore, it has been elaborated that the investigation via episodes is flawed. Accordingly, participants watching behaviour on YouTube and SB-ODSP will be measured in total watching time to make a standardized comparison of the two possible. Furthermore, the state of EWB research underlines the statement by Flayelle et al. (2018) that the approaches for studying binge-watching need to be kept exploratory rather than the confirmatory in order to first gain a proper understanding of the phenomenon.

Overall, the aim of this study is two-fold. First, it has been illustrated that YouTube and PS-ODVSP are fundamentally different in various aspects (e.g. the average video length and variation, the published video content type, and the degree of professionality in production). Therefore, it is necessary to compare YouTube and PS-ODVSP to see whether the two platforms need be investigated separately in the future. Therefore, it is necessary to examine:

# RQ1: To what extent does watching behaviour vary on YouTube and PS-ODVSP across participants, over time, and regarding intentionality?

Second, the need to categorize different binge-watching behaviour has been pointed out. With regard to the research by Riddle et al. (2017), the prevalence rates of peoples intentional and unintentional binge-watching behaviour needs to be investigated. By assessing the prevalence rates of intentional and unintentional binge-watching it is possible get a preliminary assessment whether binge-watching is most likely to be intentional or unintentional and therefore might be problematic on a societal stage.

Thus, the other question will be:

# RQ2: What are the prevalence rates for intentional and unintentional watching behaviour across participants and over time?

# Methods

#### Design

The study took place between the 28<sup>th</sup> April and 12<sup>th</sup> May 2019 resulting in a study length of 15 days, which is the average length of ESM studies (Berkel et al., 2017; Scollon et al., 2003) Furthermore, the data quality has been found to decline after 2-4 weeks (Stone et al., 1991). The data collection period started right after the national holiday 'King's day' (27<sup>th</sup> of April) and included the 'Liberation Day' (study day 9), which lead to a total of 6 weekend- and holidays and 9 workdays. Due to the high number of repeated measurements throughout the week, a small sample size of 30 participants was indicated to provide a sufficient reliability (Conner & Lehman, 2012). Furthermore, Berkel et al. (2017) found that the median number of participants for ESM studies includes 19 participants, verifying the proposed number sample size.

#### Participants

Participants were approached through convenience sampling via face-to-face interaction, social media or through the test subject pool system SONA. SONA is a webpage on which Psychology and Communication Science students of the University of Twente can sign up for studies and gather participants. The participation on this page is voluntary but facilitated by the necessity to gather a minimal amount of SONA-credits throughout the first two years of their study. The study was approved by the Ethics Committee of the University of Twente.

The study involved 45 (64.4% female, 35.6% male) participants, aged between 17 and 30 (M = 22.69, SD = 2.34). The participants had different nationalities, including German (91.1%), Dutch (2.2%)

Kurdish (2.2%) and Mexican (2.2%). The drawn sample consisted predominantly of students (84.4%), while five participants worked as full-time employees (11.1%), four individuals as part-time employee (8.8%) and two participants indicated to be pupils (4.4%).

#### Procedure

After agreeing to participate in the study via one of the three paths mentioned above, attendees received a confirmatory Email which contained more detailed information, definitions, and a step-by-step guide for registering, downloading the TIIM app, and about the following procedure (Appendix 1.1). The TIIM app is an intervention application of the University of Twente based on the LimeSurvey software. The app enables a researcher to create and schedule questionnaires as well as send notifications or reminders to participants when the surveys become available or still need to be answered. The app is only available on IOS and Android, which limited the participants to people who own a smartphone with access to the Google Play Store or iTunes App Store.

In the next step, participants registered with their Email-address via a link provided in the initial Email and downloaded the App. Participants were allowed to withdraw from the study at any time, without giving a reason. Every participant agreed to an online active informed consent (Appendix 1.2) prior to the participation, fulfilling the guidelines of this committee.

In line with the ESM, participants answered four different, short questionnaires about their mood and behaviour in the last 24 hours each day. A baseline questionnaire was added on day one, as well as a feedback questionnaire on the last day of the study. Three of the daily questionnaires assessed the participants mood, while one of them was designed to determine the participants behaviour in the last 24 hours. The mood questionnaires went online at 9 a.m., 3 p.m., and 9 p.m. and disappeared after 5 hours, while the behaviour questionnaires were published at 9 o'clock in the morning and disappeared 24 hours later. The participants received notifications on their mobile device as soon as the modules were made available and 2 hours afterwards, given that they haven't been answered by then. After the data collection was finished, participants were informed about the aim of the study and received the promised SONA credits.

#### Materials

This research project was part of a joint effort of four distinct bachelor-projects regarding other topics, such as gender-differences and binge-watching consequences. Due to means of relevance, only the measures used to study intentional and unintentional binge-watching behaviour on YouTube and Netflix

were utilized. The used measures were the baseline and seven questions of the daily retrospective questionnaire. The mood questionnaire was disregarded completely. The full questionnaires has been added in the appendix.

#### Baseline questionnaire:

The baseline questionnaire included five different questions (Appendix 1.3). First, participants were asked to indicate their age (number input), gender (male/female/other), occupation (pupil/student/employed full-time/employed part-time/Other: *single line input*) and nationality (German/Dutch/Other: *single line input*). Furthermore, participants needed to specify the question 'Which video-streaming-platform(s) do you use on at least a weekly basis?' (Answers: YouTube/Netflix/Amazon Prime/Hulu/HBOgo/Other: *single line input*) to confirm whether Netflix and YouTube were frequently used and dominantly established streaming platforms.

#### Daily questionnaire

While this 20-item (2 statements and 18 questions) questionnaire (Appendix 1.4) was the main source for answering the research question posed above, only 7 questions were relevant for the final data set. All of the following questions were based on the assumption by Katz et al. (1973), that audience members of mass media are actively participating in the media environment and sufficiently self-aware of their media behaviour. Subsequently, it was expected that participants can accurately report their watching times. Also, as established above, the following measurements were conducted regarding participants total watch time. This substitution has not only been made in the past (Rubenking et al., 2018; Samuel, 2017; Sung et al., 2018) but also has been indicated to be the most relevant factor for a conceptualization of binge-watching by the participants (N = 406) of a study by Vaterlaus et al. (2018).

The first three questions were developed to confirm the assumptions about the definition via episodes, and about the dominance of YouTube, Netflix, and Amazon Prime on the streaming platform market. By means of that they aided the process of investigating participants watching behaviour, facilitated the later analysis, and improved the reliability of this study. First, participants were reminded that 'All of the following questions are related to your behaviour/feelings from **YESTERDAY!!!**' and that it would only take about 5 minutes. Afterwards, they had to answer whether they consumed streaming content the day before ('Did you watch streaming content?': Yes/No).

Respondents continued with the questions 'How many episodes did you watch' (drop down input: I did not watch anything/I watched a movie(s)/less than 1 episode/1 episode/2 episodes/3 episodes/4 episodes/5 episodes/6 episodes/7 episodes/more than 7 episodes). This question was posed in order to prove that the definition via episodes in fact does not account for the total watching time and to give a better overview on whether participants predominantly watched movies or series. To assess whether the combined watching time on YouTube and PS-ODVSP accounted for the actual watching time, participants were instructed to report 'How many minutes did you watch' (drop down input: I did not watch anything/1-30 minutes/1 hour/1.5 hours/2 hours/2.5 hours/3 hours/3.5 hours/4 hours/4.5 hours/5 hours/5.5 hours/6 hours/6.5 hours/7 hours).

The following four questions were crucial to the central questions of this thesis. All of them were designed by the researcher due to a lack in preceding research about the topic of intentional and unintentional binge-watching. The first question of this block was 'How much time did you spend on Netflix/Amazon Prime throughout the day?', which had to be answered on a drop-down scale from 'None', over the interval between '1-30 minutes' to '7 hours' in 0.5 hour steps (0.5 hour, 1 hour, 1.5 hours, 2 hours, 2.5 hours, etc.), and finally 'more than seven hours'. Also, participants were informed that 'It's only an estimation, choose the answer you deem to be closest to the actual time', to prevent them from tracking their watching times. This could have created an interventional effect.

Overall, this question assessed the estimated time participants spend watching video-streaming content in the last 24 hours. As established above, Netflix, Amazon Prime, and YouTube are by far the most prevalent streaming providers among the European population, so it was assumed that the complicated and confusing abbreviation of PS-ODVSP could be substituted through 'Netflix/Amazon Prime'. Eventually, this claim was checked for its validity through the three control questions which have been elaborated above.

The following question was aimed developed to assess the intentionality of participants watchingbehaviour. In relation to the preceding question respondents had to indicate 'How much of it was intentional?' on a drop-down scale. The answer possibilities were the same as in the total time question (drop down input: None/1-30 minutes/1 hour/1.5 hours/2 hours/2.5 hours/3 hours/3.5 hours/4 hours/4.5 hours/5 hours/5.5 hours/6 hours/6.5 hours/7 hours/More than 7 hours). In the description, the definition of the term 'intentional' watching used in the study by Riddle et al. (2017) was mentioned ('*Intentional watching is when you plan ahead of time to watch a show (not as background noise, but as primary focus of attention*) to avoid confusing participants with vague terminology. As a result, different interpretations of the term 'intentional' were likely to be avoided.

The following two questions were essentially identical to the preceding two. Only the specification Netflix/Amazon Prime was substituted by 'YouTube'. Accordingly, the third question of the block was 'How much time did you spend on YouTube throughout the day?' (drop down input: None/1-30 minutes/1 hour/1.5 hours/2 hours/2.5 hours/3 hours/3.5 hours/4 hours/4.5 hours/5 hours/5.5 hours/6 hours/6.5

hours/7 hours/More than 7 hours) with the follow up question 'How much of it was intentional?' (drop down input: None/1-30 minutes/1 hour/1.5 hours/2 hours/2.5 hours/3 hours/3.5 hours/4 hours/4.5 hours/5 hours/5.5 hours/6 hours/6.5 hours/7 hours/More than 7 hours) .Together with the questions of the other researchers, the daily questionnaire was expected to take less than 5 minutes at the start of the study.

Most of the questions elaborated above were answered through drop down input with options increasing in thirty-minute intervals. This interval size was expected to aid a participant to accurately recall or estimate their total and intentional watching time since thirty minutes have been indicated to be the typical series episode length (Rigby, Brumby, Gould, & Cox, 2018). This subdivision was supported by the fact that participants were not expected to know exactly how long they spend watching streaming content in the last 24 hours. Furthermore, the range between 0 and 7 hours was chosen based on the average watching time found in other studies (Lauhoff, 2018; Riddle et al., 2017; Rigby et al., 2018). Based on these studies, it was estimated that participants would not exceed a daily watching time of 7 hours.

#### Analysis

For the data analysis, the statistical program for social sciences (SPSS Version 24) was used. The collected data was exported from TIIM and transformed into SPSS. Then all the surplus data gathered for the other studies as well as participants with insufficient response rates (n = 1) were omitted from the data set. The measured variables from the demographic questionnaire were age, nationality, occupation, and preferred platform, all of which were analyzed through descriptive statistics.

Regarding the daily measurement, the independent variables were 'participant ID' and 'day of study'. Furthermore, the measured dependent variables were 'occurrence of watching behaviour', 'self-reported number of episodes' and 'self-reported total watch time' as well as 'total' and 'intentional watching time' on 'YouTube' and 'PS-ODVSP'.

The different qualitative variables were coded into numeric variables. Hence, the answer 'How many episodes did you watch?' was recoded from N episodes into N (e.g. 1 episode  $\rightarrow$  1), while 'I watched a movie' was coded into 'System-missing'. Furthermore, the variables which were measured with time intervals (1-30 minutes, 1 hour, 1.5 hours, etc.), namely self-reported watching time, total and intentional watching time on Netflix/Amazon Prime, as well as total and intentional watching time on YouTube were recoded into the average number of minutes of the respective interval. Therefore, 1-30 minutes was turned into 15 minutes, 1 hour into 45 minutes, et cetera. Correspondingly, each day of study was converted into a time-point (see Table 1). Furthermore, due to the logical assumption that behaviour can be spend either intentionally or unintentionally the daily intentional watch time was subtracted from the

daily total watch time in order to retrieve participants daily unintentional watch time on the respective platforms. Furthermore, a combined watch time was computed by summing up the total, intentional, and unintentional watch time on YouTube and PS-ODVSP.

Time Point	Measured Day
1	28.04.2019 – Sunday
2	29.04.2019 – Monday
3	30.04.2019 – Tuesday
4	01.05.2019 – Wednesday
5	02.05.2019 – Thursday
6	03.05.2019 – Friday
7	04.05.2019 – Saturday
8	05.05.2019 – Sunday
9	06.05.2019 – Monday
10	07.05.2019 – Tuesday
11	08.05.2019 – Wednesday
12	09.05.2019 – Thursday
13	10.05.2019 – Friday
14	11.05.2019 – Saturday
15	12.05.2019 – Sunday

*Table 1*. Time Point for each study day with weekday and exact date.

Most importantly, a series of Linear Mixed Modelling (LMM) with a first-order autoregressive structure with homogenous variances were applied to each dependent variable of the daily measurement to analyze the hierarchical and nested repeated measurements. The independent fixed factors were participant number (subject) and time point (repeated measurement). Due to the structural features of the ESM, it was very likely that participants would not manage to fill out the questionnaire regularly (Scollon et al., 2003). The LMM accounts for missing values by estimating participants most likely behaviour based on their reported values throughout study period. More precisely, the model computes an estimated marginal mean based on the available data for each fixed factor. Hence, the output consisted of two types of estimated means for each dependent variable: one for each participant and one for every day of study.

The degree to which the two fixed factors accounted for variance of the measured dependent variables was underlined by the results of a series of Type III Test for Fixed Effects.

The relationships between all the dependent and independent variables of the baseline and daily questionnaire were examined post-hoc through Bivariate Correlation Analysis of the estimated marginal means from the LMM's. Furthermore, associations were described through the Spearman's rank-order correlation across study days and the population. It is important to emphasize that the results of an estimated mean correlation analysis only describe the between-subjects' relations and do not give evidence for intra-person variations. The Effect size r is deemed to indicate a weak correlation at 0.1, medium correlation at 0.3, and a strong correlation with a coefficient of 0.5 (Cohen, 1988).

While the estimated means only provided information about inter-personal behaviour, the standard deviation computed through LMM was used to get an idea of intra-personal variances. Additionally, three exemplary individual cases were examined through descriptive statistics as well as post-hoc bivariate correlation analyses of the reported watching times on the various dependent and independent variables. For all analyses, a significance level of .05 was used, accepting a probability of about 5% of rejecting the null hypothesis, even though there is no effect present in the data.

In order to illustrate that YouTube, Amazon Prime and Netflix are indeed the most frequently established platforms in the population, the time spend on other platforms was computed by subtracting the estimated total combined watch time from the estimated self-reported watch time. Means and standard deviations were computed for each of the produced estimations. Excel was used to graphically illustrate the findings and compare the relations of different variables to one another.

# Result

#### General findings

45 participants (29 female; 16 male) filled out the daily measurements on a regular basis. One participant was omitted from the analysis since he or she responded on less than three days. Overall, participants answered the questionnaire on 86% of the days. In the sample only two people did not consume a minimum average of 10 minutes VOD content throughout the two-week period. On average, participants indicated that they watched video content on 72% of the days and 39 Participants (86%) indicated that they use Netflix daily, while 35 participants (77.7%) reported the same for YouTube. The other utilized streaming platforms were Amazon Prime (n=16; 35%), Vivo (n=1; 2.2%), ARTE (n=1; 2.2%), Sky (n=1; 2.2%), and Kinox (n=1; 2.2%). Every participant used either YouTube, Netflix, or Amazon Prime. Also, combined use of PS-ODVSP and YouTube was a common habit (n=32; 71.1%). In fact, only a few

participants (n=8; 17.8%) claimed that they use only one streaming platform, namely YouTube (n=4; 8.9%) or Netflix (n=4; 8.9%).

#### Regarding the Definition of Watching Behaviour via Episodes

As elaborated above, the definition via episodes is hardly generalizable. The number of a participants watched episodes was significantly and very strongly positively correlated (see *figure 1*) with the combined total watching time ( $r_s = 0.828$ , p < .001).



*Figure 1.* The estimated self-reported total watching time and the number of watched episodes across participants.

### Estimated Watching Behaviour and Correlations across Participants

#### General

On average, participants indicated that they spend 68 minutes (SD=47.692) watching videos on streaming platforms each day equaling an average number of 1.92 episodes (SD=1.349) with a mean episode length of 41.5 minutes (SD=5) and a minimum watch time of 6 minutes and a maximum of 224 minutes. It was found that on average 47 minutes (69%, SD = 36.02) of the total watching time was spent intentionally. As a result, the computed unintentional daily watching-time was 21 minutes (31%, SD = 22.47) on average. While the total combined watch time was very strongly correlated to the combined intentional (r = .847, p < .001) and unintentional watch time ( $r_s = .655$ , p < .001), no correlation was found between combined intentional and unintentional watch time ( $r_s = .208$ , p < 0.17).

#### Watching Behaviour on SB-ODVSP

As indicated by high standard deviations, participants watching-behaviour was diverse on both types of platforms. Only 4 respondents were estimated to spend less than 10 minutes watching VOD content each day. The average time spend on Netflix/Amazon Prime over the course of the study varied between 0 and 197 minutes, resulting in a daily average estimated mean of 47 minutes (SD=40.94). 67% of the watching behaviour on the SB-ODVSP was indicated to be intended (M = 31.71, SD = 29.94), exposing it as the prevalent watching type on the two measured PS-ODVSP (see *figure 2*). Netflix's total watching time is strongly correlated to both intentional ( $r_s = .90$ , p < .001) and unintentional watching time ( $r_s = .70$ , p < .001). Also, the intentional and unintentional watching times on Netflix/Amazon Prime are significantly correlated ( $r_s = .369$ , p = .013). The Type III Test for Fixed Effects underlined the relationships between participants behaviour and the respective dependent variables. It was discovered that the variances in total (F (44, 139) = 5.437; p < .001), intentional (F(44, 137) = 5.73; p < .001) and unintentional watching behaviour (F(44, 149) = 2.638; p < .001) on Netflix/Amazon Prime were significantly related to the individual watching behaviour.



*Figure 2.* The estimated means of participants watching time on Netflix and Amazon Prime for total, intentional, and unintentional watching behaviour.

#### Watching Behaviour on YouTube

The estimated means of watching behaviour on YouTube ranged from 0 to 193 minutes a day. Furthermore, 56% (n = 25) of the respondents did not watch a minimum amount of VOD content (> 10 minutes) on the platform. The low overall estimated mean might be since only six people in the population watched more than 50 minutes of video content on YouTube (see *figure 3*). In comparison, on Netflix and Amazon Prime, there were 22 people watching in the same time category (> 50 minutes). Nonetheless, with a rate of 71% (M = 15.56, SD = 29.09), intentional watching was the predominant behaviour on YouTube as well. Consequently, the computed unintentional behaviour on the video streaming platform averaged at 5.53 minutes with a standard deviation of 8.85. Just as on Netflix, the total watching time on YouTube was significantly correlated to the intentional ( $r_s$  = .89, p < .001) and unintentional ( $r_s$  = .69, p < .001) behaviour as well as the both among themselves ( $r_s$  = .41, p = .005). The test for fixed effects highlighted these findings for the total (F (44, 130) = 8.43; p < .001), intentional (F (44, 142) = 9.92; p < .001), and unintentional (F(44,120) = 1.96; p = .002) watching behaviour on YouTube.



*Figure 3.* The estimated means of participants watching time on YouTube for total (intentional/ unintentional) watching behaviour.

#### Comparison of Watching Behaviour on YouTube and PS-ODVSP

Just as for the relation to the dependent variables on PS-ODVSP and YouTube, the Test for Fixed Effects showed that the total (F(44, 138) = 5.596; p < .001), intentional (F(44, 132)= 5.567; p < .001), and unintentional (F(44, 158) = 3.335; p < .001) combined watching time was significantly related to the fixed factor of participant number. Overall, participants spend substantially more time on Netflix than on YouTube (M = 21.09, SD = 34.57) (see *figure 4*). The estimated means of participants on YouTube and Netflix/Amazon Prime were compared through bivariate correlation analysis. The total, intentional, and unintentional watching behaviour on YouTube and Netflix/Amazon respectively were significantly related internally, but for the most part did not show strong correlations to the other watching streaming platform type. One exception is the correlation of unintentional behaviour across platforms ( $r_s = 0.253$ , p = 0.09). Nonetheless, as illustrated in *figure 5*, the correlation does not seem to follow a specific trend.



Figure 4. The estimated means of participants total watching time on YouTube and PS-ODVSP.



*Figure 5.* The estimated means for participants unintentional watching behaviour on PS-ODVSP and

YouTube.

A similar nearly significant negative correlation was found between the total watch time on Netflix and the intentional watch time on YouTube ( $r_s = -.285$ , p = 0.058). Having a closer look at *figure 6*, it appears that especially respondents with a long Netflix watching time tend to watch little YouTube content (or vice versa). The final correlation worth mentioning is between the unintentional behaviour on YouTube and Netflix/Amazon Prime. The bivariate correlation analysis showed that the two are not significantly related ( $r_s = -.238$ , p = 0.11) indicating that the level of unintentional behaviour on either platform is not influencing the degree to which unintentional behaviour occurs with the other streaming provider.



*Figure 6*. The estimated means for participants total watch time on PS-ODVSP and intentional watch time on YouTube.

### Estimated Watching Behaviour and Correlations over Time

#### General

Turning to the analysis of participants behaviour over time, it becomes obvious that the variation over time is substantially less diverse at the group level than the diversity displayed between participants (see *figure 7*). Day 3 (Tuesday) of the study turned out to have the lowest combined average estimated watching time with 56.4 minutes, while participants watched most on day 10 (Tuesday) with about 90 minutes on average. While the means for combined total (M = 68.3, SD =9.31), intentional (M = 47.28, SD = 6.71), and unintentional watching behaviour (M = 21, SD = 7) are similar to the ones stated above, the standard deviations of watching times turn out to be notably smaller.



*Figure 7.* The estimated means for participant combined watching behaviour for each day of study in minutes.

#### Correlations over time

Unlike the Type 3 Test for Fixed Effects on participant number, the fixed factor of time had only one significant association with the unintentional behaviour on YouTube (F (14, 280) = 1.725, p = .05). The hypothesis test turned out to be not significant for total (F (14, 291) = 1.048, p = .41) and intentional (F (14, 311) = .62, p = .85) behaviour on YouTube. Furthermore, the fixed factor was found to be not significant effect on the total (F (14, 300) = .994, p = .46), intentional (F (14, 297) = .836, p = .63), and unintentional (F (14,312) = .874, p = .58) on YouTube. Lastly, the Type 3 Test turned out to be not significant for any of the combined watching types, namely total (F (14, 300) = .835, p = .63), intentional (F (14, 293) = .872, p = .59), and unintentional.

The bivariate correlation analyses with the time point as an independent variable showed that none of the dependent variables are related to the day they were measured. Only one variable came close to achieving a satisfactory significance level in this regard. First, the unintentional watching behaviour on Netflix reached a correlation coefficient of 0.5 (p = 0.058). Still, looking at the respective graph (see *figure* 8), it is clearly visible that most of the average unintentional watching times vary between 8 and 20 minutes, with only day 1, 8 and 10 standing out. The measurement on Day 1, was concerning participants watching behaviour on Sunday 28<sup>th</sup> of April, Day 8 on Sunday the 4<sup>th</sup> of May and day 10 on Tuesday the 6<sup>th</sup> of May, one day after the Liberation Day.



*Figure 8.* The estimated means for participants unintentional watching behavior on PS-ODVSP and YouTube regarding each study day.

Most of the watching types on the respective streaming platforms were correlated with each other over time, while the total watching time on Netflix/Amazon Prime was strongly associated to the intentional watching time (r = .77, p = .001) as well as to the unintentional watching ( $r_s = .621$ , p = .013). On YouTube these associations were similar with a coefficient of .57 (p = .025) to intentional and of .568 (p = .027) to unintentional behaviour. In contrast, the intentional and unintentional watching behaviour on the respective platforms (YouTube:  $r_s = .229$ , p = .413; Netflix/Amazon Prime:  $r_s = .046$ , p = .869) were not related to each other, underlining the independence of watching behaviour from the time factor (see *figure 9*).



*Figure 9*. The estimated means for intentional and unintentional watching behaviour on YouTube and PS-ODVSP across time.

### Regarding Intra-Personal Behaviour - Individual Case Studies

Since participants watching behaviour is likely to vary throughout the study period, 3 exemplary individual cases were examined in detail to provide a better overview of within-subjects variations. The first case will deal with a participant who watched a lot of video content on YouTube, the second with someone who watched a lot of video content on Netflix/Amazon Prime and lastly, someone who had a high proportion of unintentional binge-watching. Since there is no data on the day's participants didn't manage to fill out the questionnaire, they will be omitted.

#### Case #1: High YouTube Consumption

Case #1 filled out the questionnaire on 9 of the 15 days. While he/she indicated to have not watched any video content on Netflix, the participant spent on average 195 minutes each day (SD = 96) on YouTube. The participant stated that he/she watched YouTube content on every of the 9 days. The participants lowest reported watch time was on Day 3 (Tuesday) with 75 minutes, and the highest on Day 2 (Monday) with 315 minutes (see *figure 10*). The YouTube watching behaviour was found to be predominantly intentional (82.9%; M = 161.6 SD = 93.3) with unintentional behaviour on only 2 of the 9 days (17.1%; M = 33.3, SD = 72.6) (see *figure 11*). Furthermore, Case #1 seems to have watched around 5.1 episodes (SD = 1.53) episodes a day, resulting in an average episode length of 37 minutes (SD = 13.65).





*Figure 10.* Distribution of watching behaviour types across study days (omitting day 4, 7, and 9 to 12) on YouTube and PS-ODVSP for case #1

*Figure* 11. Percentage of intentional and unintentional behaviour on YouTube and PS-ODVSP for case #1

#### Case #2: High Netflix/Amazon Prime consumption

In contrast, Case #2 indicated that he/she mostly watched Netflix video content (see *figure 12*). On average, the participant watched 225 minutes (SD = 84.6) of video content daily on both platform types of which 199 minutes (SD = 71.6) were spend on Netflix and 26 minutes (SD = 38.6) on YouTube. The lowest indicated watching time was 60 minutes on Day 1 (Sunday), while the highest watching time was 360 minutes on Day 14 (Saturday). Zooming in on the participants behaviour on Netflix/Amazon Prime, the proportion of intentional behaviour averaged at 68.8% (M = 137, SD = 71.59), resulting in an unintentional watching behaviour proportion of 31.2% (M = 62, SD = 54.9). Case #2's watching behaviour on YouTube turned out to be comparatively less intentional with an intentional proportion of 57% (M = 15, SD = 38.4) and an unintentional proportion of 43% (M = 11, SD = 19.1) (see *figure 13*). The participant watched around 6.24 episodes taking both platforms into account, with a slightly shorter mean episode length compared to Case #1 (M = 31.7 SD = 11.



*Figure 12*. Distribution of watching behaviour types across study days on YouTube and PS-ODVSP for case #2.

*Figure 13.* Percentage of intentional and unintentional behaviour on YouTube and PS-ODVSP for case #1

#### Case #3: High unintentional consumption

Finally, Case #3 stood out from the sample regarding his/her level of unintentional watching behaviour on which he/she reported on 13 of 15 days (see *figure 14*). On average, the participant spent approximately 182.3 minutes (SD = 83.48) on streaming platforms every day, 128 minutes (70.3%; SD = 65) of this being on Netflix/Amazon Prime and 54.23 minutes (29.7%; SD = 28.4) on YouTube. His/her lowest watching time was on Day 11 (Wednesday) with a total watch time of 30 minutes and the highest watch time on Day 15 (Sunday) with 330 minutes. Case #3's behaviour was predominantly unintentional (see *figure 15*) with a mean watch time of 73.8 minutes (57 %; SD = 52.8) on Netflix and 31.15 minutes (57.4%); SD = 27.7) on YouTube. The intentional watching behaviour on the other hand, only accounted for 43% (M = 54.23, SD = 22.53) on Netflix/Amazon Prime and 42. 6% (*M* = 23.07, SD = 15.75) on YouTube. The participants watched around 4.125 episodes a day with a mean episode length of 36.14 minutes (SD = 10.99). It is worth mentioning that this participant failed to indicate the number of episodes he/she watched one or multiple movies on 5 out of 13 days, so they had to be left out of the computation.



*Figure 14*. Distribution of watching behaviour types across study days (omitting day 9 and 14) on YouTube and PS-ODVSP for case #3.

*Figure 15*. Percentage of intentional and unintentional behaviour on YouTube and PS-ODVSP for case #3.

#### Substituting PS-ODVSP with Netflix and Amazon Prime

Comparing participants self-reported watching times with the combined watching time (see *figure 16*), one can clearly see that the measured watching time on Netflix/Amazon Prime and YouTube does close to fully account for peoples self-reported watching behaviour. The similarity between the two watching times is underlined by a very strong correlation of .942 (p < .001) as well as .757 (p < .01) regarding the association between self-reported and combined average video length. The time spend on other streaming platforms averaged at 8 to 9 minutes (SD=16.46) while being moderately correlated to the average episode length ( $r_s$  = .409, p < 0.005) and the self-reported total watching time ( $r_s$  = .335, p < 0.024). Furthermore, regarding the associations within subjects, the number of episodes watched correlated significantly with every watching type on Netflix and YouTube. Assessing the association throughout the study period, the number of episodes was only related to the total watch time ( $r_s$  = .62, p = .013), combined total watch time ( $r_s$  = .77, p < .001) and self-reported watch time ( $r_s$  = .657, p = .008). Again, this underlines that watch time on Netflix takes a huge part of the total watch time in this sample.



*Figure 16.* The estimated mean of participants self-reported data and the combined total watching time.

# Discussion

This study is one of the first using ESM to investigate peoples VOD watching behaviour across a 15-day span. As a follow up to the research of Riddle et al. (2017) the objective was to explore the prevalence rates of intentional and unintentional watching behaviour across participants and over time. Furthermore, the degree to which watching behaviour varies on YouTube and PS-ODVSP across participants, over time and regarding intentionality was examined.

Most importantly, strong evidence was found for a need to differentiate between YouTube and PS-ODVSP. This was due to the fact, that PS-ODVSPs were utilized notably more extensively and frequently throughout the sample. Also, a high average watch-time on one platform indicated a low watch time on the other. Furthermore, the within group watching behaviour varied immensely, exposing VOD watching as an inconsistent behaviour across the population. Also, the findings gave reasons to believe that the intra-personal variance might be highly fluctuant as well. Moreover, the estimated group behaviour did not vary across study days. Lastly, there was evidence for the claim that a definition via episodes should not be completely disregarded.

On average, participants watched about 68 minutes each day or 1.92 episodes a day with a mean episode length of 41.5 minutes. These findings are in line with the results of current research. Steinbach (2018) and Lauhoff (2018), who conducted a similar study (n=23) with regard to the effect of binge-watching behaviour on students, reported a slightly higher daily streaming content consumption of 1.42 hours (85 minutes) throughout their population and a slightly lower average watched episode number of 1.49.

69% of the mean watching time was spend on PS-ODVSP, indicating that in this population Netflix and Amazon Prime were representing the preferred platform type. The fact that PS-ODVSPs was related to the combined total watch time whilst YouTube was not, underlines how dominant the platform type was among the population. Only two participants spend over 50 minutes on YouTube every day, while nearly half of the viewers on Netflix and Amazon Prime watched more than 50 minutes of VOD content on PS-ODVSP each day. In other words, high watching times appeared to be more prevalent on PS-ODVSP.

This prevalence might be due to structural differences between the two platform types. Netflix and Amazon Prime offer plenty of professional successive series-episodes to watch while YouTube has its focus on disjointed entertainment videos, such as tutorials or individual video projects. Consequently, participants might experience different types of involvement with the story and characters, which has been indicated to be a crucial influence on VOD series binge-watching (Exelmans & Van Den Bulck, 2017; Mikos, 2016). Even so, it might be that the sample contained people that did not watch a lot of YouTube content in general (only 20 people had a mean watch time over 10 minutes a day). Hence, the found effects might be due to selection bias. Future studies are advised to draw a bigger sample to get more representative data.

The post-hoc bivariate correlation analysis showed that both, the total watching behaviour YouTube and PS-ODVSP, was related to the two watching behaviour types (intentionally/unintentionally). Additionally, the watching behaviour on one platform type was not related to the watching behaviour on another platform type. Hence, if someone watches a lot of content on YouTube, there is no evidence that he/she will do the same on PS-ODVSP or vice versa. One exception needs to be made since it seemed like participants with heightened levels of PS-ODVSP or YouTube consumption consumed less VOD content on the other respective platform. Possible explanations might be people's personal platform preferences or the fact that participants did not have the time to watch on two platforms. The latter assumption is underlined by the fact that the extent of watching behaviour has been related to one's available free time (de Feijter et al., 2016). Another explanation might be through the theory of flow. Whilst being in the flow state, participants are less likely to stop their behaviour and start something feelings (Panda & Pandey, 2017). However, the negative correlation stressed the need to differentiate between platform types whilst investigating the binge-watching phenomenon or watching behaviour in general. Hence, future researchers are advised to generalize their findings to only those platforms they have conducted the research on and to measure them separately.

With respect to binging behaviour, it is worth mentioning that most people did not fit the bingewatching definitions or cut-off scores of other studies. While 48.8% (n=22) of the participants would be identified as binge-watchers if one applied the cut-off score of watching 2-3 episodes a day, no one watched more than 3.75 hours, hence underscoring the 'heavy binger' definition of 6 hours by Foss and Alexander (1996). Walton-Pattison et al. (2018) found that an average binging session in their population (n = 86) took about 2.51 hours, which would identify about 6.6% (N=3) of this studies participants as bingewatchers. Furthermore, according to the definition, watching behaviour occurred on 15.2% (n = 89) of the measured days. Horvath (2004) reported a similar proportion, stating that 'only 17 out of 136 college students indicated themselves to be addicted' to VOD content. On average, most participants showed moderate to low levels of watching behaviour while a few individuals showed a very high level of average daily watching time. This has been a reoccurring finding in past research(Steinbach, 2018; Flayelle et al., 2017), indicating that VOD watching might be an problematic behaviour to a minority of people.

Many of the participants in this sample were Psychology bachelor students, currently writing their bachelor thesis. Hence, the moderate average watching times might be due to the pressure of the final

deadline. Respondents might have postponed their binging habits until after the graduation. As Flayelle et al. (2017) indicated, people appear to be able to easily abstain from watching VOD content provided that they can watch at a later time. Considering that similar results have been found by Steinbach (2018) and Lauhoff (2018), it is safe to assume that a majority of people have control over their watching behaviour.

As indicated by the high standard deviations of estimated means on SB-ODVSP and YouTube, people's average amount of watching time varied across the population. This result is in line with findings of Steinbach (2018), Lauhoff (2018), Touleau et al. (2016), and Maraz et al. (2015), who reported that binge-watching or watching behaviour in general is not a consistent behaviour for individuals and in between participants. Variations of participant behaviour in this study were found in the total watching time, the preferred streaming platform, and the intentionality of watching behaviour. For example, while one participant watched 225 minutes of daily VOD content on average, others settled at 6 minutes a day. Some people spend a moderate amount of their watching time on both platform types, while others focused on one. A few participants solely exercised intentional watching-behaviour, while others behaviour remained predominantly unintentional.

Furthermore, the high standard deviations of the individual case studies as well as the diverging minimal and maximal watching times suggested that the within subject differences seem to be variant as well. A possible explanation for the variation could be that participants do not tend to binge-watch two days in a row (Touleau et al., 2016). Overall, an individual's day to day behaviour is likely to vary as well as the behaviour within the studied group. This facilitates the recommendation of Flayelle et al. (2018) that research on VOD watching behaviour needs to be kept exploratory to learn more about the complex behaviour.

The watching behaviour was significantly accounted for by variations across the population rather through variations related to the measured day. As the Type III Test for Fixed effects illustrated, all the dependent variables (total, intentional, and unintentional watching time on YouTube and PS-ODVSP) were significantly related to the fixed factor person, while only one test (unintentional watching time on YouTube) turned out to be significant for the fixed factor time. As a possible explanation, it has been suggested that an individual's watching-behaviour is dependent on the amount of free time he/she has at his/her hands (de Feijter et al., 2016; Riddle et al., 2017). This assumption is facilitated by participants heightened combined average watching time on leisure days. The three days with the highest watching time were two of three Sundays covered in the study and the day after the Dutch national holiday 'Liberation Day'. One might assume that the participants joined the party and took a day off after coming home late. Similar findings have been reported during the Easter Holidays (Steinbach, 2018; Lauhoff, 2018). These findings underline the earlier made proposal that participants watching behaviour

throughout the study might be low because of the Bachelor thesis. Future research can attenuate for the effect of Holidays in the population through extending the study period.

Due to the dominance of YouTube, Netflix, and Amazon Prime on the western market, it was assumed that the watching behaviour on these platforms should account for most of a participant's actual watching time. The combined total, intentional, and unintentional watching time were strongly correlated to the self-reported watching time. On average, only 8 to 9 minutes were spent on other platforms which reaffirms that the produced difference to respondent's actual watching time is marginal. In fact, only four people watched on other platforms, none of them exclusively. Moreover, every participant indicated to watch at least on one of the investigated platforms, underlining that YouTube, Amazon Prime, and Netflix are indeed frequently established across the population.

As mentioned above, the Experience Sampling Method (ESM) was utilized to repeatedly measure participants behaviour across the study period. The fact that participants filled out the questionnaires on their mobile devices lowered the measures intrusiveness and therefore aided the ecological validity (Berkel et al., 2017). While Scollon et al. (2003) as well as Berkeley (2017) warned against a high burden for participants through the ESM and a resulting problem of participant retention and careless responses throughout the study, only one person had to be omitted form the dataset due to a low response. In fact, participants overall response rate throughout the study was very high (86%), undermining the common problem of missing data in ESM studies. In comparison, the average response rate reported by Berkel et al. (2017) was notably lower at 69.6% (SD = 22.8%). On another note, it is possible that the data quality might have suffered since the researcher did not account for factors such as atypical smartphone usage, or suspiciously fast completions of the questionnaire. Especially the latter could have been used as an indication for careless respondents. Nonetheless, in line with the findings by Myin-Germeys et al. (2009) the utilization of ESM to study participants watching behaviour in the future is strongly recommended.

To sum it up, it can be said that most of the participants time was spend intentionally and on Netflix or Amazon Prime. The huge variations in the population might be explained by their amount of available free time and personal preference. EWB or binge-watching was not a common behaviour in this sample. Overall, the watching behaviour on PS-ODVSP and YouTube did not seem to be related, hence it is suggested to differentiate the two in future research.

#### Limitations

There were some limitations regarding the data analysis. The analysis was conducted predominantly through Linear Mixed Modelling. Maruyama (2008) stated that while LMM is a powerful and flexible tool for longitudinal data, approximations used to estimate model parameters increase the

number of made assumption. Hence, the probability that the estimated means were biased increased. Furthermore, the analysis did not account for covariates while computing the estimated means. Hence, the probability for random error through unexplained variances might have skewed the computed values. Also, by estimating a mean value, the LMM the subject specific information retrieved through the repeated measures is lost (Verbeke & Molenberghs, 2004). A possible alternative could have been to analyse the data with a series of ANOVA and regression analysis. Nonetheless, since LMM can deal with missing data, it does not have the problems of traditional statistical methods, commonly associated with an incomplete dataset (Lauhoff, 2018). Additionally, Bauer et al. (2013) postulated that statistical models, such as ANOVA and linear regression assume independent observations and are therefore not suitable for nested and hierarchical repeated measurements.

It was found that the number of watched episodes was very strongly related to the total watching time. Therefore, the assumption posed in the introduction that the definition of watching behaviour via episodes is insufficient needs to be withdrawn. The same result was found in the study by Steinbach (2018) and Lauhoff (2018). Nonetheless, the critique of a measurement via episodes remains. Especially in case that a study focuses the behaviour on a streaming platform with highly variant content, such as YouTube, the number of episodes and total watch time might differ immensely. Future studies should focus on both to increase the reliability of their measurement.

A frequent problem in psychological research is the reliability and validity of self-reported data. In this study participants might have lost track of their time during watching sessions due to the state of flow, which could have led to problems of recalling past behaviour the following day. Additionally, the categorization of Riddle et al. (2017) has been criticized, since it might be hard for the participant to differentiate whether he is engaging in intentional or unintentional behaviour (Flayelle et al., 2018), especially in retrospective. Having in mind that participants might report a lower watching time to avoid being connected to the negatively connotated binge-watching (or unintentional) behaviour, the degree of unintentional watching behaviour could have been underestimated.

Considering possible influences on the participants, the effect of reporting ones intentional and unintentional watching times might have had an interventional impact. By encouraging respondents to repeatedly thing about their daily watch-time they might have been led to become more aware of their unconscious watching behaviour. This in turn could have triggered a cognitive dissonance effect which in turn lowered their daily unintentional watching time.

The study might have fallen victim to different types of selection bias. Most participants were psychology students who were predominantly friends or family of the researchers. Furthermore, the majority is currently writing their bachelor thesis which could have limited their free time and in turn their

normal VOD consumption significantly. This is supported through a very low average YouTube watching time of 21 minutes. The reported average watching time settles around 40 minutes per watching session (Omnicore Agency, 2018). Also, it might be that participants felt the need to report a lower watching time to avoid being connected to the negatively connotated binge-watching behaviour.

Finally, the findings of this study do not account for all cultures. Considering the study of Ahmed (2018) in the United Arab Emirates, it becomes clear that different cultures prefer different streaming platforms. Since this sample consisted out of mainly German students, the findings are most likely only generalizable to this population group. It might be that there are other cultural differences in binge-watching that yet need to be explored.

#### Future research

This study was the first one investigating the watching behaviour regarding different platforms and provided prevalence rates for intentional and unintentional behaviour. Most importantly, future research is advised to conduct their studies with regard to the VOD platform type they are utilizing. Most importantly, platforms with different concepts (such as YouTube and PS-ODVSP) need to be measured separately, to avoid a biased evaluation.

Having the current state of research on VOD watching behaviour in mind, it is crucial to increase the significance of the mentioned findings through repeating or expanding the conducted study. For example, a possible approach could be to extend the time participants are monitored to several weeks or even months. While the prevalence rates of intentional and unintentional behaviour across YouTube, Netflix, and Amazon Prime have been illustrated above, the findings of the current study indicate that time does not have a significant influence on peoples watch time. It needs to be investigated whether this is the case for a longer period.

Furthermore, the research on VOD watching behaviour should be kept exploratory, rather than mindlessly trying to develop definitions and cut-off scores for phenomena such as binge-watching. By means of that, the screening of VOD watching behaviour as a whole provide a scaffold on which specific phenomena can be effectively investigated and explained.

While the categorization into intentional and unintentional behaviour has been mentioned in some studies (Riddle et al., 2017; Rubenking & Bracken, 2018; Walton-Pattison et al., 2018), it is likely that peoples watching behaviour is too complex for a simple differentiation into only these two categories. Reinforced by the fact that peoples watching behaviour has been proven to be divers, the discovery of other relevant factors is crucial. In line with Flayelle et al. (2018), it is suggested to continue using an exploratory approach to investigate other VOD watching types. Additionally, with respect to the research

of Steiner & Xu (2018), it could be beneficial to apply a slender spectrum to the idea of intentional watching behaviour.

Across the studied population VOD seemed to be a controlled and intentional habit for most viewers, with some exceptions. Hence, future studies could sample a group of people who indicate that they regularly commit to excessive watching behaviour, have problems controlling their video consumption, and report to be negatively affected through their watching behaviour. By means of that, it might be possible to explore possible red flags and problematic watching behaviour more aimed and efficiently.

Overall, this study has added to the small pool of scientific research on VOD watching behaviour. In the future, similar studies should be repeated to account for selection, environmental, and situational biases and changes. As indicated in the *Introduction*, the technological development is striding forward, and the world of research needs to continue exploring its effects.

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# Appendix

Appendix 1.1 Confirmatory E-Mail Hey there!

Thank you very much for agreeing to participate in our study about the "Antecedents and Consequences of Binge-watching"!!! This project will be conducted from the 29th of April until the 13th of May (2 weeks in total). In general, our goal is to explore the sparsely researched topic of binge-watching. Most importantly, in order to participate in this study, it is necessary that you follow the steps in the "What You Need To Do" section. We recommend you mark this Email as "important" in your inbox, so you can easily find it again.

What you need to do:

In the next 2 weeks, you need to answer four different questionnaires a day at:

- 09:00 a.m. (2 questionnaires; max. 5 minutes)
- 03:00 p.m. (max. 2 minutes)
- 09:00 p.m. (max. 2 minutes)

Conveniently enough, this will be done via the TIIM app. In order to participate in this study, you need to click on the subscription-link down below and download the TIIM app in the respective app store:

1. Click on the following link to enrol and register with your full name and Email address, you can choose an own password, which you will use to login in the TIIM app

- $\rightarrow$  https://app.tech4people-apps.bms.utwente.nl/enrol/KZgBQ
- 2. Download the TIIM app
- $\rightarrow$  Google Play Store:

https://play.google.com/store/apps/details?id=nl.bmslab.utwente.tiimapp

→ iTunes App Store: https://itunes.apple.com/de/app/tiim/id1229896853?I=en&mt=8

- 3. Open the App
- 4. Log in with your Email address and your password
- 5. Make sure your notifications for this app are turned on

If you have not registered until the 29th of April at 08:00 in the morning, you won't be able to participate in the study. You should receive the first notification at 9:00 a.m. on the 29th of April. If you do not get any questionnaire around 9:00 a.m., please contact us instantly.

The questionnaires are going to take you max. 8 minutes in total each day. It is crucial that you answer the questionnaires regularly. We will send you notifications to remind you of the questionnaires, but it is very important that you check your phone around the times mentioned above.

If you have any questions, comments, or doubts about the study feel free to contact us at f.cordts@student.utwente.nl. We will reply as soon as possible.

Best regards,

Hannah, Josefine, Laura, and Florian

# Appendix 1.2 Informed Condent

#### **INFORMED CONSENT**

Florian Cordts, Laura Seifert, Josefine Sundermann, Hannah Troles
Contact: f.cordts@student.utwente.nl, h.troles@student.utwente.nl
1st supervisor: Dr. P. M. ten Klooster
2nd supervisor: Dr. M. E. Pieterse
Antecedents and consequences of binge-watching: an experience sampling study

#### PURPOSE OF STUDY

Before you decide to participate in this study, it is important that you understand why the research is being conducted and what it will include. Please read the following information carefully. Please ask the researchers if there is anything that is not clear or if you need more information. The purpose of this study is to find out more about online television watching using video on demand streaming services. Due to the increasing popularity of for example Netflix, Amazon and Youtube, watching online series and movies becomes more frequent, especially among university students. Within this study we want to learn more about binge-watching behaviour with focusing on whether it is more intentional, whether there exist any gender differences, whether it has an impact on your mood states and well-being and finally whether it interferes with your daily life activities.

#### STUDY PROCEDURES

If you participate in this study, you have to fill out one questionnaire concerning your demographics and four questionnaires including questions about your behaviour and mood related to your television watching behaviour, and questions concerning your mood and emotions in general.

For this, you will be asked to download the TIIM application on your mobile device. You will use this application for a period of two weeks to answer short daily questionnaires (approximately 3-5 minutes). For the purpose of this study, it is important that you answer the questionnaires in the given time frames. Make sure that you have switched on your notifications on your mobile device, as you will receive a notification on your mobile device about when to fill in the questions.

### CONFIDENTIALITY

The information that we collect from this research project will be kept confidential. This means that only the researchers have insight into your answers. All personal data (such as e-mail,

age, gender etc.) will be anonymized and will not be published and/or given to a third party.

### **CONTACT INFORMATION**

If you have questions at any time about this study, you may contact the researchers.

### **VOLUNTARY PARTICIPATION**

Your participation in this study is voluntary. You are free to withdraw from this study at any time and without giving a reason.

### CONSENT

I have read and understood the information provided and had the opportunity to ask questions. I understand that my participation is voluntary and that I am able to withdraw at any time, without a reason or cost. I hereby voluntarily agree to take part in this study.

AGREE

DISAGREE

# Appendix 1.3 Baseline Questionnaire

Slide 1 Slide 2 Slide 3 Slide 4 Thank you for participating! Please indicate your Please indicate your nationality. Please indicate your age. gender: Before we get started we would like to ask you some basic questions. Type your answer here Male Dutch If you have any questions feel free to cor (f.cordts@student.utwente.nl) German E Female Other Other Slide 5 Slide 6 Slide 7 Slide 8 Please indicate your Generally, I am in a better mood after binge-Which video-streaming-Make sure to check your platform(s) do you use on a weekly basis? occupation. phone every now and then! watching. ations for this app D pupil YES, I PROMISE student Netflix strongly agree employed full time VouTube agree employed part-time Amazon Prime neither agree nor disagree unemployed Hulu disagree D Other HB0Go/HB0now strongly disagree Other

### Appendix 1.4 Daily questionnaire



