The Relationship between Loneliness and Binge-watching over time: An Experience Sampling Study of Video-on-Demand watching

Bachelor Thesis

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Abstract

Background. The usage of Video-on-demand services (VoD) is becoming highly popular in recent years. This increasing consumption has led to the well-known phenomenon of binge-watching. To date, little is known about the various consequences and predictors of excessive watching behaviour. This study examines the temporal relationship between loneliness and binge-watching behaviour by using experience sampling method (ESM).

Method. The study involved 74 participants, who answered daily questionnaires targeting their mood and watching behaviour over the course of 15 days using an application called Ethica on their smartphone. On day 1, respondents were asked to answer a baseline questionnaire using the De Jong Gierveld Scale to measure their trait loneliness. Individuals were then asked daily to answer questions about watching behaviour as well as their momentary perceived level of loneliness. Level of loneliness was assessed two times a day, while yesterday's watching behaviour was assessed once a day. In this study, binge-watching was defined as watching at least 3 episodes and at least 2 hours in one sitting. Linear mixed models (LMMs) were used to analyse the longitudinal data.

Results. Loneliness was a significant predictor of binge-watching on the same day (β= .07, *SE*= .04, *p*= .04). The number of hours and episodes watched were also significantly predicted by loneliness (β= .08, *SE*= .04, *p*= .03; β= .07, *SE*= .03, *p*= .02). Loneliness was not a significant consequence of binge-watching, meaning that people did not feel lonelier the next day after watching VoD content. Furthermore, analyses revealed that associations between loneliness and VoD watching over time were not trait-like driven, but rather state-like driven.

Conclusion. The findings indicate that participants may have other motivations for watching VoD services than loneliness due to the very low average scores for loneliness. Also, results suggest that momentary loneliness predicts more binge-watching, but binge-watching does not predict higher or lower levels of loneliness the next day. Therefore, increased streaming on VoD platforms can be seen as a potential coping strategy for feelings of loneliness that should be further explored.

Keywords: Loneliness, video-on-demand, binge-watching, experience sampling method, ESM.

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1. Introduction

1.1 Emergence of VoD-services

"Just one more episode", who hasn't had this thought? Nowadays, the use of streaming services is more popular than ever. Many decades ago, when linear television came out, it was the number one invention to entertain people. Since then, television broadcasting has gone through various transformations from black and white to colour and 3D. According to Mikos (2016), classic linear television is still important, but for some viewers, it has evolved from a primary medium to a secondary medium. Especially in recent years, society has shown a shift in the use of television to video streaming options. Besides, the number of traditional TV viewers has visibly decreased, whereas the number of viewers of online streaming services is rapidly increasing (Mikos, 2016). Altogether, video-on-demand (VoD) services and online TV act as a kind of replacement for traditional TV (Brandon, 2020). This can be seen in particular in developed societies, where people's media consumption patterns have changed dramatically since the beginning of the twentieth century. Nowadays, there are many people who rely on their smartphones, tablets or laptops and not only need them for work but also use them for many different forms of entertainment. As reported by Ulrich (2016), one study revealed that for around 60% of respondents, living a life without digital-technical devices is no longer conceivable. Hence, in a world where most people can no longer imagine life without the internet, there are many resulting new activities to enjoy, such as watching many different series, films and documentaries that can be streamed online.

1.2 Streaming Platforms

The invention of streaming TV content already started in 1990, but it was revolutionised and popularised by different companies like Netflix, Amazon Prime and Youtube. Unlike broadcast television, streaming has the advantage that members can have unlimited accessibility and watch entire seasons of series anytime and anywhere (Osur, 2016; Matrix, 2014; Pittman & Sheehan, 2015). Before these streaming services existed, individuals usually had to wait a whole week to watch the next episode of their favourite series (Rubenking & Bracken, 2018). Interestingly, McCarthy (2018) points out that already 74 per cent of US households had at least one form of video streaming service in 2019.

The currently most popular of all streaming services is Netflix, followed by Amazon Prime and Hulu. A new service called Disney+ was released in late 2019 and is already the fourth most used platform (Buchholz, 2020). At the end of 2020, Netflix reported an estimated total of 204 million global subscribers (Stoll, 2021). The Corona crisis, which has resulted in multiple lockdowns so far, has had an accelerating impact on time spent streaming series. A survey found that 75 per cent of respondents (mostly people younger than 35) now watch more streaming content than before the pandemic (Barney, 2020). One month after the start of the pandemic in March 2020, time spent on subscribed streaming services even doubled in April (Rajan, 2020). The increasing popularity of streaming services has also popularized a new phenomenon, so-called binge-watching.

1.3 Definition of Binge-watching

The term "binge-watching" has been around since 2003 but has only been in common use since 2012 (ProCon.org, 2020). By 2013, the phenomenon of binge-watching had become so common in everyday language that the term "binge-watch" was included in the Oxford English Dictionary. One general conceptualization that is often used for binge-watching is "watching multiple episodes of a series in a row" (Joswiak, 2020; Erickson et al., 2019). The concept was originally coined by the popular media and not by science. Therefore, finding the right and uniform definition of binge-watching in scientific research has proven difficult. A review by Flayelle et al. (2020) discovered that nearly 20 different definitions have been used in the examined studies to date. Netflix's own definition of binge-watching is also the most widely used definition of binge-watching in research and defines it as "watching 2-6 episodes of the same TV show in one sitting" (Jenner, 2018). However, this definition does not take into account the different length of episodes as they vary from show to show (Davis, 2016). Another definition that differs from the one above and focuses on the length of watching, is that of Jenner (2016), who defines it as "watching three or more hours of a series in a single sitting". What all definitions have in common is that a particular program is watched over several hours in one session, but the number of hours and the duration varies from definition to definition (Riddle et al., 2017; Pittman and Sheehan, 2015; Jenner, 2016; Ahmed, 2017). Therefore, it is difficult to determine a valid cut-off for the notion of binge-watching.

Besides the difficulties in defining a cut-off for binge-watching, the term itself is also rather paradoxical, as bingeing is rather negatively preloaded by other behaviours such as "binge-eating"

or "binge-drinking". According to Ramsay (2013), the term is misleading, because it is also not common to say for instance "binge-reading". Furthermore, it implies that binge-watching necessarily concerns excessive and psychologically as well as physically unhealthy consumption, because bingeing can be described as a form of abnormal, excessive and non-standard behaviour (Jenner, 2017). Therefore, apart from the most popular term "binge-watching", it has also been referred to as "marathon viewing" (Sung et al., 2018) to avoid this negative connotation.

Nonetheless, binge-watching is a relevant topic in contemporary psychological research, as it is often assumed to result in harmful physical and psychological consequences (Flayelle et al., 2020; Starosta & Izydorczyk, 2020). Several studies to date have investigated whether it is possible to identify health-related consequences and potential predictors of binge-watching.

1.4 Consequences of Binge-watching

Just like the several potential predictors of binge-watching, there are also many potential consequences, both mental and physical, that can result from this behaviour. What is already known from recent systematic reviews is that several previous studies have investigated binge-watching and its consequences, but that most studies also have their drawbacks. First of all, research on the consequences of binge-watching has mostly taken a confirmatory approach, focusing only on the potential harmfulness and negative symptoms (Flayelle et al., 2019). This has implications for understanding the binge-watching phenomenon, but more exploratory approaches could overcome this barrier and contribute to a broader understanding of the concept (Flayelle et al., 2019). Secondly, the disadvantages of cross-sectional surveys and qualitative studies mentioned above can also be applied to studies exploring consequences. Such studies are often unable to demonstrate long-term effects or temporal relationships between binge-watching and potential consequences (Sedgwick, 2014; Broeder & Donze, 2010).

By looking at some consequences of binge-watching, watching behaviour can be seen to positively increase social interaction (Panda & Pandey, 2017). Conversely, excessive binge-watching can also have the opposite effect, namely isolation. As a result, social withdrawal can in turn cause feelings of loneliness (Kilic, 2020). Moreover, there are discrepancies and inconsistencies between the results of previous studies. Some studies did indeed show that watching over several hours can lead to more negative feelings like anxiety, depression and loneliness (Tukachinsky & Eyal, 2018; Ahmed, 2017; Panda & Pandey, 2017). Binge-watchers

often feel a sense of sadness after finishing their favourite show and therefore experience a kind of post-binge blues (Rubenking et al., 2018; Downey, 2018).

On the other hand, Tefertiller and Maxwell (2018) concluded in their elaborate study that there is a negative relationship between depression and binge-watching, but no relationship between self-control, loneliness and binge-watching. All these contradictory findings point to the need for further exploratory research on the predictors and outcomes of binge-watching behaviour.

1.5 Motivators of Binge-watching

Despite the lack of a uniform definition of binge-watching, researchers have found that there are many different motivators that lead people to binge-watch. Based on a systematic review by Fayelle et al. (2020), it was found that from the 24 articles analysed, around 25% dealt with the identification of binge-watching motivators. Several qualitative studies were executed in order to get a clearer understanding of what causes binge-watching behaviour (Panda & Pandey, 2017; Vaterlaus et al., 2019). The disadvantage of such studies, however, is that they often do not provide strong evidence, as it is not a statistically representative form of data collection (Broeder & Donze, 2010). Other studies have mainly used cross-sectional surveys to examine binge-watching more closely. However, such studies have the limitation that no causal or temporal relationship can be determined and that long-term effects cannot be studied (Sedgwick, 2014).

Looking more closely at possible motivators, there are several internal factors that drive people to engage in this activity, in addition to the external facilitators or the services themselves (e.g., opt-out system, auto-play, recommendation systems) that can trigger binge-watching behaviour (Osur, 2016; Matrix, 2014; Pittman & Sheehan, 2015). For instance, some binge-watchers use this remedy to distract themselves from everyday life or deal with loneliness (Flayelle et al., 2019; Starosta et al., 2019). Recent findings by Merrill and Rubenking (2019) show that a lack of self-control and self-regulation are possible predictors for binge-watching as people are more likely to binge-watch because they find it difficult to switch off (Tukachinsky & Eyal, 2018). The systematic review of Flayelle et al. (2020) revealed that some personality traits such as high impulsivity, high neuroticism and low consciousness are also possible indicators for excessive binge-watching behaviour.

A specific theoretical explanation in terms of motivators is the Uses and Gratification (U&G) framework of Elliot and Quattlebaum (1979). It states that media users have specific goals

and desires that they are continuously striving to satisfy by engaging in a variety of mass media activities (Panda & Pandey, 2017). Originally based on traditional media, the U&G framework can be adapted to digital media and shows that people use streaming services to meet different needs and desires. On the one hand, there are the "lone wolves" who watch series to relieve loneliness and find companionship, while on the other hand there are the "social animals" who watch series to enjoy the company of others (Panda & Pandey, 2017; Pittman & Tefertiller, 2015). This suggests that the predictive role of loneliness may be complex or even contradictory.

1.6 Binge-watching and Loneliness

One potential predictor or outcome of binge-watching may be loneliness. Since the feeling of loneliness is not abnormal and even natural at first, higher values tend to become a problem. This is why some studies have already investigated the association between binge-watching and loneliness. Nevertheless, there are conflicting findings with regards to binge-watching and loneliness in existing literature. A previous study by Sung et al. (2018) concluded that loneliness was positively related to and a predictor of binge-watching because viewers tend to binge-watch more to cope with loneliness, which is also supported by a cross-sectional survey of Dixit et al. (2020). Similar findings of Sun and Chan (2021) revealed a positive association between binge-watching and an increased risk of loneliness. In contrast, some other researchers such as Ahmed (2017), and Tukachinsky and Eyal (2018) found no correlation between binge-watching and loneliness. Although there is a large body of research focusing on the trait loneliness, little is known about how loneliness is experienced in daily life (i.e. the state levels of loneliness). Yet, one longitudinal study discovered that state loneliness is dependent on both social context and temporal characteristics (Van Roekel et al., 2018).

Most studies so far on the relationship between loneliness and binge-watching have used cross-sectional study designs to examine loneliness and binge-watching. In those studies, they measured both binge-watching and loneliness retrospectively over a certain period of time, based on memories (Starosta et al., 2019). The limitations of this procedure are possibly inaccurate and biased estimates of behaviours and feelings and the measurement of feelings as a trait-like variable (Scollon et al., 2003; Starosta et al., 2019). This results in an inability to account for the fluctuating nature of both behaviours and state-like feelings. Therefore, it is difficult to draw clear conclusions about the associations between trait or state levels of loneliness and binge-watching in daily life.

Also, such studies are not able to distinguish between the temporal nature of loneliness as either a predictor or consequence of binge-watching.

Therefore, several researchers suggest that current findings related to loneliness and binge-watching are limited and that future research should focus more on longitudinal or experimental research designs (Wheeler, 2015; Sun & Chang, 2021). Particularly experience sampling, an emerging type of observational longitudinal intensive measurement, could provide additional insights into the temporal relations between binge-watching and loneliness.

1.7 Experience Sampling Method (ESM)

ESM aims to obtain self-reports of people's current lives for a representative sample of participants over an extended period of time (Csikszentmihalyi & Larson, 2014; Larson & Csikszentmihalyi, 2014). As reported by Scollon et al. (2003), one major advantage of ESM is that it relies less on retrospective memory of the participants, thus reducing the likelihood of recall bias. In addition, the method does not depend on a single measurement of behaviours or feelings, but repeated measurements are taken in several situations. These provide more insight into the variation of a variable in relation to many different contexts (Larson & Csikszentmihalyi, 2014). Other assumed advantages of ESM as opposed to, for instance, a one-time survey are that it can provide more accurate estimates of behaviours, changes in behaviours and associations between different, time-varying variables over time (Verhagen et al., 2019). Lastly, this sampling method provides a more representative picture of the participants' daily lives (Scollon et al., 2003; Larson & Csikszentmihalyi, 2014). ESM study designs are becoming increasingly popular among researchers because they seem to overcome some of the limitations of earlier methods and because of technological advances that now make it easy to conduct these studies in real life using people's smartphones.

ESM may be particularly useful for examining both binge-watching and loneliness, as both can fluctuate significantly over time and loneliness could be both a predictor and an outcome of binge-watching behaviour. Hence, the current study used ESM to provide a more detailed look at binge-watching behaviour and its possible motivators and consequences over a period of time.

1.8 Aim of the Study and the Research Questions

The study aimed to explore in more detail the temporal relation between loneliness and binge-watching among participants over time using the ESM. Due to the lack of evidence on how these concepts change over time and whether the associations are more state or trait-like related, the following two research questions were examined:

1. How do binge-watching behaviour and perceived loneliness co-vary over time?

2. Are associations between binge-watching and perceived loneliness more trait-like or state-like driven?

The study additionally investigates the potential impact that loneliness may have on binge-watching behaviour and, conversely, whether binge-watching has a potential impact on loneliness. Therefore, two further research questions were formulated as follows:

3. How is participants' perceived loneliness the next day related to their binge-watching behaviour the day before?

4. How is the participants' perceived loneliness related to their subsequent binge-watching behaviour on the same day?

2. Methods

2.1 Design

An ESM study design was applied to measure daily VoD behaviour and different potentially related momentary variables (e.g. stress, loneliness, snacking behaviour) of participants over time. This study was part of a larger project of a total of six third-year psychology students' bachelor's theses. Ethical approval for this study was granted by the Ethics Committee of the University of Twente on 23/03/2021 (210327).

The two-week study started on 07/04/2021 (day 0) and continued until 22/04/2021 (day 15). The registration day (day 0) was added to ensure that all participants started on the same day to maintain consistency and to prepare them for the upcoming questionnaires. Previous ESM studies have shown that a duration of about 2 weeks is a suitable time period to achieve a good response rate and to achieve feasibility (Conner & Lehmann, 2012). In addition, this period is the most common for ESM studies and allows for a closer look at the temporal frequency of behaviours such as binge-watching (Conner & Lehmann, 2012). Data collection began the day after participants received the invitation by completing a demographic and baseline questionnaire (Day 1). Both, and especially the second one, were more extensive and took more time than the daily questionnaires, as they dealt with general information and trait measurements. On day 2, the actual ESM measurements started with daily measurements twice a day. In total, each participant received 30 surveys during this period.

Data was collected using an app called Ethica (https://ethicadata.com/). Ethica is a research platform specifically developed for ESM studies that enables researchers to measure human behaviour using a variety of self-created survey options. In order to take part in this study, only a mobile device was needed for participants to download the app and register themselves. This was also explained to the participants by the researchers in advance in a recruitment email. All information required for this study, such as informed consent and the respective questionnaires, are included in the app. To ensure that participants did not forget to fill in the questionnaires, they were asked to turn on the notifications on their smartphone to receive in-app reminders regularly to complete the measurements. In addition, the progress of the study could be monitored at any time by the researchers in the Ethica dashboard.

As part of the ESM, an interval-contingent sampling design was used to administer the daily assessments. This means that the current emotional states, as well as the behavioural assessment, were asked at fixed and regular times during the day, scheduled for morning and evening (Conner & Lehmann, 2012). This has the advantage of being able to compare the daily assessments of the different days later in the analysis. There were a total of two measurements per day to measure state feelings. Two daily measurements were chosen to avoid participants being overwhelmed with too many assessments, which could lead to certain analyses not being carried out due to a possible lack of data (Conner & Lehmann, 2012; Palmier-Claus et al., 2019). Binge-watching behaviour of the previous day was measured retrospectively only in the first survey of each day to get detailed information about yesterday's watching behaviour.

Figure 1 shows an outline of the study design, with day 0 as the registration day, where participants registered themselves for the study, provided informed consent and prepared for the upcoming research. Day 1 consisted of the completion of the demographic and baseline questionnaires. Days 2 to 15 included the repeated daily data collection twice a day.

Figure 1.

Timeline of the study design
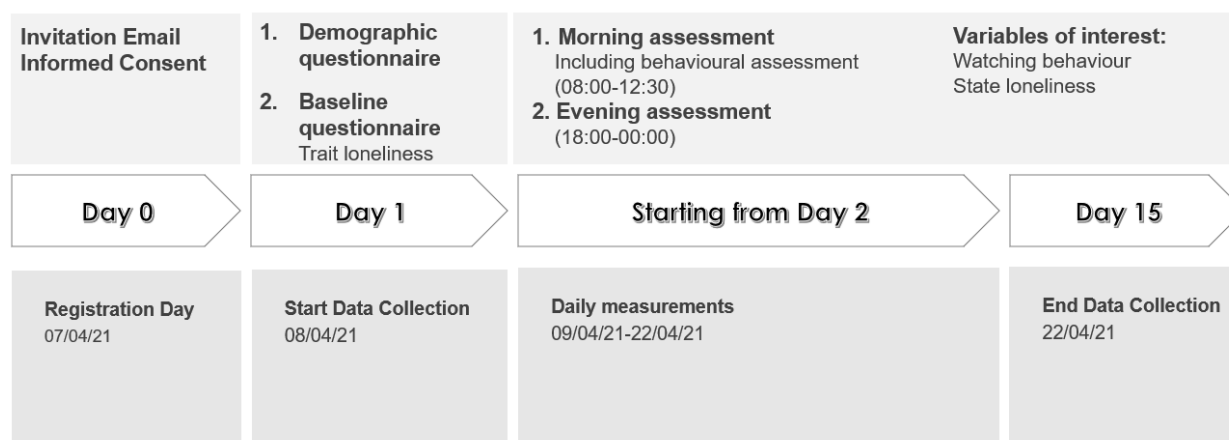
2.2 Participants

The requirements for participation in this study were that participants could read sufficient English, owned a smartphone and were at least 16 years old. The method used to recruit participants was convenience sampling. Through social media or face-to-face, the researchers asked acquaintances,

family and friends, to participate in their study. This sampling method was chosen because these groups are easier to approach and likely to complete the two-week study when they are familiar with the researchers.

In general, sample sizes for ESM studies are rather small (Conner & Lehmann, 2012). Van Berkel et al. (2017) showed that the mean number of participants in previous ESM studies was 53. Therefore, this sample size was set as an approximate aim for this study to obtain reliable and valid measurements. Due to the possible drop-out rate, each researcher asked about 10 prospective participants to have around 60 participants in total. All participants gave informed consent on Day 0 and had the option to withdraw from the study at any time without a reason.

2.3 Materials

Since the different questionnaires also contained other variables that were of interest to the other researchers, only those that were important in terms of loneliness and binge-watching were considered for this study. In addition, for more information about the participants, the data of the demographic questionnaire were used.

2.3.1 Demographics and Baseline Questionnaire

On the day after registration, participants were asked to complete the one-time demographic and baseline questionnaires (Appendix A). The demographic questionnaire contained general questions concerning their age, gender, nationality and current occupation. In addition, participants were asked to provide specific information about their watching behaviour in relation to VoD services by indicating the streaming services they used on a regular basis.

The baseline questionnaire contained 61 questions related to several trait measurements. For this study, only the measurement related to loneliness was used. To measure trait loneliness a shortened version of the De Jong Loneliness Scale, the De Jong Gierveld Scale, was used. This six-item scale was created by Gierveld and Tilburg (2006) and measures emotional, social and overall loneliness. Responses were given on a 5-point Likert scale of "None of the time", "Rarely", "Some of the time", "Often", and "All of the time". The summed total score of the scale is used to compare respondents by assigning them a position on an underlying continuum of 0-1 for "Not lonely" and 2-6 for "Lonely".

The abbreviated questionnaire is a reliable and valid measurement tool that can be used as an overall unidimensional measure of loneliness (Gierveld & Tilburg, 2006). In this current study, internal consistency was measured using Cronbach's Alpha. Results showed that the reliability of the trait measurement of loneliness was satisfactory ($\alpha = .74$).

2.3.2 Morning VoD Behaviour and State Assessment

Part of the morning assessment was not only the current state of feelings but also the behavioural assessment. For this purpose, several questions were created to gain more detailed information about the watching behaviour of the past day (Appendix A). The participants were first asked to indicate how long they watched VoD services the day before (i.e., "How **long** did you watch VoD services **yesterday**?"). Here, they had the opportunity to display that they did not watch any VoD services. The other response options ranged from "Less than 1 hours", up to "More than 5 hours". After that, it was asked how many episodes were watched ("How many **episodes** did you watch **yesterday**?"). For this question, the participants could give their answer on a numerical scale of 0-10. Thereby "0" indicates that they had not watched any episodes whereas films and documentaries should be rated as "1" episodes each. It was not assumed that more than 10 episodes were consumed per day. The next question asked was about the time when they watched VoD content ("At what **time** did you start watching video-on-demand content **yesterday**?"). Participants could choose multiple answers between the options "Morning (6 a.m. - 12 p.m.)", "Afternoon (12 p.m. - 6 p.m.)", "Evening (6 p.m. - 11 p.m.)", and "Night (11 p.m. - 6 a.m.)". The last question regarding watching behaviour related to the reasons why the participants watched VoD services ("What were your **reasons** for watching?". Here, the respondents could choose from several possible reasons such as "Stress", "Entertainment", "Loneliness", "Boredom" and "Other".

To measure the current state of loneliness of the participants a validated single-item scale was used that was created for an ESM study by Reissmann et al. (2018). On a five-point Likert scale, participants were asked to indicate how lonely they felt at the moment. The response possibilities ranged from "Not at all" to "Very much".

There were a total of ten questions in this assessment, and questions not of interest to this particular study included, for example, asking how many hours participants slept last night, with an assessment of sleep quality. There was also a question about snacking behaviour after yesterday's mealtime, including what types of snacks, were eaten.

2.3.3 Evening State Assessment

In this assessment, two out of six items from the morning state assessment, regarding the respondents' stress level and perceived loneliness, were posed again in the evening. For the purpose of this study, again only the one-item scale by Reissmann et al. (2018) was used (Appendix A). For the reliability of the one-item loneliness scale, the average morning and evening measures were compared. The measured Pearson coefficient indicated a positive moderate correlation (r= .59) between the morning and evening measurement. A total of five questions were asked in this assessment. In addition to the question regarding loneliness, further questions were added on the feeling of fear of missing out, as well as two questions concerning delaying tasks, including the question of which tasks were delayed.

2.4 Procedure

After finishing the participant recruitment, all prospective respondents received an email created by the researchers that provided step-by-step instructions for the Ethica application and explained the assessments (Appendix B). After downloading the app, signing up and entering the code for the study, participants received the consent form and were asked to accept it in order to participate in the study (Appendix C).

The study officially started when the participants received the instructions for the application Ethica and the upcoming assessments. On the next day, the participants received the demographic questionnaire and the baseline questionnaire both at 08:00. There was no time limit for these questionnaires and participants had until the end of the study to complete them. On the following day (Day 2), the daily measurements began. The first questionnaire appeared fixed at 08:00 in the morning and the participants had until 12:30 to answer it. This time span was chosen to give the participants enough time to answer, regardless of the different occupations. After half the time, at 10:15, the respondents received a reminder if the questionnaire had not been completed by then.

The participants received the second daily questionnaire in the evening, at 18:00 and had to complete it by 00:00. A relatively large time span was also chosen for this assessment in order to give the participants enough time. Halfway through the assessment, a reminder came at 21:00 to remind them to complete the questions. After 14 days, on day 15, data collection was completed and participants were thanked for their participation via email.

2.5 Data Analysis

The data were processed and analyzed using the IBM SPSS Statistics 27 program. A dummy variable was created for daily binge-watching based on the reported duration of VoD watching and the number of episodes watched. Occasions where the participant watched at least 3 episodes and at least 2 hours in one sitting were categorised as binge-watching (coded "1") and watching behaviours that did not meet this criterion were coded as "0".

After screening the data, 3 participants were removed from the data set because they had not participated at all or only answered a few surveys. According to Conner & Lehmann (2012), it is common practice to only include participants for analysis that completed at least 50% of the measurements. Due to the good response rate (M= 92.9%), the cut-off point was raised to 70%, which is also in line with the mean response rate of 69.6% according to van Berkel et al. (2017). One participant had a response rate of 70%, but the baseline questionnaire was missing. Consequently, a total of 7 participants were excluded from the analysis.

To analyze the relationship between the different measurements, a series of analyses were carried out using Linear Mixed Models (LMMs). The LMM was chosen because it helps to understand changes in human behaviour over time and is, therefore, convenient for processing the multi-level (repeated) ESM data (Shek & Ma, 2011). As it is common in ESM studies that participants do not complete all measurements, the LMM can also adequately account for missing data with maximum likelihood estimation, calculating the most likely behaviour of a respondent, based on their previously reported values (Shek & Ma, 2011). This way, participants with missing data are not deleted and all participants are included in the analysis.

LMM with a first-order autoregressive covariance structure (AR1) was applied to analyse the hierarchically nested repeated measures. For each individual LMM, the variable "ID" was set as the subject and the variable "time" (in days) was determined as the repeated measure. All variables were also z-transformed to obtain standardized regression estimates. In relation to the first research question, in order to gain insight into the viewing behaviour of the overall sample, the dependent variables were binge-watching behaviour, episodes watched, hours spent watching, as well as the average daily level of loneliness. Here, "time" was set as a fixed independent factor to calculate estimated marginal means for each study day over the 14-day period.

Next, a series of Linear Mixed Model Analyses were run with the baseline assessment mean scores of loneliness (trait loneliness) as a fixed covariate, to test the association between

trait-like loneliness and binge-watching, duration of VoD watching and the number of episodes watched as dependent variables in order to be able to compare the outcome with different indicators of VoD watching.

Next, to test whether loneliness is a potential consequence of binge-watching, the average daily loneliness level was set as a DV, while all three watching variables the previous day were set separately as fixed covariates in new LMMs. To test the extent to which loneliness is a potential predictor of binge-watching behaviour on the same day, the daily mean value of loneliness had to be adjusted in order to be in line with the watching behaviour of the same day. This was done by creating a lag variable via the Lag(1) function in SPSS. Analyses were then conducted by setting the binge-watching, hours and episodes variables as dependent variables and the new total loneliness lag variable as a fixed covariate.

3. Results

3.1 Participant Characteristics

74 participants remained in the final data set for analysis. During the two weeks, these participants answered on average 87.1% of the daily questionnaires. The sample consisted of 61 female and 13 male respondents. Most participants (97.2%) were young adults, in the age group 20-26 years (M= 22.96, SD= 5.51). One participant was 48 and another 60 years old. With regard to nationality, almost 95% of the respondents were German (n= 70). Only one indicated being Dutch (1.4%) and three were from another European country (4.1%).

The sample consisted predominantly of students (77%, n= 57). Six participants stated that they were doing an apprenticeship (8.1%), five were full-time employees (6.8%), three were part-time employees (4.1%), two stated other occupations (2.7%) and one person in the sample was unemployed (1.4%). Almost all respondents used more than one streaming service and Netflix was selected by participants as the most frequently used streaming service (95.6%, n=70), followed by Youtube (71.6%, n=53) and Amazon Prime (63.5%, n=47). Figure 1 shows the absolute distribution of the frequency of each of the possible streaming platforms.

Figure 2.

Frequency of the Participants' Responses (n=74) *on the Respective Streaming Services used*
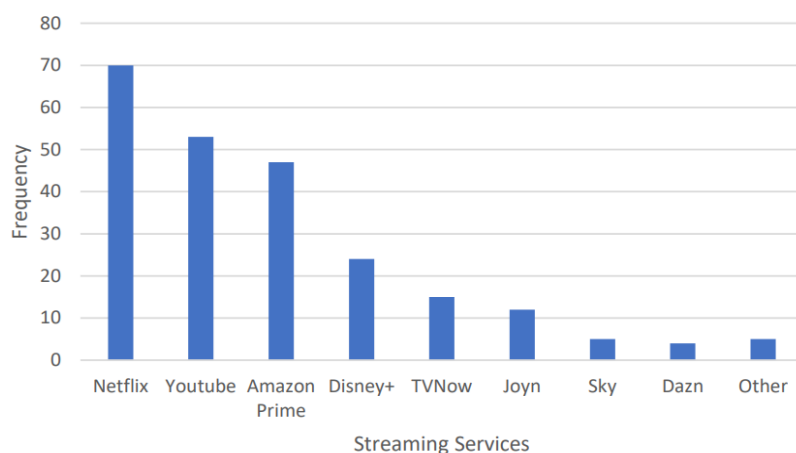

3.2 Loneliness and Watching Behaviour over time

In the 14-day period, a total of 36.3% of all measurement occasions met the criterion for binge-watching. In terms of motivation to use VoD streaming services, most participants mentioned

positive reasons to engage in watching behaviour, such as curiosity, peer activity, entertainment and relaxation (76.2%). Only 23.8% reported negative reasons, including stress, boredom, procrastination and loneliness. This suggests that the majority of people watched VoD content for positive rather than negative motivations. Entertainment was by far the most frequently mentioned reason with almost 30% (*n*= 474), followed by relaxation with 17% (*n*= 297) and peer activity with 9.1% (*n*= 159). Out of all responses, loneliness was specifically mentioned 41 times (2.4%) as a reason why they engaged in VOD watching the previous day, making it one of the least mentioned reasons. In addition, in most instances, streaming services were watched during the evening and nighttime (41.8%).

Figure 3 shows the distribution of all variables per time point over the 14 days. The highest amount of watching behaviour occurred on day 4, with an estimated average of 2.82 episodes (*SD*= 0.39) and 2.06 hours (*SD*= 0.19) watched on this day. The lowest amount of observed episodes occurred on day 2, when participants consumed an average of 1.86 episodes (*SD*= 0.39). On day 12, participants engaged in the least amount of time watching, averaging 1.43 hours (*SD*= 1.8). The highest amount of binge-watching behaviour occurred on day 13, with a proportion of .46 (SD= 0.06) of the participants meeting the criterion of binge-watching, whereas on day 2 the proportion was lowest (*M*= 0.22, *SD*= 0.66).

Figure 3.

Mean Scores of the Level of Loneliness, Episodes and Hours Watched and the Proportion of Binge-watching Behaviour during the 14-day period
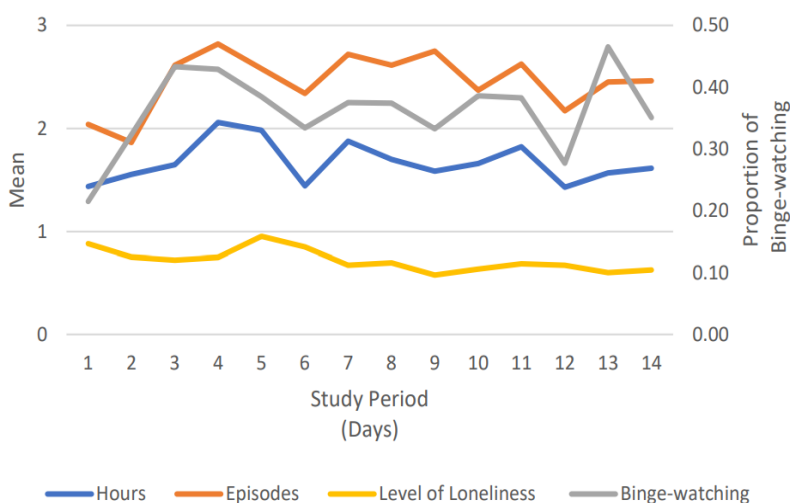
On average, the state loneliness scores of all participants were very low over the two weeks (*M*= 0.72; *SD*= 0.85). The highest perceived loneliness was observed on day 5, with a mean of 0.95 (*SD*= 0.10) across the participants. Of all the responses on loneliness, most were in the range of 0-1, namely, 80.8%. This indicates that most participants perceived no or only a little loneliness over time. In the range of 1.5 to 2.5, 15.4% of the responses indicated being lonely only to some extent. Only 3.7% of the responses were observed in the range of 3 to 4, indicating high experienced loneliness. The exact frequencies of the levels of loneliness over the study period can be seen in Figure 4.

Figure 4.

Total Frequency of Loneliness Levels During the Study Period
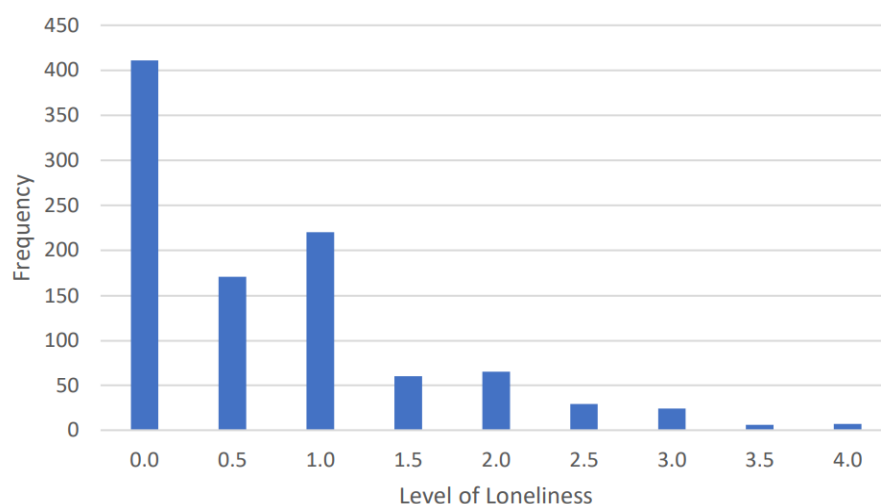
The mean trait loneliness score on the De Jong Gierveld scale at baseline was also low at 2.15 (*SD*= 1.7). Half of the participants (48.6%) were below this value as their final score was only 0 or 1. Beyond this, however, the other half were in the range of 2-6, which is categorised as "Lonely". More specifically, 18.9% of respondents had a final score of 2. Final score 3 was achieved by 8.1% (*n*= 6) and end value 4 by slightly more, 13.5% (*n*= 10). The highest loneliness scores 5 and 6 had only 3 respondents (4.1%) and 5 respondents (6.8%) as final values. Figure 5 shows the exact distribution of the results for the De Jong Gierveld Scale.

Figure 5.

Overall Frequency of Participants' Scores (n= 74) on the One-time Trait Measure of Loneliness
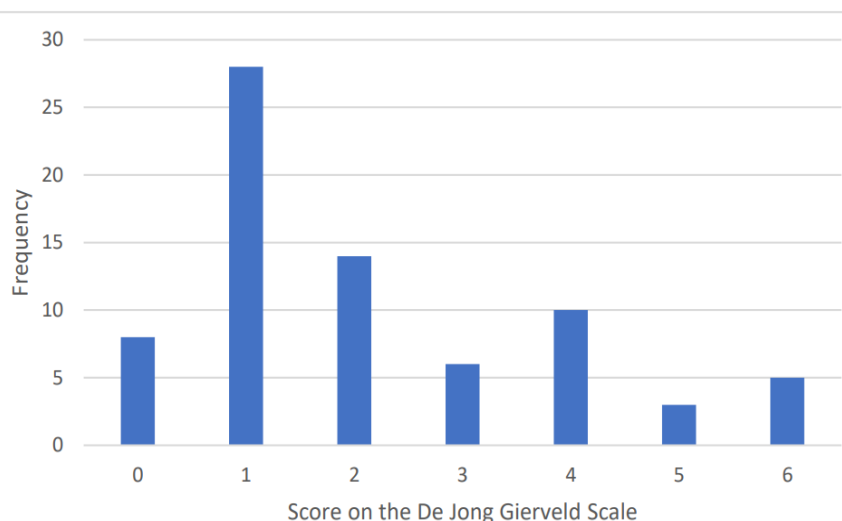
3.3 Associations between Trait Loneliness and Watching Behaviour over time

To examine whether the associations between binge-watching and perceived loneliness are more state or trait related, three multilevel LMM analyses were conducted.

The analysis of trait loneliness and binge-watching showed that no significant effect was found (F (1, 921.486) = 1.53; p= .13). Trait loneliness and hours watched also showed no significant relationship (F (1, 206.699) = 0.62; p= .54), nor did the analysis of trait loneliness and episodes (F (1, 144.441) = 0.98; p= .33). The data clearly showed no consistent significant relationship between the loneliness scores on the De Jong Gierveld scale and the watching variables. Therefore, binge-watching and viewing behaviour, in general, were not related to trait loneliness at the group level. All results of the analyses with the baseline measurement can be seen in Table 1.

Table 1.

Linear Mixed Model Analyses of VoD watching (DV) and Trait Loneliness (IV)

Dependent variable	B [SE]	β [SE_β]	95% CI [LB, UB]	F [df1, df2]	p

Binge-watching	0.01 [0.10]	0.04 [0.04]	[0.0, 0.03]	1.53 [1, 921.486]	.13
Hours	0.27 [0.04]	0.03 [0.05]	[-0.06, 0.11]	0.62 [1, 206.699]	.54
Episodes	0.12 [0.12]	0.06 [0.06]	[-0.12, 0.37]	0.98 [1, 144.441]	.33

Note. B and β indicate unstandardised and standardised the B-estimate, *SE* and *SE_β* the unstandardised and standardised standard error and *LB* and *UB* represent the lower and upper limits of the 95% confidence interval, respectively.

3.4 State Loneliness as a Consequence of Binge-watching

To investigate further correlations in relation to binge-watching and daily state levels of loneliness, three additional LMMs were conducted. These first examined the extent to which participants' level of loneliness the next day was related to their binge-watching behaviour the previous day.

The analyses showed that there was no significant relationship between binge-watching and loneliness over time ($F (1, 812.046) = 1.50$; $p= .13$). Also no significant relationships between hours ($F (1, 837.202) = 1.41$; $p= .16$) and episodes ($F (1, 924.971) = 0.97$; $p= .33$), in relation to participants' loneliness level were found. Therefore, daily loneliness was not associated with binge-watching, the number of hours and the number of episodes watched the previous day (see Table 2).

Table 2.

Linear Mixed Model Analyses of VoD watching (IV) and State Loneliness (DV)

Fixed Covariate	*B* [*SE*]	*β* [*SE_β*]	95% CI [*LB, UB*]	*F* [df1, df2]	*p*
Binge-watching	0.06 [0.04]	0.04 [0.03]	[-0.02, 0.15]	1.50 [1, 812.046]	.13

Hours	0.02 [0.01]	0.04 [0.03]	[-0.01, 0.05]	1.41 [1, 837.202]	.16
Episodes	0.01 [0.01]	0.03 [0.04]	[-0.001, 0.026]	0.97 [1, 924.971]	.33

Note. B and β indicate unstandardised and standardised the B-estimate, *SE* and *SE_β* the unstandardised and standardised standard error and *LB* and *UB* represent the lower and upper limits of the 95% confidence interval, respectively.

3.5 State Loneliness as a Predictor of Binge-watching

To answer the fourth and final research question, whether the level of perceived loneliness has a potential impact on watching behaviour the same day, three further LMMs were performed.

The results showed that participants' level of loneliness had a significant effect on binge-watching behaviour on the same day (F (1, 669.075) = 2.04; p= .04). The non-standardized parameter estimate was positive (B= 0.04; *SE*= 0.02), implying that binge-watching behaviour increased slightly with the level of loneliness. In addition, the level of loneliness also had a significant, but weak, effect on the other two variables, hours and episodes (F (1, 735.531) = 2.10; p= .03; F (1, 851.016) = 2.30; p= .02). Here, the estimates of the non-standard parameter were also positive (B = 0.16; SE = 0.07; B = 0.30; *SE*= 0.12).

Looking at the standardised coefficients of B to see the strength of an effect, it is apparent that all three variables seem to have a positive but weak effect. The variable hours has a slightly stronger correlation (β= .08), than episodes (β= .07) and binge-watching (β= .07).

Higher levels of perceived loneliness were associated with increased watching the same day on all three indicators of watching. Based on these results, evidence shows that loneliness was a potential predictor of binge-watching and watching behaviour in general. Table 3 provides an overview of the analyses results of the significant relationship between the three variables and the lag variable of total loneliness.

Table 3.

Linear Mixed Model Analyses of VoD watching (DV) and State Loneliness (IV, Lag)

Dependent variable	*B* [*SE*]	*β* [*SE_β*]	95% CI [*LB, UB*]	*F* [df1, df2]	*p*
Binge-watching	0.04 [0.02]	0.07 [0.04]	[0.00, 0.09]	2.04 [1, 669.075]	.04
Hours	0.16 [0.07]	0.08 [0.04]	[0.02, 0.30]	2.10 [1, 735.531]	.03
Episodes	0.30 [0.12]	0.07 [0.03]	[0.06, 0.54]	2.30 [1, 851.016]	.02

Note. B and *β* indicate unstandardised and standardised the B-estimate, *SE* and *SE_β* the unstandardised and standardised standard error and *LB* and *UB* represent the lower and upper limits of the 95% confidence interval, respectively.

4. Discussion

4.1 Meaning of Results

The aim of this study was to examine the temporal relationship between binge-watching behaviour and perceived loneliness over time. The results showed that on average the participants tended not to feel lonely during the study period. It was also found that the sample indicated thinking of more positive than negative reasons to engage in this behaviour. Furthermore, binge-watching tended to be rather state-like driven as the participants' level of the trait loneliness had no significant impact on watching behaviour. Regarding the question of whether state loneliness is a predictor and/or consequence of VoD watching, the results showed that participants did not feel lonelier after increased watching, but that their level of loneliness before watching was positively associated with increased watching. Overall, in this study, VoD watching did not seem to have negative outcomes with respect to loneliness.

Referring to the first research question regarding the co-variation of binge-watching and perceived loneliness over the two-week period, participants had, on average, very low scores on the single-item scale by Reissmann et al. (2018), suggesting that participants may have other motivations for watching VoD services than loneliness. This was confirmed by the daily asked question regarding the motive for watching, which showed that respondents mainly indicated entertainment and relaxation rather than loneliness as reasons for watching. One possible explanation for this could be that the participants were experiencing generally good times and had few negative experiences for which they needed to seek distraction. However, it could also be that they were not aware of negative motivations for watching VoD and attributed this behaviour to positive motives. Nevertheless, previous research confirms that positive factors such as entertainment and peer activity are major reasons for binge-watching (Sung et al., 2018; Starosta et al., 2019).

With regard to the second research question, whether the associations between binge-watching and perceived loneliness are more driven by momentary or trait loneliness, LMMs analyses in relation to the baseline trait measurement using the De Jong Gierveld scale, showed that trait loneliness was not associated with VoD watching amount or binge-watching over time. This suggests that watching behaviour is not trait-like driven, but rather state-like driven as the momentary loneliness state was predictive for same-day watching behaviour. No study to date has

investigated exactly this, so no direct comparison with previous findings can be made. However, some studies have shown that in general, emotional states (e.g. feeling depressed, lonely or anxious) can have a potential impact on people's watching behaviour and whether or not they engage in binge-watching (Tefertiller & Maxwell, 2018; Rubenking et al., 2018). Since a longitudinal study by Van Roekel et al. (2018) found that state loneliness depends on both social context and temporal characteristics. Therefore, it is possible that other personality traits, such as introversion or neuroticism, are related to higher state loneliness leading to increased watching behaviour. Due to the lack of research, future studies in this area would be advisable.

Furthermore, predictors, as well as consequences of VoD streaming behaviour, were investigated using ESM. In contrast to previous cross-sectional studies, the current study allowed a closer look at the feelings after and before watching VoD. Results showed that loneliness was not a consequence of the watching behaviour as participants did not feel significantly lonelier after watching VoD content. This indicates that watching streaming services has no effect on the feeling of loneliness on the group level and that binge-watching does not predict higher or lower levels of loneliness the next day. This finding is contrary to the previous cross-sectional study of Sun & Chang (2021), who found an increased risk of loneliness in relation to binge-watching. This contrast could be explained by the fact that the sample population and the way of measurement were different, including the ESM design.

In contrast to the absence of an association between VoD watching and loneliness the next day, the main finding of this research was that there is a significant positive relationship between loneliness and binge-watching on the same day. Interestingly, higher levels of loneliness were associated with increased same-day VoD watching on all three watching indicators. However, the strength of the significant effects appears to be rather weak. The results may suggest that participants consciously or unconsciously use VoD to reduce feelings of loneliness, which is also consistent with the findings of Dixit et al. (2020), whose study found that some people use binge-watching to overcome loneliness. Moreover, this is in line with the previous study by Sung et al. (2018), which found that loneliness is a potential predictor of binge-watching and is also used to cope with loneliness. This also confirms the Uses and Gratification (U&G) framework of Elliot and Quattlebaum (1979), which mentions that there are "lone wolves" who watch serials to alleviate loneliness. Lastly, Starosta et al. (2019) also found positive associations between dealing with loneliness and binge-watching. On the contrary, Ahmed (2017), as well as Tefertiller and

Maxwell (2018), found no correlation between binge-watching and loneliness, i.e., no difference between binge-watchers and non-binge-watchers, which is inconsistent with our results. This could be explained as both studies were cross-sectional studies that did not examine participants over a period of time and therefore only have one-time measurements. Since in the current study binge-watching behaviour and the actual state of loneliness were reported daily over a period of time, it is possible that the reported responses in the other two studies were driven by recall bias, since the behaviour was only asked retrospectively once with a greater time difference.

4.2 Strengths and Limitations of the Study

The current study had several particular strengths. First of all, the intensive sampling method of the ESM offered several benefits. The long-term nature provided the opportunity to study behaviours and feelings over a longer period of time, which is not the case with cross-sectional surveys. This made it possible to get a more detailed overview of binge-watching behaviour and examine possible consequences or predictors associated with it. Also, by using ESM with an app on a smartphone, it was achievable to get a more accurate and representative overview of the participants' daily lives.

Another strength was shown by the use of the validated scales in the current study. Research showed that the reliability and construct validity of the original De Jong Gierveld scale were adequate in five research projects using self-administered paper questionnaires and face-to-face interviews (De Jong Gierveld, 1987). Regardless of which of the two scales is used, both are a reliable and valid measurement instrument that can be used as an overall unidimensional measure of loneliness as well as providing information about the respondent's emotional and/or social loneliness situation (De Jong Gierveld & Van Tilburg, 2006). In addition, the one-item state loneliness instrument by Reissmann et al. (2018) was a validated scale as well that was already used for an ESM study.

In addition, the mobile application Ethica made it as easy as possible for participants to use. Since most people always have their mobile phone with them, it was possible to use the application in their daily life. Additionally, participants could complete the surveys at home or work, no matter where they were at that time. Each daily questionnaire was about 2 minutes long, taking a total of only 4 minutes of their day, which was also an advantage. Also, the reminders were beneficial as participants did not have to remember to fill out the surveys themselves. These

factors ensured a good response rate (*M*= 92.9%) and minimized dropout. Throughout the study, there was only one technical issue from the platform itself, which resulted in some participants not being able to complete their evening questionnaires on day 12, but this was barely noticeable in the results and therefore not mentioned further.

Nevertheless, in addition to the positive aspects of the study, there are also a few drawbacks to consider. Regarding the potential limitations of the study, it is clear that convenience sampling may have led to sampling selection bias. As the sample were mostly acquaintances of the researchers, most of the participants were German students, which leads to a rather homogeneous and well-educated sample. This group shows probably less risk for binge-watching as they are more in control of their behaviour, due to them presumably being more reflective about their own behaviour. Additionally, as 97.2% of the participants were between 22 and 26 years old, the results can be applied mainly to young adults. Therefore, the results cannot be generalised to the whole population. Although young adults in particular are at risk for excessive consumption of streaming services, in the future it would be advantageous to make the samples more diverse or to examine the at-risk group of young adults or teenagers more closely.

Another limitation is that binge-watching behaviour was still measured retrospectively for the previous day. It is difficult to measure exactly when participants stopped watching, as everyone engages in this behaviour at different times of the day and with different frequency. It would have been possible to use event-based sampling and to instruct participants to track their duration and quantity after each session, but there is a risk that they will forget to do so and the data will be incomplete. Therefore, the researchers decided to ask about the previous day's watching behaviour in the morning questionnaire to get the most accurate answers possible, as most people were assumed to still be able to remember it at this point. Due to this retrospective component, future studies should seek to further reduce the reliance on participant recall and see if there is another method or way to capture it in a more timely manner. Furthermore, it is possible that through the daily questionnaires and querying of watching duration and quantity, it could be that participants were increasingly made aware of their time spent on VoD streaming platforms resulting in measurement reactivity (Steinbach, 2018). This could lead to the participants wanting to show socially desirable behaviour. Also considering that binge-watching has a negative connotation according to Jenner (2017), it is possible that the respondents wanted to reduce or avoid this behaviour.

Finally, this research was conducted in the times of the COVID-19 Pandemic. The Corona measurements could also have had an influence on the results, as there was a lockdown in Germany at the time of data collection. As there are no comparable studies before the pandemic, it is not possible to give any information about the impact of the current situation on the measurements and associations. Therefore, it is unclear in which direction the effects occur. It might be important that the current findings are compared again in normal circumstances. However, it is possible that without these circumstances, the proportion of binge-watching hours, episodes watched and perceived loneliness would be lower due to a different daily structure.

4.3 Future Research

As the study dealt with several research projects, the researchers tried to include as few questions as possible for each topic. In the future, this could be expanded a bit more, for example, to include a more comprehensive questionnaire on loneliness in the baseline questionnaire and/or to ask it again retrospectively to get more detailed information about it. It would also be possible to look at the individual level of participants who are particularly conspicuous, as this study only dealt with analyses at the group level. For example, this could be done by carrying out case studies and looking at people who show extreme observational behaviour. It would also be interesting to further examine personality traits or other moods to gain new insights in terms of consequences or predictors of binge-watching. Also with regard to loneliness being a potential predictor of watching behaviour, it is possible to investigate in more detail to what extent this is the case and whether there are other correlations with other relevant feelings.

In order to better compare the different studies, it would also be advantageous for the research community to agree on a uniform definition of binge-watching, as each researcher sets different cut-off points. At this point, the comparison is limited and only transferable to a certain extent, as it could also lead to varying results due to different classifications. Also, as this study found no negative outcomes with respect to VoD watching and loneliness it may be beneficial to categorize between healthy and harmful binge-watching. According to Flayelle et al. (2020), this would also help to avoid over pathologizing this popular behaviour. In addition, categorising binge-watching could have further benefits, as distinguishing between levels could provide further valuable insight into which different outcomes to expect and when.

4.4 Conclusion

To conclude, binge-watching is an ever-growing phenomenon in today's world, which is not expected to disappear in the near future, and which may be particularly exacerbated by the COVID crisis. The results indicated that higher levels of loneliness were associated with increased same-day VoD use, which suggests that participants use streaming services to reduce feelings of loneliness. This implies that increased streaming on VoD platforms could be a potential coping strategy for feelings of loneliness that should be further explored. Nevertheless, findings showed that binge-watching does not predict higher or lower levels of loneliness the next day. Overall, there were no apparent negative consequences with respect to loneliness found and the findings highlight the current lack of knowledge and scientific research on this topic and call for further detail-focused studies in the near future.

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Appendix A

Questionnaire in the Ethica application

Demographics

Thank you for participating in our study and welcome to your first questionnaire 😊 With this questionnaire we want to gain some information about you and your background - no worries, just some casual facts. Have fun filling it out!

PS: concerning the whole study coming up: please try to fill out the questionnaires on time! You will receive reminders so you won't forget it since we know how easily that can happen. Still, *if* it happens that you forget to fill out one questionnaire that is okay, please just continue with the next ones, so we can still use the data! Thank you 📩

1. What is your age?

➕

20

➖

2. What is your gender?
    a. Female
    b. Male
    c. Diverse
    d. Wish not to disclose
3. What is your nationality?
    a. German
    b. Dutch
    c. Other European
    d. Non-European
4. What is your occupation?
    a. Pupil
    b. Student
    c. Apprentice
    d. Part-time employee
    e. Full-time employee
    f. Unemployed
    g. Self-employed
    h. Other
5. Which streaming services are you using? (multiple answers possible)
    a. Netflix
    b. Amazon Prime
    c. Disney+
    d. TVNow
    e. Joyn
    f. Youtube
    g. Sky
    h. Hulu
    i. Maxdome
    j. Dazn
    k. Other

l.   I do not use streaming services

Great work! Thank you for your information, if you have a couple more minutes, please take a look at the baseline measurement. Thank you!

Reminder:

Tell us something about you!
Please fill out your first short questionnaire about your background

Baseline questionnaire

Please fill out this questionnaire! Thank you!

This questionnaire only needs to be filled out **once**. We know this one is a bit longer than the others (it will take you around 10 minutes to fill it out) but please take your time and answer as honestly as possible. The daily questionnaires will take you **way less** time to fill out, we promise! 😊

1. In the last month, how often have you been upset because of something that happened unexpectedly?
    a. Never
    b. Almost never
    c. Sometimes
    d. Fairly often
    e. Very often
2. In the last month, how often have you felt that you were unable to control the important things in your life?
    a. Never
    b. ...
3. In the last month, how often have you felt nervous and "stressed"?
    a. Never
    b. ...
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
    a. Never
    b. ...
5. In the last month, how often have you felt that things were going your way?
    a. Never
    b. ...
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
    a. Never
    b. ...
7. In the last month, how often have you been able to control irritations in your life?
    a. Never
    b. ...
8. In the last month, how often have you felt that you were on top of things?
    a. Never
    b. ...
9. In the last month, how often have you been angered because of things that were outside of your control?
    a. Never
    b. ...
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
    a. Never

      b.   ...

11. I am relaxed most of the time
    a. Very accurate
    b. Moderately accurate
    c. Neither inaccurate nor accurate
    d. Moderately inaccurate
    e. Very inaccurate
12. I seldom feel blue
    a. Very accurate
    b. ...
13. I get stressed out easily
    a. Very accurate
    b. ...
14. I worry about things
    a. Very accurate
    b. ...
15. I am easily disturbed
    a. Very accurate
    b. ...
16. I get upset easily
    a. Very accurate
    b. ...
17. I change my mood a lot
    a. Very accurate
    b. ...
18. I have frequent mood swings
    a. Very accurate
    b. ...
19. I get irritated easily
    a. Very accurate
    b. ...
20. I often feel blue
    a. Very accurate
    b. ...

Please indicate now, how often do you experience the following feelings:

21. I experience a general sense of emptiness.
    a. None of the time
    b. Rarely
    c. Some of the time
    d. Often
    e. All of the time
22. There are plenty of people I can rely on when I have problems.
    a. None of the time
    b. ...
23. There are many people I can trust completely.
    a. None of the time
    b. ...
24. I miss having people around.
    a. None of the time
    b. ...

25. There are enough people I feel close to.
    a. None of the time
    b. ...
26. I often feel rejected.
    a. None of the time
    b. ...
27. I fear others have more rewarding experiences than me.
    a. Not at all true of me
    b. Slightly true of me
    c. Moderately true of me
    d. Very true of me
    e. Extremely true of me
28. I fear my friends have more rewarding experiences than me
    a. Not at all true of me
    b. ...
29. I get worried when I find out my friends are having fun without me.
    a. Not at all true of me
    b. ...
30. I get anxious when I don't know what my friends are up to.
    a. Not at all true of me
    b. ...
31. It is important that I understand my friends "in jokes".
    a. Not at all true of me
    b. ...
32. Sometimes, I wonder if I spend too much time keeping up with what is going on.
    a. Not at all true of me
    b. ...
33. It bothers me when I miss an opportunity to meet up with friends.
    a. Not at all true of me
    b. ...
34. When I have a good time it is important for me to share the details online.
    a. Not at all true of me
    b. ...
35. When I miss out on a planned get-together it bothers me.
    a. Not at all true of me
    b. ...
36. When I go on vacation, I continue to keep tabs on what my friends are doing.
    a. Not at all true of me
    b. ...

You are almost done! Just a few questions more 🏁

37. I am good at resisting temptations
    a. Not at all like me
    b. Not like me
    c. Neutral
    d. Like me
    e. Very much like me
38. I have a hard time breaking bad habits
    a. Not at all like me
    b. ...
39. I am lazy
    a. Not at all like me
    b. ...

40. I say inappropriate things
    a. Not at all like me
    b. ...
41. I do certain things that are bad for me, if they are fun
    a. Not at all like me
    b. ...
42. I refuse things that are bad for me.
    a. Not at all like me
    b. ...
43. I wish I had more self discipline
    a. Not at all like me
    b. ...
44. People would say that I have iron self discipline
    a. Not at all like me
    b. ...
45. Pleasure and fun sometimes keep me from getting work done
    a. Not at all like me
    b. ...
46. I needlessly delay finishing jobs, even when they're important.
    a. Disagree
    b. Slightly disagree
    c. Neither disagree nor agree
    d. Slightly agree
    e. Agree
47. I postpone starting in on things I don't like to do.
    a. Disagree
    b. ...
48. When I have a deadline, I wait until the last minute
    a. Disagree
    b. ...
49. I delay making tough decisions.
    a. Disagree
    b. ...
50. I keep putting off improving my work habits.
    a. Disagree
    b. ...
51. I manage to find an excuse for not doing something.
    a. Disagree
    b. ...
52. I put the necessary time into even boring tasks, like studying.
    a. Disagree
    b. ...
53. I am an incurable time waster.
    a. Disagree
    b. ...
54. I'm a time waster now but I can't seem to do anything about it.
    a. Disagree
    b. ...
55. When something's too tough to tackle, I believe in postponing it.
    a. Disagree
    b. ...
56. I promise myself I'll do something and then drag my feet.

    a. Disagree

    b. ...

57. Whenever I make a plan of action, I follow it.

    a. Disagree

    b. ...

58. Even though I hate myself if I don't get started, it doesn't get me going.

    a. Disagree

    b. ...

59. I always finish important jobs with time to spare.

    a. Disagree

    b. ...

60. I get stuck in neutral even though I know how important it is to get started.

    a. Disagree

    b. ...

61. Putting something off until tomorrow is not the way I do it.

    a. Disagree

    b. ...

YOU DID IT! We are proud of you, thank you so much for giving us your time 🔔 See you again for the daily measurements and like we said, those are not as long as this questionnaire so please keep filling them out 😊

Reminder: Please fill out the Baseline Questionnaire!

This one will take a bit longer than the others, still it would be great if you fill it out timely!

Morning assessment

We wish you a wonderful morning 🌼

Please take a moment to reflect and fill out this short questionnaire!

1. How **long** did you watch VOD services **yesterday**?

(If you did not watch a full hour, please just round up/off - e.g., if you watched more than 1 hour and 30 minutes please indicate 2 hours)

    a. I did not watch
    b. Less than 1 hour
    c. 1 hour
    d. 2 hours
    e. 3 hours
    f. 4 hours
    g. 5 hours
    h. More than 5 hours

2. How many **episodes** did you watch **yesterday**? (please set the number to 0 if you did not watch any episodes and please count all movies/documentaries you watched also as episodes)

3. At what **time** did you start watching video-on-demand content **yesterday**?

(Multiple answers possible)

    a. Morning (6 a.m. - 12 p.m.)
    b. Afternoon (12 p.m. - 6 p.m.)
    c. Evening (6 p.m. - 11 p.m.)
    d. Night (11 p.m. - 6 a.m.)
    e. I did not watch VOD services

4. What were your **reasons** for watching? (multiple answers are also possible)

    a. Entertainment
    b. Boredom/nothing else to do
    c. Stress
    d. Interest/curiosity
    e. Escape from reality
    f. Escape from reality/Distraction
    g. Peer activity (watching with friends/family)
    h. Procrastination/Avoidance of responsibilities
    i. Information seeking
    j. Relaxation/Taking a break
    k. Loneliness
    l. Other
    m. I did not watch

5. How many **hours** did you **sleep approximately**?

6. Last night, how would you rate your **quality of sleep**?

Very bad   Very good

5

7. Did you eat a snack yesterday **after dinnertime**?

    a.   Yes
    b.   No
    c.   I cannot remember

8. If you ate a snack yesterday during the evening, which **type(s) of snack(s)** did you eat? (Multiple answers possible)

    a.   Chocolate, candy, cake, ice cream or something similar
    b.   Chips, flips or something similar
    c.   Fruit or vegetables or something similar
    d.   Crackers, nuts, yogurt or something similar
    e.   Other
    f.   I cannot remember
    g.   I did not eat a snack

What is your **current stress level**?

not stressed   extremely
   at all   stressed

5

How **lonely** do you feel at the moment?

    a.   Not at all
    b.   Only a little
    c.   To some extent
    d.   Rather much
    e.   Very much

That's already all we needed from you for now, see you in the evening.

Have a nice day! 📬

Remider:

Please fill out the morning questionnaire

Sleepyhead you there? We are waiting for your responses 😊
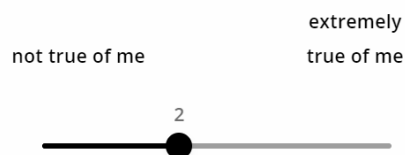
Evening assessment

Hello there again,

We hope you had a great day. Now it is time for your evening questionnaire! Please take a short moment and fill it out �שּ

1. What is your **current stress level**?

not stressed   extremely
at all   stressed

5

2. I intentionally **delayed a task today** that is personally important to me, although it was unreasonable to put this task off.
   a. Disagree
   b. Slightly disagree
   c. Neither disagree nor agree
   d. Slightly agree
   e. Agree
3. What **kind of planned task** did you delay?
   a. Household (doing the dishes, cleaning the bathroom etc.)
   b. Work (projects, phone calls, protocols etc.)
   c. Education (learning for exam, preparation for lesson etc.)
   d. Leisure activity (exercise, socializing, hobbies etc.)
   e. Other
   f. I did not delay any tasks
4. How **lonely** do you feel at the moment?
   a. Not at all
   b. Only a little
   c. To some extent
   d. Rather much
   e. Very much
5. Do you experience the **fear of missing out**?

extremely
not true of me   true of me

2

That's already everything we need from you right now 🌙 Have a good night, we will see you tomorrow in the morning xx

Reminder:

Are you forgetting something? Please fill out the evening questionnaire!

Tick tock - the time is running out ⏲ Take a short moment to fill out the questions

Appendix B

Invitation Email

Dear Participant,

Thank you very much for taking your time and supporting us with our bachelor thesis study! We will tell you everything you need to know before you can get started.

Overall, the aim of the study is to have a look at video on demand (VOD) watching behaviour and health related concepts. With the help of our questionnaires, we would like to gain more insights into your viewing behaviour over the next 14 days.

As of today, we would kindly like to ask you to download the **Ethica Data** app for either your Android or IOS smartphone. You will use this app on a daily basis to answer our little questionnaires and help us gather data.

Once you downloaded the app and created an account with your mail address, you can click on **Join Study** and enter the following code:

1712

And just like that you are part of our research!

To get started we would like to ask you to read our consent form and indicate whether you like to participate or not. After that you are done for today! **Tomorrow** you will receive your **first two questionnaires**, remember that these might take a little bit longer as these are baseline questionnaires. You probably will need 10 – 15mins to answer them. **After that**, you will receive a morning and an evening questionnaire for the next 14 days. These questionnaires are really short and will take you approximately 3mins in total to complete.

That is all you need to know! We would like to thank you again and wish you a lot of fun answering the questions.

Maybe you can even find out more about yourself!

Your dedicated psychology researchers,

Christine, Naomi, Lara, Annika, Celine and Jeremy

Appendix C

Informed Consent

Welcome to our study about video-on-demand (VOD) watching behaviour!

Thank you for your time and support! Please read the following information carefully.

The aim of this research is to explore the relation between VOD watching and (mental) health-related variables. With your participation in this research you will help to make a contribution to the scientific knowledge of VOD watching behaviour.

You can participate in this study if you are at least 16 years old and proficient in English. Ethica is used over a 14-day period to respond to short questionnaires on a daily basis. Please make sure that the notifications on your device for the application (Ethica) are turned on. This facilitates you to answer the questions in the predetermined time frame.

At the start of the study, you will be asked to fill out a baseline questionnaire with questions about demographics, and personality traits. This questionnaire will take around 10 minutes to fill out. From the 5th of April, you will be asked to fill out a short questionnaire twice a day. The questionnaire will be around 5 minutes and the questions asked are about your mood, behavior and feelings.

This research is not expected to pose any risks. One side effect that can occur is that you might be more aware of your daily mood, behavior, and feelings. The participation in this study is voluntary. If you wish to withdraw from this research, you can do so at any time without giving a reason.

All your answers will be treated confidentially. Therefore, all personal data (e.g., e-mail, age, gender, etcetera) will be anonymized and will not be published and/or given to a third party.

The study has been approved by the Ethics Committee of the University of Twente, and is thus compliant with internationally recognised guidelines on ethical research.

If any questions or concerns arise before, during or after your participation, do not hesitate to contact the researchers:

Christina Ernsting (c.ernsting@student.utwente.nl)

Jeremy Hanhoff

Celine Mezielis

Naomi Nitsche

Lara Schwerdtner

I have fully read and understand the text above and I am willing to participate in this study.