Binge-watching: An experience sampling approach to investigate the associations between Video-on-demand consumption and indicators of depression.

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Abstract

Background: Over the past years Video-on-Demand (VoD) services widely replaced linear TV as the go-to entertainment medium for young adults. The freedom to watch whenever, wherever in unlimited quantities, gave rise to a phenomenon called 'binge-watching'. Previous cross-sectional studies found a link between VoD watching and health issues such as depression or addiction. Only recently scholars advocated for more exploratory and longitudinal approaches in VoD research. Therefore, this study serves to explore how VoD watching is related to mood or energy over time between and within persons and whether the social context of watching moderates this relationship.

Method: A post-hoc analysis of data collected with the experience sampling method (ESM) was performed. A sample of 38 respondents (M_{age}=23.8; male=55%) was utilised to investigate the directionality and nature of the association between the duration of VoD watching, mood or energy levels and the social context; a series of linear mixed models (LMM) was conducted.

Results: No significant overall association was found between mood or energy and the time spent watching on the same day or between the hours watched and mood levels on the next day. However, the time spent watching was weakly positively associated with an increase in energy on the next day. This effect operated only on a within-person level, hence individuals who exceeded their own average of time spent watching over two weeks had increased energy levels on the next day. Moderation analyses revealed that the social context of watching did not interact with the relationship between either the number of hours watched on mood or energy the next day or between the association of mood or energy and the time spent watching on the same day.

Conclusion: In contrast to previous studies, the findings of this study suggest that VoD watching does not have a detrimental effect but can have a positive effect on individuals. Future research should aim to explore whether the current findings hold on an individual level and should explore whether and when VoD watching becomes problematic for an individual.

Keywords: VoD streaming, depression, mood, energy, experience sampling method

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Introduction

Video-on-Demand

Over the last decade, the popularity of online television watching has reached new heights. A trend that has been influenced substantially by the advance of streaming services such as *Netflix*, *Amazon Prime*, *Disney+* or *Hulu*, offering a growing amount of content within affordable subscription models (Reelgood, 2019). Unlimited accessibility whenever and wherever has made Video-on-Demand (VoD) platforms appealing to users worldwide. Subscription-VoD services expand continuously at accelerating rates. *Netflix*, for instance, was available only in the United States before 2010, by 2015 it was operating in 50 countries and by 2017 in 190 countries around the world (Brennan, 2018). Thereby, achieving almost global availability within 7 years. With the rising availability, the number of subscribers of existing VoD services has risen exponentially from 171 million users in 2015 to 642 million users in 2019 and is expected to rise to 1.1 billion users by 2025 (Stoll, 2021c). A development that was sped up by the implications of the COVID-19 pandemic and the subsequent rise in subscribers (Watson, 2020).

Before 2011, VoD services such as *Netflix* offered already published TV series and movies of popular movie studios to their users. With the announcement of the first *Netflix*-produced show *House of Cards* in 2011, VoD services started to supply their customers with their own content besides offering existing popular TV shows (Stoll, 2021a). Moreover, *Netflix* set a new trend by releasing the whole season of episodes on the launch of its first original show. In comparison to traditional broadcasting (linear) TV, VoD services have increased the autonomy and flexibility of use by offering unlimited content, for a low price, that is consumable on any device, at any time, wherever you are and at the pace you like (Granow et al., 2018; Stoll, 2021b). These features of VoD services have lastingly shaped consumer behaviour and have resulted in new ways of consuming TV shows by watching more than one episode in a row, in contrast to the consumption of merely one episode each week which is typical for linear TV consumption. This highly dosed usage of audiovisual content is frequently termed ‘binge-watching’ (Flayelle et al., 2020; Pierce-Grove, 2017).

Binge-watching

After the release of the full season of *Netflix's* first *Original* in 2013, media picked up on this trend. Popular media outlets were the first to describe the change of watching behaviour itself and the possible negative implications it could have on people's daily living (Kolker, 2013). Binge-watching (BW) was described as being driven by the urge of social belongingness by keeping up with new trends, and as an experience that could be "numbing", "taking its toll" or even addictive but also as entertaining and a "more immersive experience" (Kolker, 2013; Matrix, 2014; Wadler, 2014). Between the years of 2011 to 2015, BW became fashionable, with prominent figures such as Barack Obama and Bill Clinton declaring themselves as committed binge-watchers (Pierce-Grove, 2016). Recent numbers suggest that more than 47% of adults under 45 years engage in weekly watching of two or more episodes of the same series in one sitting, while the prevalence is the highest with 54% among individuals aged between 14 to 35 (Shannon-Missal, 2018; Stoll, 2021c; Stoll, 2021d). The widespread prevalence of BW, the extensive media coverage and the suggested negative implications for the individual's health also sparked the interest of the scientific community into the phenomenon (Pierce-Grove, 2016; Pittmann & Sheehan, 2015).

To date, however, a clear and operational definition of BW is still subject to discussion in scientific discourse. The behaviour is commonly described as watching two or more episodes in one sitting (Flayelle et al., 2020; Merikivi et al., 2020). Frequently this definition is supplemented by stating that the episodes viewed must be from the same show (Ort et al. 2021). The variety in operational definitions in research has been acknowledged as detrimental to the comparability and reproducibility of research results (Flayelle et al. 2020; Merikivi et al., 2020; Starosta & Izodorczyk, 2020). Moreover, the term itself has been critiqued in the context of VoD watching for insinuating pathology (Billieux et al., 2015).

The term 'bingeing' is commonly used to describe behaviours of excession or overindulgence like in binge-drinking and binge-eating, implicitly implying that the behaviour itself is harmful to mental and physical health (Flayelle et al., 2019a; Kuntsche et al., 2017; da Luz et al. 2020). However, the negative connotation of a behaviour that has been shown to be representative for the majority of the population, especially for younger adults, may have led to a shift of focus merely on the adverse effects of binge-watching at societal and individual levels (Flayelle et al., 2019b). Flayelle et al. (2019b) have suggested to refrain from confirmatory

approaches attempting to investigate merely the deleterious effects of excessive VoD watching. Others have advocated to disregard the term binge-watching completely, calling it marathon viewing (MV) instead (Tukachinsky & Eyal, 2018).

Whether the behaviour is termed MV or BW, the underlying problem of a valid definition for problematic behaviour has made existing research prone to inconsistently and arbitrarily dichotomise watching behaviour into 'normal' and problematic behaviour. Hence, taking a step back to consider the amount of VoD consumption as a continuous variable may yield new possibilities of understanding the consequences of the amount of VoD watching which could be the first step towards more exploratory approaches.

Video-on-Demand watching and depression

Although the precise causal or temporal relationship between VoD watching and depressive symptoms has not yet been established, several studies have described an association between the two (Starosta & Izydorczyk, 2020; Steins-Loeber et al., 2020; Tukachinsky & Eyal, 2018).

Higher time spent watching was found to correlate with concentration problems during the day, especially in adolescents but also in young adults (Flayelle et al., 2020; Kavyashree et al., 2013; Schoeni et al., 2016). In a cross-sectional survey by Exelmans and van den Bulck (2017), people who watched "[...] multiple episodes of the same series" (Exelmans & van den Bulck, 2017, p. 4) were found to experience more sleeping problems and insomnia which was associated with lower energy levels, fatigue, and tiredness on the next day. A suggested mechanism was that heightened cognitive arousal due to a more immersive watching experience negatively affected the process of falling asleep and therein sleep itself. All of these studies (Exelmans & van den Bulck, 2017; Kavyashree et al., 2013; Steins-Loeber et al., 2020; Tukachinsky & Eyal, 2018) found a correlation between VoD watching and single symptoms which are known to be linked to depression (American Psychiatric Association, 2013), but the implications also manifest themselves on an affective level. Thereby, watching more may also interfere with goal attainment (deliberate procrastination, unintentional marathon viewing), influenced by lower energy and concentration but also by self-regulation deficits (Flayelle et al., 2020; Hofmann et al., 2012; Merrill & Rubenking, 2019). As a consequence, individuals may experience a lowered mood once they stopped watching due to the discrepancy between their

behaviour and their valued action (Reinecke et al., 2014; Walton-Pattison et al., 2016). Besides negative affective states, lower energy levels as a consequence of deprived sleep are also associated with increased susceptibility to depressive symptomatology.

In their cross-sectional study, Steins-Loeber et al. (2020) pointed out that the reduction in social contact, physical activity and an increase in unhealthy eating are associated with excessive VoD watching which was defined as "[...] 3 or more episodes of at least one TV series in one sitting" (Steins-Loeber et al., 2020, p. 143). While unhealthy eating habits have mainly physiological implications, inactivity and the reduction of social contacts can also impact mental health, thereby making the individual more susceptible to psychopathology. Specifically, people who watch more VoD content on their own were found to be more likely to experience feelings of loneliness due to their reduction of social contacts (Steins-Loeber et al., 2020). Through that, these individuals have an increased chance of feeling depressed which may further foster social isolation, creating a vicious cycle (Ahmed, 2017; Steins-Loeber et al., 2020; Starosta & Izodorczyk, 2020). Although some evidence for negative mental health correlates of watching behaviour exist, too little is known yet about when such behaviour becomes problematic for the individual, which further supports more exploratory than confirmatory approaches (Flayelle et al., 2019b).

Motivations and the role of social context of watching

Overall, the reasons why people engage in frequent VoD watching can be categorised into motivations that seek to facilitate the enjoyable aspects of VoD viewing and into those that serve to re-establish psychosocial balance within an individual as a maladaptive coping mechanism (Flayelle et al., 2020, Ort et al., 2021). Thereby, the motivations of watching and the social context in which these motivations and hence watching occurs appear to be interrelated. Motivations such as watching out of boredom to pass time, procrastinating, dealing with loneliness, escapism and regulation of emotions were all linked to problematic watching behaviour (Flayelle et al., 2020; Ort et al. 2021; Panda & Pandey, 2017; Rubenking & Bracken, 2018). Excessive consumption to reduce possible aversive emotional states is a strong indicator of problematic behaviour, as seen in video gaming addiction or online gambling, but also substance use disorders (Anker et al., 2019; Hartmann et al., 2018; Karsay et al., 2019; Weinstein & Lejoyeux, 2010). Here, emotion regulation as a coping mechanism works as long as

the individual watches, accounting for more watching time, but elicits craving once the user stops and is faced with the same aversive states he sought to escape from, eventually creating a vicious cycle.

In contrast, motivations such as entertainment/joy, relaxation, immersion, learning and social interaction are less likely to yield problematic use (Flayelle et al., 2019a; Ort et al., 2021; Rubenking, & Bracken, 2018; Shim & Kim, 2018). Several studies have emphasised the social nature of watching TV, movies and even VoD (Derrick et al., 2009; Gomillion et al., 2016; Panda & Pandey; Tukachinsky & Eyal, 2018). On the one hand, watching a popular series can enable individuals to foster social connections with friends, family or significant others by bonding over shared interests such as a favourite series. On the other hand, this could mean that people consume certain content in order to be accepted by peers (Starosta et al., 2019). Conforming with the propositions of bonding over VoD content, in their cross-sectional study Gomillion et al. (2016) have suggested that shared interests such as watching a TV show together may facilitate experienced closeness in relationships. Spending time together can improve relationship quality and may well be a key ingredient in leading satisfying relationships. Engaging in longer watching sessions may be one of those immersive positive experiences to be shared (Girme et al., 2014; Gomillion et al., 2016).

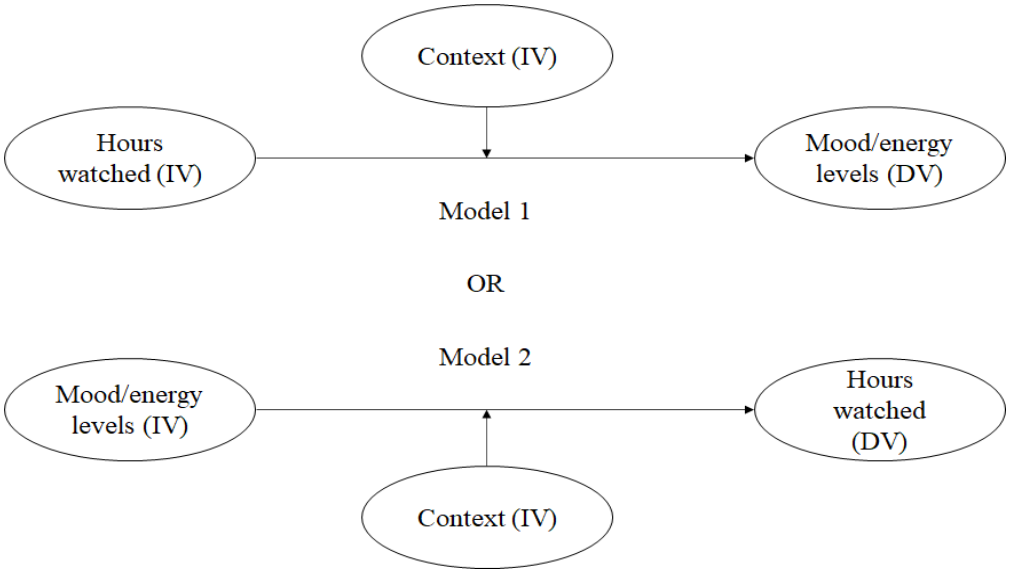
Even though lone VoD consumers have been found to be more likely to engage in problematic watching behaviours (Flayelle et al, 2020; Starosta et al., 2019), for some individuals watching VoD content may also be a buffer to loneliness. Specifically, lone watchers were found to build stronger parasocial relationships with the protagonists of the shows (Derrick et al., 2009; Tukachinsky & Eyal, 2017). Thereby, the perceived familiarity and intimacy with the characters may create a bond that serves to mimic social relationships but creates the tendency to consume more to feel less lonely, thereby increasing watching time (Starosta et al., 2019; Tukachinsky & Eyal, 2017).

It becomes clear that the motivations and consequences of watching VoD content are multi-layered. For many individuals, the positive consequences may determine the high frequency of consuming VoD content, while for others emotion regulation and possible addictive patterns of behaviour may determine the amount of watched content. The social context in which VoD content is consumed might moderate this relationship, between the time spent watching and possible negative effects on mood and energy levels. Therefore, a more explorative approach to

the study of watching behaviour is needed to investigate the directionality of the relationship between VoD watching and negative mood or energy and to account for possible moderating effects.

Figure 1

The theoretical conceptualisation employed in this study



Note. IV = independent variable, DV = dependent variable.

The current study

Following the call to action on more exploratory and longitudinal research designs to provide insight into the consequences of VoD watching over time by Flayelle et al. (2019b) and Granow et al. (2018), this study seeks to investigate the relationship between the time spent watching VoD content and the experienced mood and energy over time, both possible indicators for depression (Starosta & Izydorczyk, 2020; Steins-Loeber et al., 2020; Tukachinsky & Eyal, 2018). Furthermore, it will be investigated whether the association of watching time and mood/energy is influenced by the social context in which VoD is watched (see Figure 1). This will be investigated with the following research questions (RQ): Are there differences in the temporal direction of the association between VoD watching and mood/energy? (RQ1) Are there differences in the association on a between- or within-person level? (RQ2). Is the relation between VoD watching and mood/energy the same day or the next day moderated by the social context of watching? (RQ3).

The need for longitudinal intensive measurement

Overall, the evidence on binge-watching/marathon viewing suggests that VoD watching can have positive effects on mental health, however, there also are indications that some individuals may be more prone to develop a pathological habit that may be detrimental to mental health. To date, the majority of the studies conducted on VoD consumption behaviour utilised cross-sectional designs employing one-time retrospective measurements of watching behaviour which has been critiqued to give a rather unilateral view on the topic (Flayelle et al., 2020).

Cross-sectional designs and retrospective measurements have several limitations. First, they bear the risk of not capturing phenomena to their full extent or deliver biased data due to recall errors (van Berkel et al., 2017). Especially for highly fluctuating behaviours and psychological phenomena such as mood, one-time assessments are not sufficient in capturing individual changes over time. Secondly, inferences about the measured constructs cannot exceed a correlational level and it is not possible to make inferences about the directionality of the effects as the variables are measured simultaneously (Granow et al., 2018; Reinecke et al., 2014). Third, cross-sectional data can only be used to analyse between-person differences and associations between the variables of interest and do not allow to focus on associations between variables within individuals over time (Levin, 2006; Myin-Germeys et al., 2018). Finally, those studies cannot take the influence of contextual factors on the behaviors and feelings of interest, which themselves may also vary over time, into account (Myin-Germeys et al., 2018).

To avoid these limitations, this study uses data collected with the Experience Sampling Method (ESM). ESM is an intensive longitudinal research method with which an individual's behaviour, thoughts, or emotions can be sampled through self-reported momentary assessments (Csikszentmihalyi & Larson, 2014; Myin-Germeys et al., 2018). ESM is becoming a more feasible and easily accessible method as it can be administered via smartphones which are commonly owned nowadays. The longitudinal collection of data with ESM has been shown to be ecologically valid and reliable (Csikszentmihalyi & Larson, 2014; Myin-Germeys et al., 2018; van Berkel et al., 2017; Verhagen et al., 2016).

In an ESM study, the respondents can report on behaviours, thoughts or emotions either in the moment of experience or shortly after they occurred. This decreases the burden of subjects to recall past events because the idiosyncratic experience of an individual can be sampled

immediately after the occurrence of the assessed state or affect (Myin-Germeys et al., 2018; van Berkel et al., 2017). Furthermore, ESM has been shown to deliver more accurate assessments of affective states since it is more sensitive to fluctuations within individuals over time (Myin-Germeys et al., 2018; van Berkel et al., 2017). This sensitivity of ESM will be utilised to assess the fluctuating constructs of mood and energy in relation to VoD watching. Additionally, time-varying contextual variables such as the social context in which VoD watching occurs can be accounted for (Myin-Germeys et al., 2018; Scollon et al. 2009). Further, ESM can be used to investigate the directionality of effects to examine whether VoD watching influences mood or energy levels or whether watching behaviour is influenced by these factors. Finally, the exploration of levels of effect is feasible with ESM (Scollon et al. 2009). Hence, it can be distinguished whether the relationships between VoD watching and mood or energy exist on a group or individual level, making ESM a valuable measurement method in research on VoD watching.

Methods

The current study is a post-hoc analysis of already collected data within the joint research project by Buschmeyer (2020), Erker (2020), Lehmkühler (2020) and Preißler (2020) as part of their bachelor theses. Extensive descriptions of the original study can be found in the respective bachelor theses. Here, an abbreviated explanation of the study design and the measurements of interest for the current post-hoc analysis is presented. The original study project received ethical approval from the Ethics Committee of the University of Twente (200366).

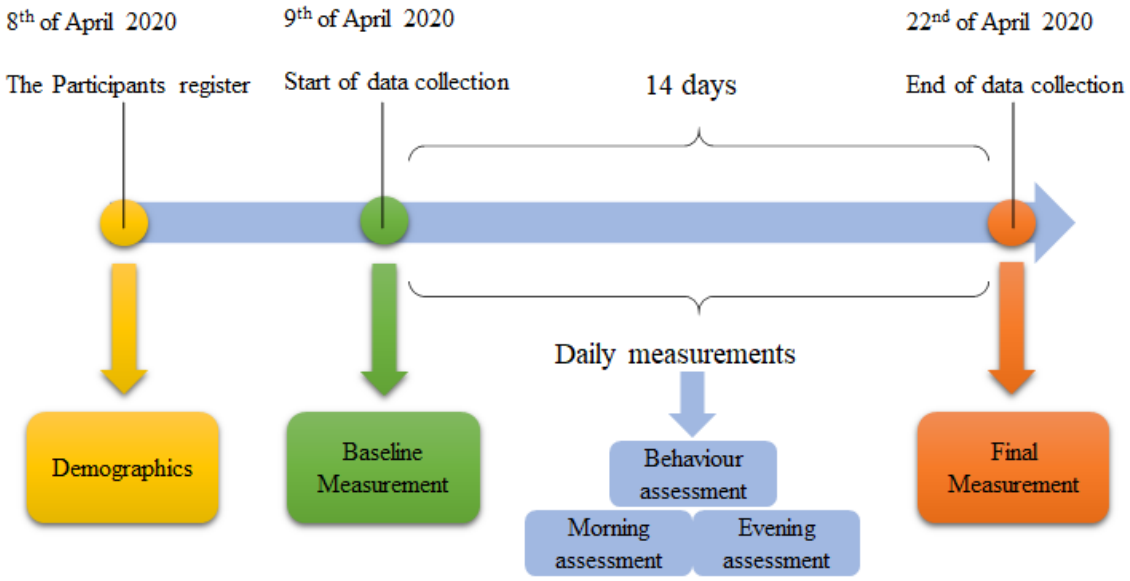
Design

The original study followed a two-week schedule (see Figure 2). Data was collected between the 9th and 22nd of April 2020. In these two weeks, an ESM study was employed to sample the daily VoD watching behaviours of young adults in relation to their experienced depressive symptoms, such as energy level and mood, as well as the context in which VoD watching occurred. For this, interval contingent sampling was used, meaning that the participants received random notifications within a fixed schedule to fill in the assessments each day (Conner & Lehmann, 2012). The data was collected via the smartphone application *Ethica* which is a

mobile version of the *Ethica Data* platform (Ethica, 2021). The *Ethica Data* platform was utilised to invite participants, coordinate the surveys and the assessment prompts and to monitor the response rates.

Figure 2

Visual depiction of the original study design



Note. For a detailed overview of the daily measurements see Figure 3.

Participants

To recruit participants, a convenience sample of 42 subjects was drawn from the researchers' social networks. In accordance with previous ESM research, a rather small sample size of at least 19 participants was deemed sufficient a-priori in consideration of the longitudinal nature of the ESM survey design (Caine, 2016; Conner & Lehmann, 2012; van Berkel et al., 2017). Three of the 42 participants were excluded from the data set since more than 40% of their responses were missing. Although according to the guidelines of Conner and Lehmann (2012) participants should be excluded if they missed more than 50%, this conservative cut-off was chosen to exclude only these three participants and to retain a sufficient number of participants. Yet another participant was excluded since the respondent consistently missed the evening assessments and was, thus, missing crucial information about mood and energy levels over the course of several days.

The final data set for analysis included 38 participants, of which 55% were male (n=21) and 45% female (n=17). The mean age of the respondents was 23.8 years with a standard deviation of 5.3 and a range of 18 to 51 years. Most of the participants were German (92.4%, n=35). The other participants were either from other European countries (5.3%, n=2) or Dutch (2.3%, n=1). Data on the occupational level of the participants revealed that most subjects were students (57.9%, n=22), 23.7% were employed full-time (n=9), 7.9% were apprentices (n=3), 5.3% had a different occupation than the options specified (n=2), 2.6% were part-time employees (n=1), and 2.6% were pupils (n=1). On average the participants watched 1.30 hours (SD=1.87) of VoD content over the course of two weeks. Watching behaviour among the participants ranged from watching nothing at all to a maximum of watching 14 hours a day. Over the period of measurement, the participants had an average score of 3.58 (SD=.66) for mood and of 3.17 (SD=.79) for energy levels. Both variables ranged from 0, indicating worse mood/energy to 4, indicating high mood/energy levels.

Materials

To partake, the participants needed a smartphone on which the free mobile application (Version 157) of *Ethica* could be installed. Through the mobile app, the participants received in total five different types of questionnaires. A one-time questionnaire was administered to assess demographic variables when the subjects registered for the study. A baseline measure of trait characteristics was administered at the start of the two-week period and at the end of the study period for comparison. Furthermore, repeated assessments for the daily behaviours (once a day) and state assessments of feelings of the respondents (twice a day) were collected (see Appendix A and B for a detailed description of all questionnaires).

Demographic questionnaire

Demographic data such as age, gender, nationality and occupational status were collected in order to provide a detailed account of basic information about the sampled subjects (see Appendix A1).

Behaviour assessment

In the daily behavioural assessment (see Appendix A2) participants' watching behaviour of the previous day was assessed in detail. In total 11 questions were posed of which only the first item (Q1: "*Did you watch a series on a video-on-demand platform such as Netflix or Amazon Prime Video yesterday?*"), the fourth item (Q4: "*Please indicate the number of hours you watched*") and the eighth item (Q8: "*In what kind of context did you watch?*") were used in the current research. For question 4, participants could indicate the hours watched with intervals of 0.25. Question 8 asked whether the participants watched *alone*, *with friends*, *with family*, or *with* (their) *partner*.

State assessments

The daily state assessments were prompted twice a day. The morning assessment included 6 single-item questions of which the latter 5 asked the participants to indicate to what extent they experienced several feelings within the past hour (see Appendix A3). For the current study, the items 2 and 3 were used because they were intended to assess the mood (low/sad mood) and energy levels (low energy/fatigue) of the participants. Each item was answered on a 5-point Likert scale, ranging from "*Extremely*", "*Strongly*", "*Moderately*", "*Slightly*", to "*Not at all*". Originally, 5 questions were incorporated into the assessment because each question was intended to measure a specific symptom of depression (Lehmkühler, 2020). The evening assessment included the same questions as the morning assessment plus an additional 9 questions related to other constructs which are irrelevant to the current study (for a detailed account see Appendix A2).

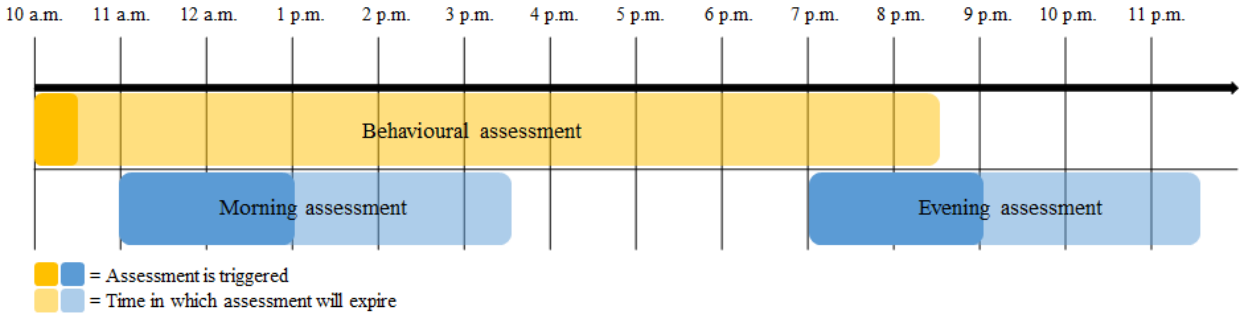
Procedure

The recruited participants received information on the procedure of the study via e-mail (see Appendix B). Until the 8th of April, the subjects were asked to set up an account for *Ethica* and to download the mobile application (see Figure 2). On the 8th of April, they were invited to the study and required to give their informed consent (see Appendix C) and to fill in the demographic and baseline questionnaire to be able to start with the daily assessments on the 9th of April. For the following two weeks until the 22nd of April, every participant received a daily prompt to fill in the morning state assessment at a random point in time within the interval of 11

AM to 1 PM. The evening state assessment was triggered between 7 PM and 9 PM. Both state assessments, when prompted, could be answered for 2.5 hours after which the request expired. The behavioural assessment was prompted between 10 AM and 10:30 AM and was answerable for 10 hours. Following the guidelines of Conner and Lehmann (2012), interval contingent sampling was used to minimise the chance of mental preparation of reporting behaviour or emotional states. See figure 3 for a detailed account of the daily assessments during the 14 days of data collection between the 8th and 22nd of April 2020.

Figure 3

Time intervals for the daily behaviour and state assessments in the active phase of 14 days



Dataset appropriateness

The chosen data set was considered to fit this secondary research for several reasons. First, the sample size met the literature guidelines for ESM study designs (van Berkel et al., 2017; Conner & Lehmann, 2012). Moreover, in consideration of the participants' mean age of 23.7 years, the sample was considered relevant for the general target public since the prevalence of VoD watching is the highest for young adults aged between 14 to 35 years (Shannon-Missal, 2018; Stoll, 2021c).

Secondly, the collected ESM data allowed for a detailed exploration of the watching behaviour. As the amount of content watched was measured in hours, also lower levels of VoD watching can be included in the analyses. Thereby, the limitations of previous studies on VoD watching behaviour which arbitrarily dichotomized as BW can be avoided.

Thirdly, the available data allowed exploration of the fluctuations of feelings of mood and energy in relation to the watching behaviour over a period of two weeks. Here, the richness of data from the data points per day allows the comparison of affective and behavioural changes

between days. The scalability, as well as the frequency of measurement, could provide a more sensitive picture of how individual changes regarding the measured constructs occur in real life. More specifically, the availability of data on the context of watching could be used to examine under what social conditions problematic watching might occur and what implications that might have. Finally, due to the longitudinal nature of the data, more advanced analyses become possible regarding the directionality and type of the relationship of VoD watching and changes in mood and energy.

Data Analysis

The collected data was post-hoc analysed using IBM SPSS Statistics Version 27 (IBM Corp., 2020). First, the separate data sets were merged into one long-format file. A dummy variable was created for the social context in which participants had watched VoD content. The variable was coded 1 if the participants had watched at least once in a social setting on the previous day, so either with their partner, friends or family. If participants had watched alone, this variable was coded 0. If the participants had answered that they had not consumed any VoD content on the previous day, the value of the variable 'hours watched' was coded as 0. The values of the variables for mood and energy were reverse coded so that high values equalled high levels of energy or high levels of mood. An additional variable, the mean of mood was calculated from the entries of the morning and evening assessments of each day. The same was done for energy.

A series of linear mixed models (LMMs) was used to analyse and visualise the data and to statistically test the different research questions. LMM was considered a suited method to analyse ESM data for several reasons. First, utilising a maximum likelihood estimation, LMM can inherently account for missing data by estimating the most likely response of a subject based on their previous responses (Conner & Lehmann, 2012). This feature has been shown to be useful as missing data points are likely within the structural, longitudinal nature of ESM (Scollon et al., 2009). Secondly, as each measurement is nested within each participant, multi-level models such as LMM are required to handle this nested structure of such intensive longitudinal data without losing information in the process (Conner & Lehmann, 2012). All LMMs were performed with a first-order autoregressive or AR (1) covariance matrix with homogeneous variances. Autoregressive models try to predict a series based on previous values (lags) of the

series. A model that only depends on the previous value or lag is called a first-order autoregressive model (Littell et al., 2000). This covariance matrix was chosen because it infers that observations are correlated more strongly if they are timely adjacent and that measurements are correlated within subjects.

For the number of hours watched and daily mood and energy levels, additionally, the person-mean (PM) and the person-mean centered (PMC) scores were calculated to separate between-person and within-person associations. Whereas a between-person effect would involve differences across respondents, a within-person effect reflects the variability of effect in a single individual over time or observations. According to Curran and Bauer (2011), the disaggregation of between-subjects and within-subjects effects can be done efficiently and unambiguously utilising the method of person-mean centering. First, to obtain the person-mean scores, the mean score of each respondent across all timepoints was calculated. Secondly, by subtracting the PM from each individual's daily total score, the PMC scores were calculated.

For all LMMs, the dependent and independent variables of interest were transformed into z-scores to obtain standardized regression estimates from the LMMs. This allows the comparison of Beta-estimates for easier interpretation of the results. In line with the propositions by Cohen (1988) the scores were interpreted as weak if β <.30, as moderate if β = .30 - .50 and as strong if β > .50. For all analyses, the respondent ID was entered as the subject and the time point/day was entered as repeated to account for the repeated measurement data. To examine the overall association between mood and watching behaviour on the previous day over time, two LMMs were performed, one with mood and another one with energy as the dependent variable and the number of hours watched as fixed covariate. Next, to examine whether associations were present on the between-subjects or within-subjects levels, another two LMMs were conducted. Here, the PM and PMC scores for the number of hours watched were added simultaneously as fixed covariates on mood as the dependent variable. An identical model was carried out by replacing the dependent variable mood with energy to investigate possible associations with the second indicator of depression.

To investigate the (inverted) relationship of mood and energy (IV) on time spent watching (DV) on the same day, the variable "hours watched" (IV) was lagged by one value so that the possible association of the independent variable with mood or energy as dependent variables could be explored. First, two LMMs were performed with the number of hours watched

as the dependent variable and either mood or energy as fixed covariates. Following this, two LMMs were conducted to explore the between- and within-person associations with the number of hours watched on the same day as the DV and either the PM and PMC for mood or the PM and PMC for energy as fixed covariates.

Lastly, four more LMMs were conducted to test the possible moderation effect of the social context of streaming. Thereby, the dummy variable of social context was added to the model for the overall associations as a fixed factor along with its interaction term in order to establish whether the social context moderated the association between mood/energy and the time spent watching. For the first LMM, mood was set as the DV and the number of hours watched on the previous day and the social context as fixed covariates. For the second LMM, the DV of mood was exchanged with the variable energy. The last two LMMs were performed with the number of hours watched on the same day as the DV and either mood or energy and the social context as fixed covariates. For all of the aforementioned analyses estimated marginal means, parameter estimates of fixed regression effects (β) and p-values were obtained to answer the research questions. For all statistical analyses a p-value of $<.05$ was considered to be statistically significant (Amrhein et al., 2017; Brysbaert & Stevens, 2018).

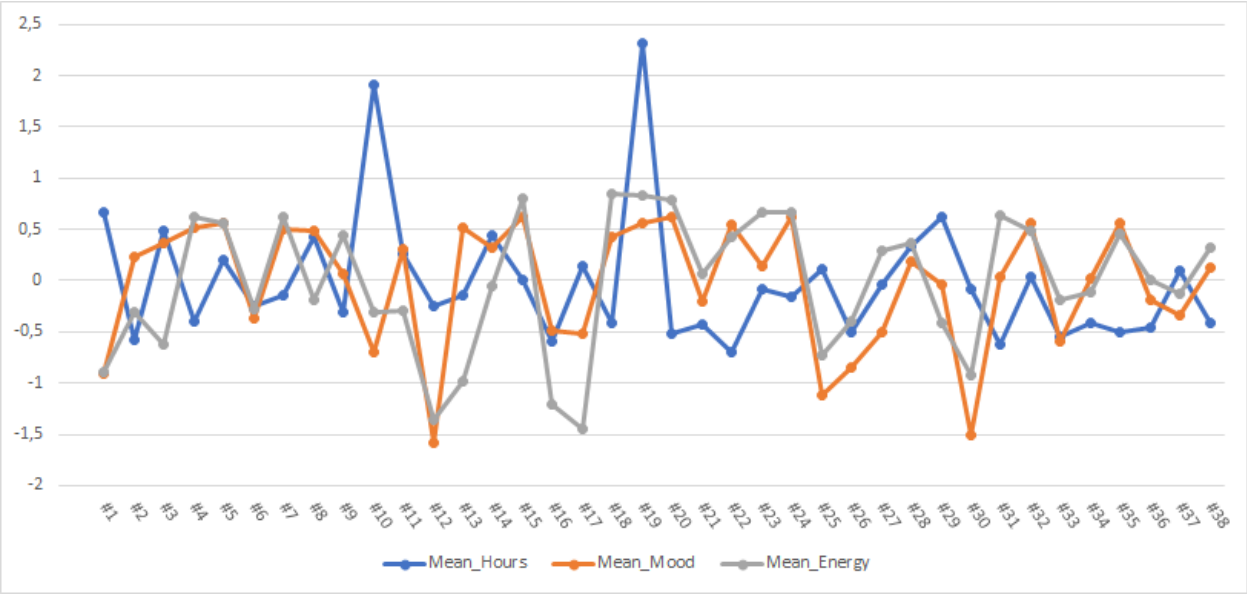
Results

Exploration of associations

To gain some insight into the associations between mood/energy and watching behaviour, the estimated marginal means for the three main variables were calculated and visualized in a graph. In figure 4, the distribution of means of the number of hours watched and the mood and energy levels are displayed per respondent. Overall, looking at the distribution of means for mood and energy it becomes apparent that on a group level the two factors appear to correlate between persons. This means that participants with on average lower mood, also had lower energy levels. Regarding the association of the number of hours watched with either mood or energy, no clear between-person association was observed.

Figure 4

Estimated Marginal Means for the main variables 'hours watched', 'mood', and 'energy' per participant

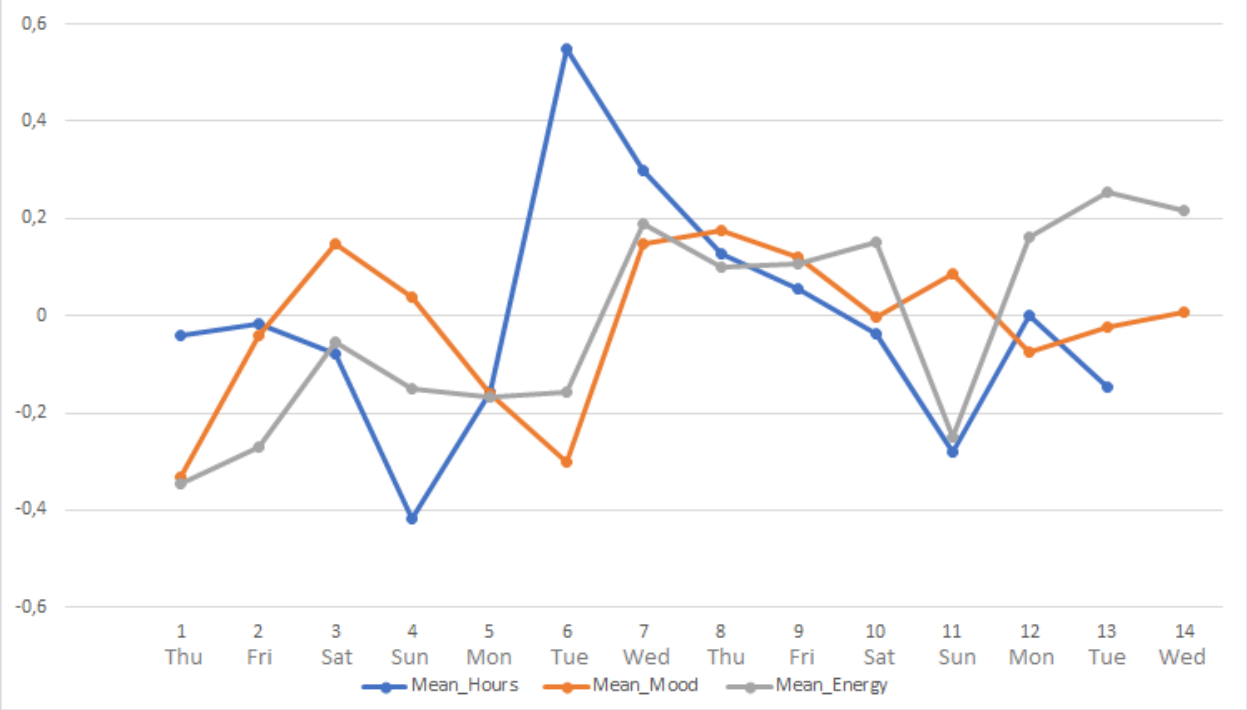


Note. On the y-axis, z-scores are displayed. On the x-axis, the participants (38 in total) are listed.

In figure 5, the distribution of the daily means across all participants is given for the three main variables. No clear consistent association of the distributions of means between the number of hours watched and the mood and energy levels can be observed over time. However, it is noticeable that on average the number of hours of watched VoD content decreased rapidly during the weekends of each week. The means of mood and energy levels fluctuated over the week. Towards the weekend, either on Thursday in the first week, or on Wednesday in the second week an increase in mood levels could be observed with a decreasing trend towards the beginning of each week. The levels of energy seemed to follow a slightly different trend. Whereas on average an increase of energy could be observed over the weekends in both weeks, energy levels on the first weekend are lower than on the second weekend.

Figure 5

Estimated Marginal Means for the main variables 'hours watched on the previous day', 'mood', and 'energy' per timepoint (days)

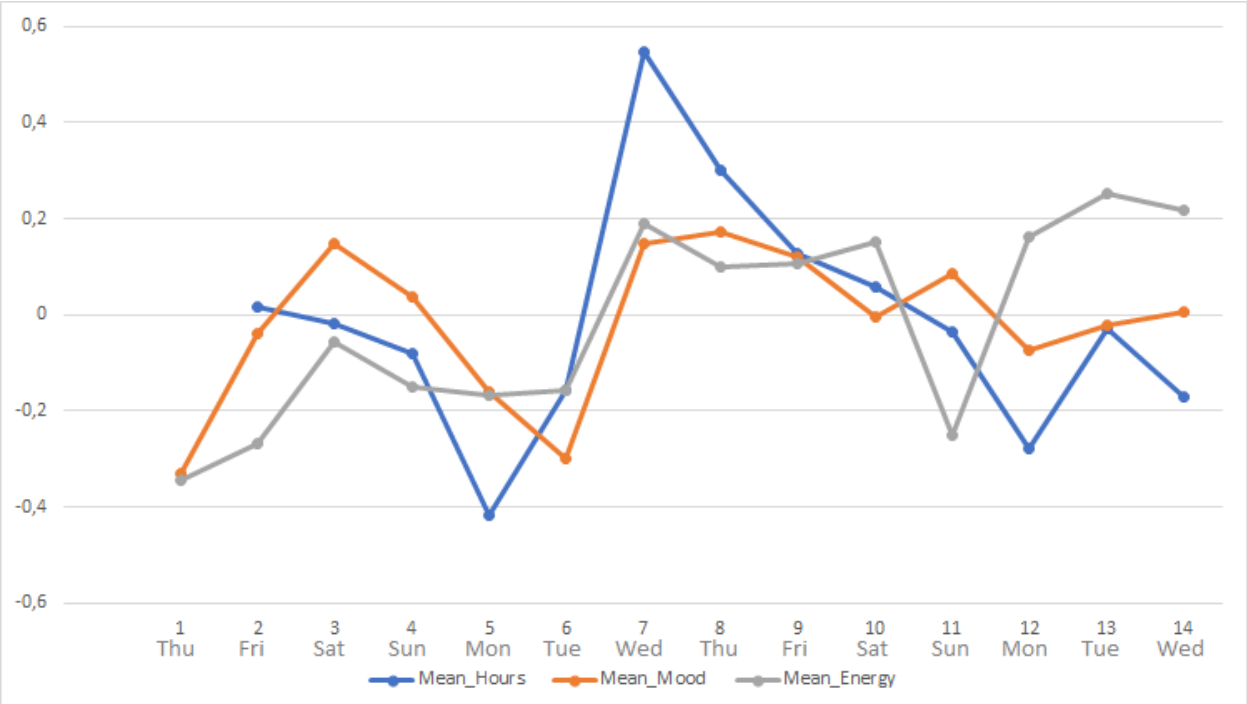


Note. On the y-axis, z-scores are displayed. On the x-axis, the timepoints (14 days in total) are listed.

In figure 6, the associations of the main variables are displayed per timepoint (14 days in total) similarly to figure 5. In contrast to figure 5 which displays the time spent watching on the previous day, in this graph the number of hours watched on the same day are displayed. Again, no clear trend for an association between VoD watching and mood and energy was evident.

Figure 6

Estimated Marginal Means for the main variables 'hours watched on the same day', 'mood', and 'energy' per timepoint (days)



Note. On the y-axis, z-scores are displayed. On the x-axis, the timepoints (14 days in total) are listed. In this graph, the number of hours watched was lagged by 1 day, so that the number of hours watched on the same day is displayed.

Overall associations between the number of hours watched and mood or energy on the next day

To statistically test the overall associations for the number of hours watched and either mood or energy the next day, two LMMs were conducted. For the association between mood and VoD watching the prior day, no statistically significant association was found (see Table 1). The relationship between the watching behaviour on the previous day and energy levels was found to be statistically significant (p=.033). Although the association was only weak in strength *(β=.10)*, the model indicates that with increasing time spent watching VoD content, energy levels on the next day tended to increase as well.

Table 1

Results of the Linear Mixed Model with the number of hours watched on the previous day as the fixed factor and its effect on either mood or energy levels.

	β	*SE*	*p*	95 % CI
Mood				
Hours watched	-.07	.04	.123	-.16, .02
Energy				
Hours watched	.10	.05	.033	.01, .19

Note. The model for mood was not statistically significant with [$F(1,460.22)=2.39$, $p=.123$]. The model for energy was found statistically significant with [$F(1,460.68)=4.60$, $p=.033$].

Overall associations between mood or energy and the number of hours watched on the same day

To investigate the relationship between mood or energy as the IVs and the number of hours watched on the same day as the DV, two LMMs were performed (see Table 2). Both models indicated that neither mood nor energy was significantly associated with VoD watching the same day.

Table 2

Results of the Linear Mixed Model with either mood or energy as the fixed factor and its effect on the number of hours watched on the same day.

	β	*SE*	*p*	95 % CI
Mood	.09	.06	.121	-.02, .19
Energy	-.06	.05	.245	-.17, .04

Note. The model for mood was not statistically significant with [$F(1,444.74)=2.41$, $p=.121$]. The model for energy was also not statistically significant with [$F(1,440.35)=1.36$, $p=.245$].

Associations on the between- and within-person level

To further explore whether the relationships between the time spent watching and mood or energy differed on the within-person or between-person level, further LMMs were conducted (see Table 3). For VoD watching and mood the next day neither on a between-person nor on a within-person level, a statistically significant effect was found. For the model with energy, a statistically non-significant effect was found on the between-subjects level, but on the within-subjects level, a statistically significant effect was found (p=.011). This means that when participants watched more than their own average this was weakly positively associated with higher levels of energy the next day.

Table 3

Results of the Linear Mixed Models with the person-mean and person-mean centered of the number of hours watched as the fixed factors and its effect on mood/energy on the next day

		β	*SE*	*p*	95 % CI
Mood					
Hours watched	PM	-.01	.07	.868	-.16, .13
	PMC	-.06	.04	.117	-.14, .02
Energy					
Hours watched	PM	-.05	.07	.531	-.19, .10
	PMC	.10	.04	.011	.02, .17

Note. PM=person-mean, PMC= person-mean centered. For mood, the model was not statistically significant between persons [F(1,80.62)=.28, p=.868]. The model was not statistically significant within persons [F(1,410.70)=.2.47, p=.117]. For energy, the model was not statistically significant between persons [F(1,86,41)=.40, p=.531]. The model was statistically significant within persons [F(1,415.74)=6.60, p=.011].

Next, the relationship between the time spent watching on the same day as the IV and mood or energy as the DV was explored with two LMMs in regard to between- and within-person associations (see Table 4). For both mood and energy, no statistically significant between-person or within-person associations with VoD watching on the same day were found.

Table 4

Results of the Linear Mixed Models with the person-mean and person-mean centered of mood/energy as the fixed factors and its effect on the number of hours watched on the same day

		β	*SE*	*p*	95 % CI
Mood	PM	-.03	.08	.712	-.19, .13
	PMC	.06	.04	.147	-.02, .13
Energy	PM	.01	.08	.994	-.15, .15
	PMC	-.03	.04	.522	-.10, .05

Note. PM=person-mean, PMC= person-mean centered. For mood, the model was not statistically significant between persons [$F(1,71.03)=.14$, $p=.712$]. The model was not statistically significant within persons [$F(1,371.78)=2.12$, $p=.147$]. For energy, the model was not statistically significant between persons [$F(1,80.87)=.00$, $p=.994$]. The model was not statistically significant within persons [$F(1,384.11)=.41$, $p=.522$].

VoD watching and mood or energy moderated by the social context of watching

To examine the potential moderation effect of the social context in which VoD content was watched on the relationship between the time spent watching as DV and mood or energy as IV, two separate LMMs were conducted (see Table 5). Both interaction models were found to be non-significant. Hence, the social context in which VoD content was consumed did not significantly affect any associations between VoD watching and mood or energy levels.

Table 5

Results of the Linear Mixed Models with mood or energy and the social context of watching as the fixed factors and its effect on the number of hours watched on the same day

	β	*SE*	*p*	95 % CI
Mood				
Hours watched	.06	.06	.291	-.06, .18
Context	-.15	.11	.176	-.38, .07
Hours watched*Context	-.02	.08	.794	-.17, .13
Energy				
Hours watched	.03	.07	.665	-.10, .16
Context	-.22	.12	.068	-.46, .02
Hours watched*Context	-.08	.08	.349	-.25, .09

Note. For mood, the interaction model was not statistically significant [$F(1,202.63)=.07$, $p=.794$]. For energy, the interaction model was not statistically significant [$F(1,220.26)=.89$, $p=.349$].

Two more LMMs were conducted to investigate the interaction effect of the social context on the relationship between mood or energy and the number of hours watched on the same day (see Table 6). Again, both models were not found to be statistically significant. Thus, the social context also did not moderate the relationship between the time spent watching and mood or energy levels on the next day.

Table 6

Results of the Linear Mixed Models with the number of hours watched on the previous day and the social context of watching as the fixed factors and its effect on either mood or energy

	β	*SE*	*p*	95 % CI
Mood				
Mood	.02	.08	.781	-.13, .18
Context	.12	.13	.354	-.14, .38
Mood*Context	-.15	.13	.239	-.39, .10
Energy				
Energy	.22	.08	.008	.06, .38
Context	.14	.13	.292	-.12, .40
Energy*Context	-.14	.13	.272	-.39, .11

Note. The interaction model 'Mood*Context' was not statistically significant [$F(1,269.75)=1.40$, $p=.239$]. The interaction model 'Energy*Context' was not statistically significant [$F(1,274.13)=1.21$, $p=.272$].

Discussion

The purpose of this study was to take a more exploratory and detailed look at the association between VoD watching and indicators of depression over time. As aforementioned, a large body of previous research has adopted rather confirmatory approaches to the supposedly problematic and addictive nature of modern streaming behaviour (Ahmed, 2017; Flayelle et al., 2019b; Panda & Pandey, 2017; Rubenking & Bracken, 2018). Only recently, scholars such as Flayelle et al. (2019b) have advocated for a more exploratory stance in VoD research as the various antecedents and outcomes of VoD watching have been shown to be complex and are not merely reducible to a negative or problematic nature (Flayelle et al. 2020; Merikivi et al., 2020; Starosta & Izydorczyk, 2020). Therefore, this study served to find out how mood or energy as

indicators of depression are associated with watching behaviour over time and whether the social context in which persons watch influences this association.

Current findings in light of previous research

Overall, VoD watching was not clearly associated with mood or energy as indicators of depression, neither as an antecedent to nor as an outcome of watching, at the group level. Whereas the time spent watching VoD content was weakly associated with higher levels of energy on the next day, changes in mood levels the next day were not predicted by the number of watched hours. A possible explanation for this association between watching behaviour and energy may be that consumers "successfully" watched as a means for relaxation or entertainment (Ort et al., 2021; Shim & Kim, 2018). Therefore, VoD watching may have served as a recreational activity that participants knowingly engaged in to restore or enhance their energy. The second indicator of depression, mood, was not associated with the time spent watching the day before. The respondents in the current sample did not seem to have used VoD watching as a maladaptive strategy to alter their affective states as suggested by previous research (Flayelle et al., 2020; Rubenking & Bracken, 2018). In consideration of the on average high levels of energy and mood of the respondents, it can be concluded that both levels were quite high in general over the course of the measurement period.

These findings stand in contrast to previous studies which found that excessive VoD watching is used as a maladaptive coping mechanism and will deplete energy (Ahmed, 2017; Kubey & Csikszentmihalyi, 2002). One reason for this difference may be the variation in outcomes if watching behaviour is planned rather than unintentional (Castro, et al., 2019; Riddle et al., 2018). Here, intentional VoD watching could yield better outcomes and may be less likely of problematic nature. This discrepancy could also be explained by the methodological differences between the current and previous studies.

The aforementioned studies employed cross-sectional surveys which are more susceptible to recall biases (Granow et al., 2018; Myin-Germeys et al., 2018; van Berkel et al., 2017). In more detail, a retrospective measurement method such as a questionnaire can be subject to imprecise measurements as the participants are required to accurately reproduce their idiosyncratic experiences after their occurrence (van Berkel et al., 2017). ESM preserves the ecological validity of measurement by minimising the reliance on recall to report on the to-be-

measured phenomenon through more direct assessment of affective states and processes in the natural environment of an individual (Granow et al., 2018; Myin-Germeys et al., 2018; van Berkel et al., 2017). Moreover, the difference could be derived from the sampled population. The average watching time of all participants over the course of two weeks was 1.30 hours (90 minutes). Although this is rather simplified as the individual averages differ, it illustrates that overall, the respondents engaged in watching behaviour which compares to the average time (1.37 hours) adults aged 18-34 spent on watching linear TV (Richter, 2020). This could suggest that most of the respondents rather displayed recreational viewing patterns than obsessive ones or that the sample was largely composed of less severe watchers.

Interestingly, whenever individuals had watched more than their own average, they seemed to profit from VoD watching by feeling more energised the next day. This positive association between watching and energy the next day seemed to operate at an intraindividual level. Not only opposes this the notion of experiencing worse mood and energy levels after watching, advocated by Ahmed (2017) and Kubey and Csikszentmihalyi (2002) but it also suggests that particularly ("excessive") watchers who exceeded their average watching time experienced pleasant effects rather than detrimental ones. Alternatively, if the individuals had a relaxed day and therefore, more time to watch, this could have accounted for the increase in energy on the next day as well.

Besides the investigation of the outcomes of VoD watching, the directionality of the relationship between watching behaviour and indicators of depression was explored. Mood and energy did not predict the number of hours watched on the same day. Previous studies have found that depression was a significant predictor of more time spent on VoD watching (Ahmed, 2017; Tukachinsky & Eyal, 2018; Wheeler, 2015), claiming that individuals utilised watching as a maladaptive coping strategy to escape from their dysphoric reality. A possible reason why no evidence in favour of this hypothesis was found may be that merely two indicators of depression were utilised while the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5) lists eight criteria in total (American Psychiatric Association, 2013).

Furthermore, the sample of the study consisted mostly of highly educated psychology students who are more likely to use adaptive coping strategies to deal with psychosocial stressors (Enns et al., 2018; Sideridis; 2006), perhaps making them less prone to use VoD watching as a problematic coping mechanism. The operationalisation of varying definitions of BW may be a

possible explanation for the difference in findings as well (Flayelle et al., 2020). In this study, the time spent watching VoD content was considered entirely whereas other studies researched BW defined as "[...] watching more than one episode from the same TV content consecutively in the same session (Ahmed, 2012, p. 198) or as "[...] 3 or more episodes of at least one TV series in one sitting" (Steins-Loeber et al. (2020, p. 143). The lack of an operational definition is a primary barrier to the comparability of research findings.

Although the social context of watching was anticipated to moderate the relationship of VoD watching as a factor on mood or energy levels or on the relationship of mood or energy on VoD watching, no such interaction was found. This means that whether the participants watched alone or in company of others did not affect either of the two models. A reason for this might have been that the data was collected during the beginning of the Covid pandemic in April 2020 when the first social distancing measures had been implemented (Deutsche Welle, 2020). The number of people watching alone rather than with others might have increased due to social distancing. Therefore, the associations between the context in which individuals have watched and the affective states and watching times connected to that might have been altered. However, it should be noted that no evidence was found either that supported findings of previous studies that individuals who watched alone were more susceptible to problematic watching behaviours (Flayelle et al. 2020).

Foremost, the findings highlight that VoD watching, and its various implications and antecedents is a complex phenomenon that needs to be researched considering the context in which it takes place and regarding the individual outcomes of watching. Further, it emphasises the importance of distinguishing between within-person and between-person processes and the additional value of intensive longitudinal measurement designs to capture VoD watching in its context (Curran & Bauer, 2011; Myin-Germeys et al., 2018). Linear mixed modelling as utilised in this study has been useful in accounting for the hierarchical nature of ESM data. Further, it successfully differentiated between the levels of effect at group and individual levels through the disaggregation of data with the person-mean centering method (Curran & Bauer, 2011).

Limitations and future research directions

The sample of this study consisted of 57.9% of young students which could have introduced a selection bias. The homogeneity of the sample may limit the generalizability of the

findings to the extent that highly educated psychology students do not necessarily fall under the risk groups for problematic behaviours, such as addiction (Hormes et al., 2014; Kuss et al., 2013; Wu et al., 2013). Generally, university students are usually of higher socioeconomic status and are more likely to rely on adaptive coping responses and less likely to have self-regulation deficits (Hormes et al., 2014; Kuss et al., 2013; Wu et al., 2013). Notwithstanding, a sample of young adults is well suited for research into VoD watching as the prevalence among this population is the highest (Flayelle et al., 2020; Merrill & Rubenking, 2019). Still, the inclusion of a more heterogeneous sample in terms of educational and occupational levels could improve the variability of watching behaviour and mood and energy levels to represent the target population of young adults.

Another limitation is the data collection period. The data was collected during the beginning of the Covid-19 pandemic which likely severely affected how much time individuals spent at home which in turn led to an increase in VoD consumption (Watson, 2020). Social distancing measures had been in place for a month (Deutsche Welle, 2020). Being isolated may have influenced the reported affective states as well as the context in which VoD content was consumed. This scenario seems interesting to study, however the replicability and transferability to other, more 'normal' societal contexts are not necessarily given. To determine whether the detected effects remain, the research should be replicated after the restrictive measures of the pandemic have been lifted.

The analyses that were used also constitute a limitation to the study. The utilised analyses operate at the group level as the observations of each individual are linearly regressed onto a single regression line. Even if the PMC method was able to successfully assess and distinguish the levels of effect, the analysis of individual data could have given insight into how variables are related for specific individuals (Scollon et al., 2009). Within N-of-1 methods, the investigation of the relationship of VoD watching and indicators of depression for individuals would become feasible as N-of-1 analyses plot observations on a regression line for one participant (McDonald et al., 2020; Scollon et al., 2009). This method derives its statistical power from the sample size of the repeated observations of an individual subject over time (McDonald et al., 2020). Within N-of-1 designs, the utilisation of the experience sampling method can be beneficial by allowing intensive longitudinal measurement of highly personalised data (Johnston & Johnston, 2013; Kwasnicka & Naughton, 2020).

Building on the foundation of this study, future research should further explore the relation between VoD watching and mental health. The finding that mood and energy as indicators of depression were not negatively related to VoD watching could be further elaborated by investigating the remaining symptoms indicative of a depressive disorder, for instance, impaired concentration or feelings of guilt (American Psychiatric Association, 2013). Moreover, researching whether the within-person effect of increased energy on the next day of watching is connected to the intentionality of watching through a motivation such as relaxation could yield a better understanding of the suggested positive qualities of VoD watching. ESM as an intensive longitudinal research method could be valuable to this purpose since the assessment of changes in VoD consumption and affective states in connection to its social context or motivations can be assessed. To explore individual differences in VoD watching, the usage of N-of-1 analyses as described in McDonald et al. (2020) is advocated. As suggested by Brand (2021), a study employing N-of-1 analyses should include substantially more measurement points to provide sufficient statistical power.

Conclusion

To the researcher's knowledge, this study was the first to explore the directionality and the nature of effects between mood and energy as indicators of depression and VoD watching behaviour in relation to the social context of watching. It was found that the time spent watching was weakly positively related to a rise in energy levels on the next day. Specifically, individuals who watched more than their own average over the duration of two weeks profited from an increase in energy levels the next day. Overall, no negative effects of the amount of VoD watching on mood or energy were found. Also, no evidence was found that the social context of watching influenced the relationship between mood or energy and the time spent watching. The findings of this research raise the question if "excessive" VoD watching is depicted as more problematic in current scientific discourse than it might actually be. Future research should aim to replicate the results of this study at an individual level of analysis. A possible guideline for individual-level analysis (N-of-1) is provided by McDonald et al. (2020). In combination with ESM as an intensive longitudinal measurement method, future research should explore whether and when VoD watching becomes problematic for the individual.

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Appendix A: The original survey, including all four questionnaires

Appendix A1: Demographics

Welcome to our study about VoD watching behaviour! Thank you for your time and support! Before the daily questionnaires start, we would like to get some basic information about you.

1. Please indicate your gender.
    - o Male
    - o Female
    - o Other (or do not wish to answer)
2. How old are you?
3. What is your nationality?
    - o Dutch
    - o German
    - o Other, European
    - o Other, non-European
4. Please indicate your current occupation.
    - o Pupil
    - o Student
    - o Apprentice
    - o Employed full-time
    - o Employed part-time
    - o Unemployed
    - o Other

As you were informed beforehand, we would like to investigate your video-on-demand (VoD) watching behaviour. This does not mean linear television, but streaming platforms such as, for example, Netflix. The following questions are meant to explore your usage of these services to watch series, shows or/and movies.

5. Please mark the VoD streaming services that you usually use to watch series, shows, or/and movies. Multiple answers are possible.
    - o Netflix
    - o Amazon Prime Video
    - o Hulu

- o Disney+
- o Maxdome
- o Sky Home
- o Youtube
- o Other

6. Do you use one of these services at least once a week?

- o Yes
- o No

Appendix A2: Behaviour assessment

Hey there! Now we'd like you to answer some questions concerning your video-on-demand watching behaviour.

1. Did you watch a series on a video-on-demand platform such as Netflix or Amazon Prime Video yesterday?

- o Yes
- o No

2. At what time of the day did you watch the series? Multiple answers are possible. For example: You watched from 6 p.m. until 11 p.m., mark evening and night.

But: The times only serve approximate orientation. If you started watching at 5:55 p.m., for example, you do not have to mark “afternoon”.

- o Morning (6 a.m. - 12 p.m.)
- o Afternoon (12 p.m. - 6 p.m.)
- o Evening (6 p.m. - 11 p.m.)
- o Night (11 p.m. - 5 a.m.)

3. Did you watch for more than 1 hour?

- o Yes
- o No

4. Please indicate the number of hours you watched.

5. Please indicate how many episodes you watched. If you watched more than 20 episodes, choose 21.

6. What type of content did you watch?

a. Comedy

b. Thriller

c. Documentary

d. Horror

e. Action

f. Drama

g. Romance

h. Adventure

i. Animation

j. Mystery

k. Science-fiction

l. Fantasy

m. Other

7. What was your reason for watching? *Multiple Choice

a. Entertainment

b. Boredom/nothing else to do

c. Stress

d. Interest/Curiosity

e. Escape from reality/distraction

f. Procrastination/Avoidance of other responsibilities

g. Information seeking

h. Peer activity (watching with friends/family)

i. Relaxation/taking a break

8. In what kind of context did you watch?

a. Alone

b. With friends

c. With family

d. With partner

9. After that, did you feel guilty for watching?

a. Yes *enables following items

b. Not at all.

10. To what extent did you feel guilty?
    a. Slightly guilty
    b. Moderately guilty
    c. Very guilty
    d. Extremely guilty
11. Please mark the reason for your guilty feeling
    o I watched more episodes or for a longer time than I wanted / planned to.
    o I neglected other obligations that I should have fulfilled.
    o I neglected other free-time activities that I wanted to pursue.
    o I neglected bodily needs, for example sleep.
    o I think that I wasted time or could have spent that time more wisely/useful.
    o Other, namely… *enables Free-Form Text Question

Thank you for answering the questions. See you later!

Appendix A3: Morning State Assessment

Good Morning! We'd just like you to answer some questions about your recent moods and feelings. Have a nice day!

1. On a scale of 0 to 10, with 0 being no stress and 10 being the worst stress possible, what number best describes your level of stress right now?
2. Please indicate to what extent you experienced the following feelings within the past hour.
    o Low/sad mood
        ▪ Not at all
        ▪ Slightly
        ▪ Moderately
        ▪ Strongly
        ▪ Extremely
    o Low energy/fatigue
        ▪ …
    o Feelings of guilt
        ▪ …
    o Problems with concentration

        - …
    - Sleeping problems in the last night
        - …

Appendix A4: Evening State Assessment

Hey! We'd again like you to answer a few questions concerning your current moods and feelings. Thank you!

1. On a scale of 0 to 10, with 0 being no stress and 10 being the worst stress possible, what number best describes your level of stress right now?
2. Please indicate to what extent you experienced the following feelings within the past hour.
    - Low/sad mood
        - Not at all
        - Slightly
        - Moderately
        - Strongly
        - Extremely
    - Low energy/fatigue
        - …
    - Feelings of guilt
        - …
    - Problems with concentration
        - …
3. Next, there are some statements about feelings and thoughts. Please tick the box that best describes your experience of each during the day.
    - Today, how often have you felt nervous, anxious or on edge?
        - Not at all
        - Several times
        - More than half of the day
        - Nearly all day
    - Today, how often have you not been able to stop or control worrying?
        - …

- Today, how often have you felt down, depressed or hopeless?
  - …
- Today, how often did you have little interest or pleasure in doing things?
  - …

4. Next, there are five statements that you may agree or disagree with. Please indicate your agreement with each item by choosing the answer that suits your agreement on the statement based on your momentary feeling the most. That means your answer should reflect how you feel about a particular statement right now. Please be open and honest.

- In most ways my life is close to my ideal.
  - Strongly disagree
  - Disagree
  - Slightly disagree
  - Neither agree nor disagree
  - Slightly agree
  - Agree
  - Strongly agree
- The conditions of my life are excellent.
  - …
- I am satisfied with my life.
  - …
- So far, I have gotten the important things I want in life.
  - …
- If I could live my life over, I would change almost nothing.
  - …

Appendix B: Information mail for the participants

Hey there!

Thank you very much for agreeing to participate in our study about Video-on-Demand (VoD) watching behaviour! This research will be conducted from April 9 until April 23 (2 weeks in total). In general, our goal is to investigate the topic of VoD watching behaviour. In order to be able to participate in this study, it is necessary that you follow the steps in the “To-do” section.

We recommend you to mark this e-mail as “important” in your inbox, so you can easily find it again.

To-do:
Before the daily questionnaires start, you need to fill in one questionnaire concerning your demographics and general information about your watching behaviour and one baseline questionnaire today.
In the next 2 weeks, you need to answer three different questionnaires each day:

- Morning State Assessment (3-5 minutes)
- Evening State Assessment (3-5 minutes)
- Behaviour Assessment (3-5 minutes)

After the two-week period, one final questionnaire needs to be filled in.
Conveniently enough, this will be done via the “Ethica” mobile application. In order to participate in this study, you need to download and install the Ethica app on your mobile phone in the respective app store. Further information about that will be sent to you soon via e-mail.
It is important that you register today, April 8. If you have not registered until 11:59 p.m. today, you won’t be able to participate in the study. You should receive the first notification from Ethica around 10:00 a.m. tomorrow, April 9. In case you don’t get access to any questionnaires until 11:00 a.m, please contact us immediately. The questionnaires are going to take you a maximum of 15 minutes in total each day. You will receive regular notifications to remind you of the questionnaires, but it is very important that you check your phone yourself during the day, especially if you don’t receive any notifications due to whatever reason. If you have any questions, comments, or doubts about the study, feel free to contact us via e-mail (see contact details below). We will reply as soon as possible.

Contact details
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Thank you in advance!
Kind regards,
Olivia, Robert, Dino, and Johanna

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 investigate the use of video-on-demand (VoD) streaming services. 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 18 years old and are proficient in English. This application (Ethica) is used over a two-week period to respond to daily questionnaires. For the study's purpose, it is important that you answer the questions in a given time frame. So, you should make sure that the notifications on your mobile device are switched on, since you receive notifications on that device within these time frames.

As part of the study, you will first receive a questionnaire concerning your demographics and a baseline questionnaire that need to be filled out once before the actual study starts. From tomorrow on, April 9, you will receive three short daily questionnaires consisting of 10-15 questions over a period of two weeks that will take you 3-5 minutes each. The daily assessments will focus on your behaviours, moods and feelings with regard to your VoD watching behaviour. After the two-week period you will receive a final questionnaire to fill in.

Besides the time invested and a slight disruption of your daily life, we do not expect that you will experience any disadvantages from this research. 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.

Moreover, your answers will be treated confidentially. All personal data (e.g., e-mail, age, gender, etcetera) will be anonymised 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, Johanna Lehmkühler, Robert Preißler, Dino Erker, or Olivia Buschmeyer (see contact information in your earlier received e-mail). You can also contact us, if you are interested in the outcomes of the study.

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