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The Association of Video-on-Demand Watching and Depressive Symptoms:

An Experience Sampling Post-Hoc Research

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VIDEO-ON-DEMAND WATCHING AND DEPRESSIVE SYMPTOMS

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Abstract

Introduction. The increasing availability of Video-on-Demand (VoD) services has led to a new phenomenon called "binge-watching" (BW), which involves watching multiple episodes of a series in one sitting. The phenomenon has quickly gained increasing interest since BW is assumed to have a negative impact on (mental) health. The aim of the present study is to examine the association between VoD watching and depressive symptoms and focus especially on the temporal directionality of the relationship.

Method. This is a post-hoc study using the Experience Sampling (ESM) data of four bachelor theses. The participants answered three short daily questionnaires over a 14-day period. The questionnaires assessed VoD watching behaviour once per day and depressive symptoms twice per day. To analyse the longitudinal data, several Linear Mixed Models (LMMs) were used.

Results. The sample consisted of 36 participants ($M_{Age} = 23.83$, $SD_{Age} = 5.47$; 52.8% male), which were mostly German students. No significant association between VoD watching and depressive symptoms was found, neither when VoD watching was used as a predictor nor consequence of depressive symptoms and neither between nor within participants. Estimates were larger when depressive symptoms were used as a predictor of VoD watching, but they remained small ($\beta = 0.034$, $p = .490$).

Discussion. The results indicate that there is no significant association between VoD watching and depressive symptoms on the group level. However, the visual analyses indicated an association for some individuals. These findings suggest that for most individuals, binge-watching is not harmful, but for some people, it can be problematic. Further research is needed to identify people at risk for the development of adverse effects.

The Association of Video-on-Demand Watching and Depressive Symptoms:

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The recent developments in technology have made it easier than ever for viewers to consume their favourite TV shows. Online streaming services like Netflix, Amazon Prime, Apple TV, or Disney+ offer viewers a great variety of shows for affordable prices. Furthermore, viewers are not dependent on a TV anymore to watch their favourite shows. Streaming services are available as applications to use on Smart-TVs, laptops, tablets, and phones, which makes viewing TV shows possible at any place and any time (Steins-Loeber et al., 2020). Another feature of these platforms is that they offer Video-on-Demand (VoD) by making various series and movies immediately available, either by online streaming or downloading them. Furthermore, many of these platforms publish complete seasons of a series at once. This allows users to watch as many episodes as they like, not having to wait each week for new episodes to get published. This immediate availability of entire series has led to a relatively new phenomenon called "binge-watching" (BW) (Starosta & Izydorczyk, 2020). BW is commonly defined as watching between two and six episodes of a TV show in one sitting (Netflix, 2013). This kind of watching behaviour has quickly become the new norm for watching TV series, especially among young adults (Starosta & Izydorczyk, 2020). The phenomenon has also raised increasing interest from psychological research, as researchers are trying to develop a deeper understanding of why individuals engage in BW and its potential consequences. Most of the studies exploring this kind of watching behaviour to date have looked at personality traits associated with BW, BW-motivations, profiles of binge-watchers and (mental health) risks associated with BW (Flayelle, Maurage, et al., 2020). Especially the latter has led to contradictory results in the past and is still in need of more in-depth research.

Binge-Watching

Bingeing often refers to negative aspects of excessive behavioural patterns, like binge-eating and binge-drinking. Hence, the term "binge-watching" has been negatively connotated for a long time. But BW is assumed to have many positive characteristics as well, for example being able to dive deeper into the narrative or making social connections by exchanging with others about the latest episode of a series (Starosta et al., 2019; Starosta & Izydorczyk, 2020). Therefore, BW has become the new normative way of watching TV for many people. According to a study by Forte et al. (2021), about 51% of European citizens engage in BW,

and 60% of binge-watchers indicated to do so more than once a week. Younger people generally tend to engage more in BW than older people, with the majority of binge-watchers being aged between 18 and 39 years. Current research is in disagreement about any gender differences in terms of BW frequency since some studies found that women engage more in BW (Flayelle, Maurage, et al., 2020), while other studies found BW to be a gender-neutral phenomenon (Moore, 2015). Differences between genders tend to display rather in the content of the series as women tend to prefer dramas and comedies while men watch more fantasy or sci-fi series (Starosta & Izydorczyk, 2020).

One issue limiting research into BW is that to date there is no consistent definition of BW in the literature. The present studies vary in their operationalization of BW and consider different criteria, which is a major obstacle to coherence and reproducibility. Some authors define it by taking into account the amount of hours spent viewing, while others refer to the total number of episodes watched (Panda & Pandey, 2017). Rubenking and Bracken (2018) consider the length of the episodes viewed, defining BW as watching at least three to four or more thirty-minute-long episodes of a TV series or three or more one-hour-long episodes. Other authors in turn relate to the viewing of an entire season or an entire series in one sitting (Tefertiller & Maxwell, 2018). The current definitions are also in disagreement on whether the episodes watched must be from the same series or whether BW also refers to watching multiple episodes from different series (Flayelle, Maurage, et al., 2020). However, one aspect all these definitions have in common, is that they consider watching multiple episodes consecutively (Flayelle, Canale, et al., 2020; Panda & Pandey, 2017; Rubenking & Bracken, 2018). Therefore, the most common definition for BW is viewing between two and six episodes of a TV show in one sitting (Netflix, 2013).

Predictors and Consequences of Binge-Watching

Most of the research to date has focused on either the predictors or the consequences of BW. A recent review by Starosta and Izydorczyk (2020) found that BW is often used for entertainment, a way of spending free time and relaxation. BW can also be influenced by social motivations as people make social connections through BW, for example when they become part of a fandom (Starosta et al., 2019). Another motivation for BW is the fear of missing out and avoiding spoilers from other viewers (Conlin et al., 2016). Moreover, BW can help the viewer to dive deeper into the narrative, which amplifies the experience of watching a show (Starosta & Izydorczyk, 2020). However, BW can also be the result of compensatory motivations, for instance when individuals try to escape reality or avoid

problems. Furthermore, BW can be used as a strategy to regulate negative and unpleasant emotions since BW has been shown to positively affect the mood of individuals after watching (Boudali et al., 2017; Starosta & Izydorczyk, 2020).

Next to many assumed positive aspects related to BW, excessive BW can also lead to impairments like insomnia, chronic fatigue, an unhealthy lifestyle, neglect of important life duties, and reduction of social relationships (Flayelle, Maurage, et al., 2020). These impairments are often the consequences of problematic BW when individuals try to use BW as a maladaptive way of coping (Flayelle, Maurage, et al., 2020). There are several motivations to engage in problematic BW, such as the urge to escape from reality, dealing with loneliness, habit or passing time (Starosta & Izydorczyk, 2020). Some individuals reported feeling a decrease of meaningful and positive affect right after viewing, which in the literature is called a "show-hole", referring to a feeling of emptiness after completing a series (Tefertiller & Maxwell, 2018). Studies have also shown the potentially addictive nature of BW, which shows itself in different symptoms, such as lack of control, feelings of guilt and neglect of duties or even symptoms of withdrawal such as anxiety, nervousness and concentration difficulties (Starosta & Izydorczyk, 2020). Individuals who show addictive tendencies often engage in BW to obtain instant gratification and use it for emotion regulation, which is characteristic of problematic internet use, gambling and social media addiction as well (Flayelle, Canale, et al., 2020). Personality traits like neuroticism and introversion, low self-esteem, isolation and low conscientiousness have been shown to be the main predictors of addiction to different types of media (Starosta & Izydorczyk, 2020). Furthermore, some studies have shown that excessive forms of BW can lead to mental conditions, such as depression, anxiety or sleeping problems (Starosta & Izydorczyk, 2020).

Depression and Binge-Watching

Past research has shown a link between depression and other binge behaviours, like binge-eating or binge-drinking. For instance, a study by Bertoli et al. (2016) could show a link between binge-eating and depression as well as anxiety. Furthermore, a study by Strine et al. (2008) has shown that anxiety and depression among adults were related to binge-drinking and alcoholism. Hence, it may be implied that depression is related to BW as well.

The potential connection between BW and depression is assumed to have several possible underlying mechanisms, which are often the same as for other binge-related behaviours. One aspect that can affect binge-behaviours is self-control. Individuals with high levels of self-control are less likely to practice binge-eating or -drinking (Tangney et al.,

2004). Low self-control, on the other hand, has been shown to be an important predictor of binge-drinking and alcohol-related behaviours (Gibson et al., 2004). Another factor that may play a role in the connection between BW and depression is the viewer's coping-style. Recent research suggests that BW can be an emotion-focused coping strategy, and that emotional enhancement and coping are the key motives for BW (Flayelle, Canale, et al., 2020). A study by Sun and Chang (2021) found that some individuals use BW as a way to escape reality and avoid their negative emotions, which decreases the use of other adaptive coping strategies.

Previous studies that have specifically investigated the relationship between BW and depression, however, yielded mixed results. Some studies discovered that people's BW frequency was related to symptoms of depression (Ahmed, 2017; Wheeler, 2015), while other studies found no such association (Tefertiller & Maxwell, 2018). Furthermore, it is not clear whether depression leads to BW or the other way around. Cross-sectional studies looked for an overall association between the two variables and could only assume the direction of the relationship. A recent bachelor's study specifically explored whether depression may be the consequence of BW rather than its predictor using longitudinal data, but the results could not support this hypothesis (Lehmkühler, 2020). Some authors also suggest that the relationship between depression and BW may be reciprocal, with both variables influencing each other (Starosta & Izydorczyk, 2020; Tefertiller & Maxwell, 2018). To date, research regarding BW, and especially on the association between BW and depression, is still in its infancy. More research is needed to understand whether there truly is an association between BW and depression and what the temporal nature of such an association is.

Experience Sampling Method

Previous studies have investigated the association between BW and depression using different methods, but most of them relied on either qualitative methods or retrospective cross-sectional survey designs (Flayelle, Maurage, et al., 2020). For the present study, the Experience Sampling Method (ESM) is used to investigate the relation between BW and depressive symptoms over time in more detail. The ESM is a relatively new methodology that has gained increasing interest for use in different fields, like behavioural sciences, psychology, psychiatry and psychosomatic medicine (Myin-Germeys & Kuppens, 2021). With the ESM, it is possible to track the experiences and behaviours of individuals in the real-world and nearly in real-time, using self-reports multiple times per day over a short period of time. This methodology has several advantages over traditional cross-sectional designs. First, the ESM is assumed to substantially reduce the risk of recall bias since individuals report their

experiences closer to the moments in which they actually occur. This leads to higher reliability and validity of the data, compared to retrospective cross-sectional design studies (Myin-Germeys & Kuppens, 2021; Tefertiller & Maxwell, 2018). Furthermore, the ESM allows to study temporal associations between momentary behaviours and feelings using intensive longitudinal data. This kind of data makes it possible to investigate the directional nature of the relationship, which is not possible with traditional cross-sectional designs (Myin-Germeys & Kuppens, 2021). Another advantage of ESM is that it makes it possible to look at the individual level, whereas other methods prefer to stay at the group level, with the goal of making statements about whole populations (Myin-Germeys & Kuppens, 2021).

The Present Study

The aim of the present study is to develop a deeper understanding of the association between symptoms of depression and BW over time. As explained in the previous section, the measurement of BW has been inconsistent in the past, and any classification of BW tends to be rather arbitrary. Therefore, the amount of VoD watching in number of hours will be used as a measure in the present study. The association between depressive symptoms and VoD watching will be explored by answering the following research questions:

1. What is the momentary association between same day VoD watching and depressive symptoms?
2. How much of the participants' variation in depressive symptoms is explained by their VoD watching the day before?
3. How much of the participants' variation in VoD watching is explained by their depressive symptoms the day before?

Methods

Design

This is a post-hoc study based on the joint bachelor thesis project of Lehmkühler (2020), Buschmeyer (2020), Erker (2020) and Preissler (2020). The ESM was applied in the initial study to assess daily behaviour and daily states. Using an application called Ethica, participants received daily short questionnaires on their smartphones over the course of 14 days. Within the context of the ESM, a semi-random sampling scheme was used (Myin-Germeys & Kuppens, 2021). Based on this sampling scheme, participants received the daily assessments at random times within multiple pre-defined time intervals. This sampling scheme is the most commonly used in ESM studies because it offers several advantages. The use of the semi-random sampling scheme results in a relatively high ecological validity, relatively low participant burden, and relatively small negative consequences for compliance, compared to other sampling schemes (Myin-Germeys & Kuppens, 2021). Only three short daily questionnaires were administered to keep the participant burden low and increase compliance. The measurements were presented in English to generate as many participants as possible. Depressive symptoms were assessed twice each day as they were expected to change more frequently than watching behaviour, which was assessed only once each day. Since the assessment frequency was rather low with three assessments per day, the study duration was set to 14 days to gather enough data (Myin-Germeys & Kuppens, 2021). Furthermore, the duration of 14 days allowed to compare behaviour and states on weekdays with those on weekends (Myin-Germeys & Kuppens, 2021). The questionnaires assessed the two variables "number of hours watched" and "depressive symptoms". The number of hours watched was used as a measure of VoD watching. Since the aim of the present study is to explore the temporal direction of the relationship between the two variables, both variables were used as the dependent as well as the independent variable in the analyses.

Participants

To gather participants for the study, convenience sampling was used as the participants were recruited from the researchers' personal networks. It was aimed to recruit up to 40 participants since current research suggests that a sample size between 30 and 40 is sufficient for most ESM studies to obtain reliable and valid results for most purposes (van Berkel et al., 2018). Furthermore, the study aimed to include participants aged between 18 and 30 years since people in this age group engage the most in BW, compared to other age groups (Starosta & Izydorczyk, 2020). Furthermore, the participants were required to install

the Ethica mobile application on their smartphone and to create an account in the system to participate in the study.

Materials

Since the initial sample was gathered for the purpose of different theses, participants answered some questionnaires that are not relevant for the present research. For the present study, only the demographics questionnaire, the once-daily behaviour assessment, and the morning and evening state assessment of depressive symptoms were used.

Demographic Assessment

The demographics questionnaire contained six items and assessed information regarding the gender, age, nationality and occupation of the participants. Furthermore, it was assessed what streaming services respondents use regularly. This questionnaire was administered once, before the start of the behaviour and state assessments (Lehmkühler, 2020).

Behaviour Assessment

Next, the VoD watching behaviour was assessed each day more in detail using 11 items with adaptive logic. First, participants were asked whether they had watched a series on a VoD platform on the previous day. If they answered this question with "No", it led them to the end of the survey. If they answered with "Yes", the survey continued by asking them during what time of the day they had watched, for how long they had been watching and how many episodes they had watched. Furthermore, participants were asked what type of series they had watched and their reason for watching. Lastly, participants were asked in what context they had watched (Lehmkühler, 2020).

State Assessment

The state assessment examining the variable "depressive symptoms" took place twice each day, once in the morning and once in the evening. During each assessment, respondents had to indicate for five depressive symptoms (low/sad mood, low energy/fatigue, feelings of guilt, concentration problems and sleeping problems) to what extent they had experienced them within the past hour. The items were specifically developed for the study by the researchers. The five symptoms were based on the diagnostic criteria for a depressive disorder from the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) and have been found to correlate with BW (Exelmans & van den Bulck, 2017; Flayelle, Maurage, et al., 2020; Schoeni et al., 2016). The symptom of sleeping problems was only assessed in the morning since it was not considered to be relevant

for the evening assessment. A 5-point-Likert scale was used to rate depressive symptoms (Not at all, Slightly, Moderately, Strongly, Extremely) (Lehmkühler, 2020). A mean over the morning and evening assessments was used for further statistical analysis.

Procedure

The participants were recruited from March 30th and started the daily assessments from April 9th until the 22nd of April 2020. They were informed about the longitudinal nature of the study and received instructions on how to participate in the study via email. After registering for the study in Ethica, participants were asked to accept the informed consent form to participate in the study.

Once the participants had signed up, they were asked to complete the demographics questionnaire. After that, the data collection began. Participants were asked to report their VoD watching behaviour of the previous day in the morning, for which they received a notification between 10 a.m. and 10:30 a.m. The notification for the assessment of depressive symptoms appeared in the morning between 11 a.m. and 1 p.m. and in the evening between 7 p.m. and 9 p.m. (Lehmkühler, 2020).

Data Analysis

The data was exported from Ethica and then analysed with the software IBM SPSS Statistics version 28. First, the dataset was cleaned and a new variable with the mean depression scores of the two assessments each day was computed. Next, descriptive statistics were calculated to evaluate the demographics questionnaire. After that, frequency tables were created to analyse the pattern of the VoD watching behaviour as well as the mean depression scores of the participants over the two weeks. After that, different methods of visualizing the data were used to explore the variability in the data.

Next, a series of Linear Mixed Models (LMM) with first-order autoregressive covariance structure (AR1) for the repeated measurements was used to test the different research questions. AR1 specifies homogenous variance and that "covariances between observations on the same patient are not equal, but decrease toward zero with increasing lags" (Littell et al., 2000, p. 1800). A multi-level model is the method of choice for ESM data because it can handle the complexities of longitudinal data, for example missing data, unequally spaced time points or time-varying covariates, which other classical procedures cannot handle (Myin-Germeys & Kuppens, 2021). For each LMM, the timepoint (in days)

was set as the repeated measurement and the participant's ID as the subject. To avoid controlling for time in all following analyses, a LMM was run with depression as the dependent variable and the timepoint as a fixed covariate. The same was done for the number of hours watched, using said variable as the dependent variable.

In the next step, the association between depressive symptoms and same day VoD watching was investigated. Therefore, a one-day lagged variable for the mean daily depression scores was computed using the timeseries function in SPSS. Then, the first observation for every participant was unselected in the one-day lagged variable. After that, a LMM was calculated using the one-day lagged depression variable as the dependent variable and number of hours watched as a fixed covariate.

To answer the second research question on how much of the participants' variation in depressive symptoms is explained by their VoD watching the day before, depression was set as the dependent variable and the number of hours watched the previous day was set as a fixed covariate. Using longitudinal data, it is possible to not only look at between-person associations but also at within-person associations. This allows to investigate how much individuals differ from themselves (within-person association), compared to how much they differ from others (between-person association). To avoid an error of interference, one must first disentangle the within- and between-person effects, which can efficiently be done using the strategy of person mean centering (Curran & Bauer, 2011). Therefore, the next step involved calculating the person mean scores (for between-person associations) by taking the mean score for number of hours watched over all observations for each participant. For the calculation of the person centered means (for within-person associations) the person mean of every participant was subtracted from each of their observations for number of hours watched. Then, another LMM was run with depression as the dependent variable and the person mean and the person centered mean of number of hours watched as a fixed covariate.

To answer the third research question and investigate how much of the participants' variation in VoD watching is explained by their depressive symptoms the day before, a two-day lagged variable of depression was created using the timeseries function in SPSS. This variable was lagged two times to be able to predict VoD watching by depression on the previous day. A new LMM was computed, using number of hours watched as the dependent variable and the two-day lagged depression variable as a fixed covariate. Again, the person mean and the person centered mean of the two-day lagged depression variable were used to analyse both the between- and within-person associations. For this purpose, a LMM was used

again, using the number of hours as the dependent variable and the person mean and the person centered mean of the two-day lagged depression variable as a fixed covariate.

Results

Characteristics of the Participants

A total number of 40 participants completed the daily questionnaires. Two participants were excluded from the datasets due to low completion rates. One additional participant was excluded because they did not answer any of the evening assessments. Another participant was excluded from the dataset because they reported that they had never watched a series during the study period. Therefore, the final sample consists of 36 participants. In total, 52.8% of the participants were male. The age of the participants ranged between 18 and 51 years ($M = 23.83$, $SD = 5.47$). The majority of the sample was German (91.7%) and reported being a student as their current occupation (50%). The most popular streaming service among the participants was Netflix (83.3%).

Watching Behaviour and Depression Levels

The depression level of the participants ranged between 1 and 5 ($M = 1.6$). On average participants watched 2.2 episodes in one sitting ($SD = 3.1$) with a maximum of 21 episodes. The LMM with depression as the dependent variable and the timepoint as a covariate yielded nonsignificant results ($\beta = -0.026$, $p = .136$), indicating no linear association over time. The mean number of hours watched was 1.4 hours ($SD = 1.8$) with a maximum of 14 hours. The LMM with hours as the dependent variable and timepoint as a covariate showed no significant association ($\beta = 0.000$, $p = .990$), indicating that there was no linear increase or decrease in number of hours watched over the 14 days. Figure 1 shows the mean number of hours watched and the mean depression scores for each participant. The figure suggests a substantial between-person variability for the number of hours watched. The figure also implies variability in depression scores, but not as strong as for number of hours watched. Moreover, the figure suggests an association between depression and hours watched for some participants. This is implied since some individuals have a high score for hours watched and depression. However, other individuals, like participant #11, have watched for many hours but their depression scores are comparatively low. Hence, the figure implies an association only for some individuals.
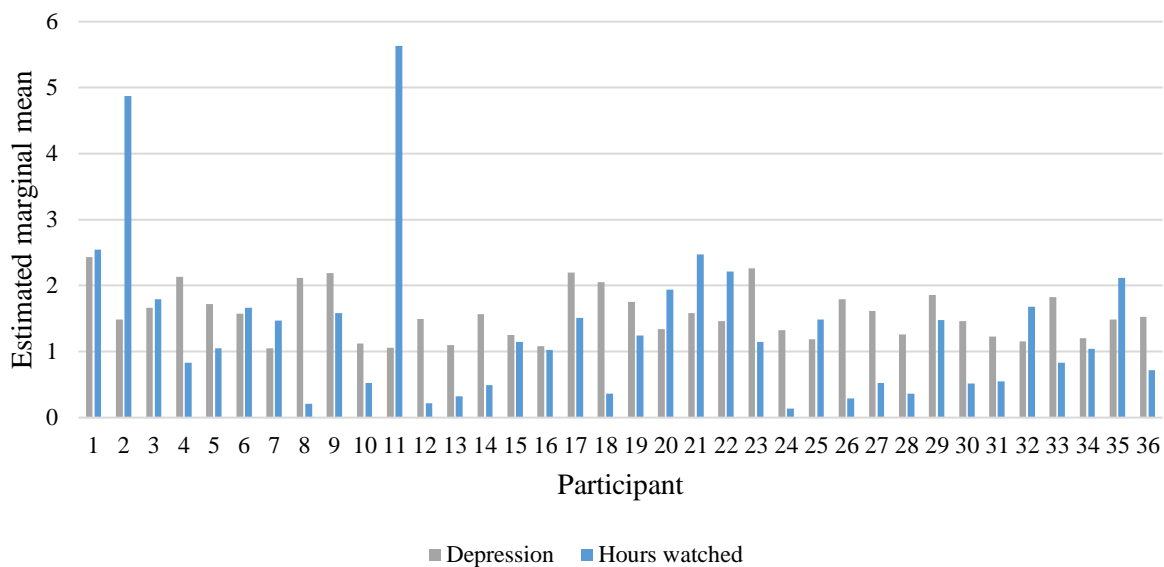
Figure 1

Estimated marginal means for depression and hours watched per participant

The Association between Depressive Symptoms and same day Watching Behaviour

Figure 2 shows a line graph for the mean scores for hours watched and same day depression over the course of 14 days. The visual analysis of Figure 2 indicated no clear association between the average number of hours watched and average depression scores. The LMM with depression as the dependent variable and hours watched as a covariate indeed showed no significant overall association between the two variables (see Table 1). A further LMM investigating the between- and within-person associations yielded insignificant results as well (see Table 1).

Figure 2

Estimated marginal means for same day hours watched and depression over 14 days
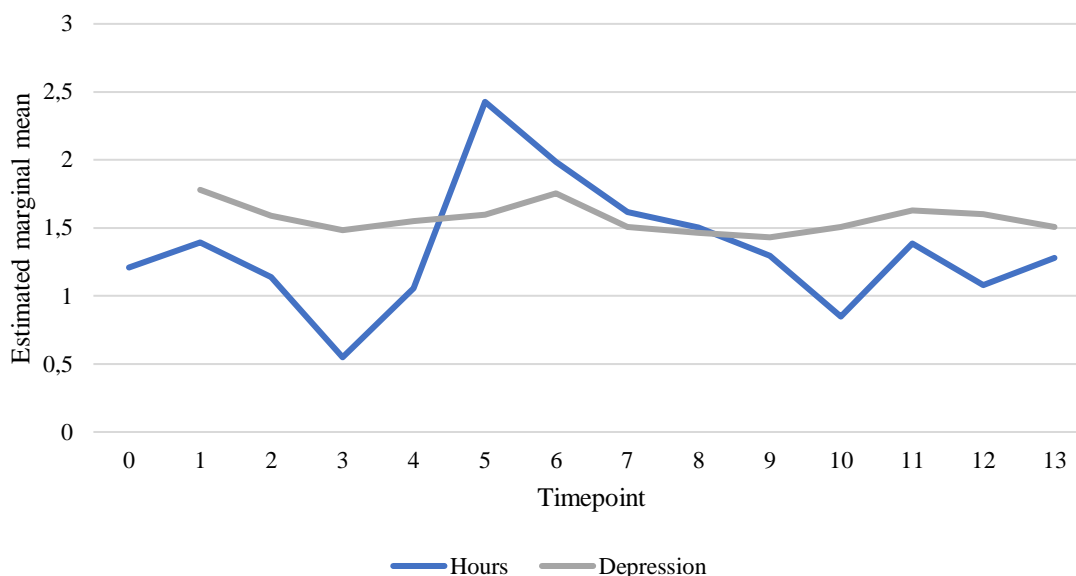
Note. Hours watched begins at day 0 because this variable was measured retrospectively.

Table 1

Estimates of fixed effects of VoD watching on same day depression (N = 36)

Covariate	*B* (*SE*)	*β*	*F* (df1, df2)	*p*
Hours watched	0.002 (0.014)	0.007	.02 (1, 416.9)	.878
Hours watched between person association	-0.036 (0.039)	-0.076	.89 (1, 71.2)	.349
Hours watched within person association	0.008 (0.015)	0.021	.29 (1, 353.8)	.593

Note. Dependent variable = same day depression

The Temporal Directionality of the Relationship

The next LMMs were computed to explore the directional nature of the association. Table 2 shows the results of the LMMs investigating the impact of VoD watching on next day depression. The LMM with depression as the dependent variable and hours watched as a fixed covariate showed no significant effect. A further analysis of the between- and within-person variability revealed a nonsignificant association at the group level as well. Figure 3 shows the individual associations between VoD watching and next day depression. For most participants, the slope is flat, indicating no association between the two variables. But for some participants, there is a steep slope, indicating a strong positive or negative relationship

between VoD watching and depression. Last, there are also some flatter slopes indicating a moderate positive or negative association between the two variables.

The LMM with hours watched as the dependent variable and the two-days lagged depression variable as a fixed covariate indicated no significant effect (see Table 3). A further LMM analysing the between- and within-person associations resulted in nonsignificant results as well. The association between depression and next day VoD watching can be seen in Figure 4. Again, the figure indicates no association for most participants. But for some participants, there appears to be a strong negative or strong positive association between the two variables.
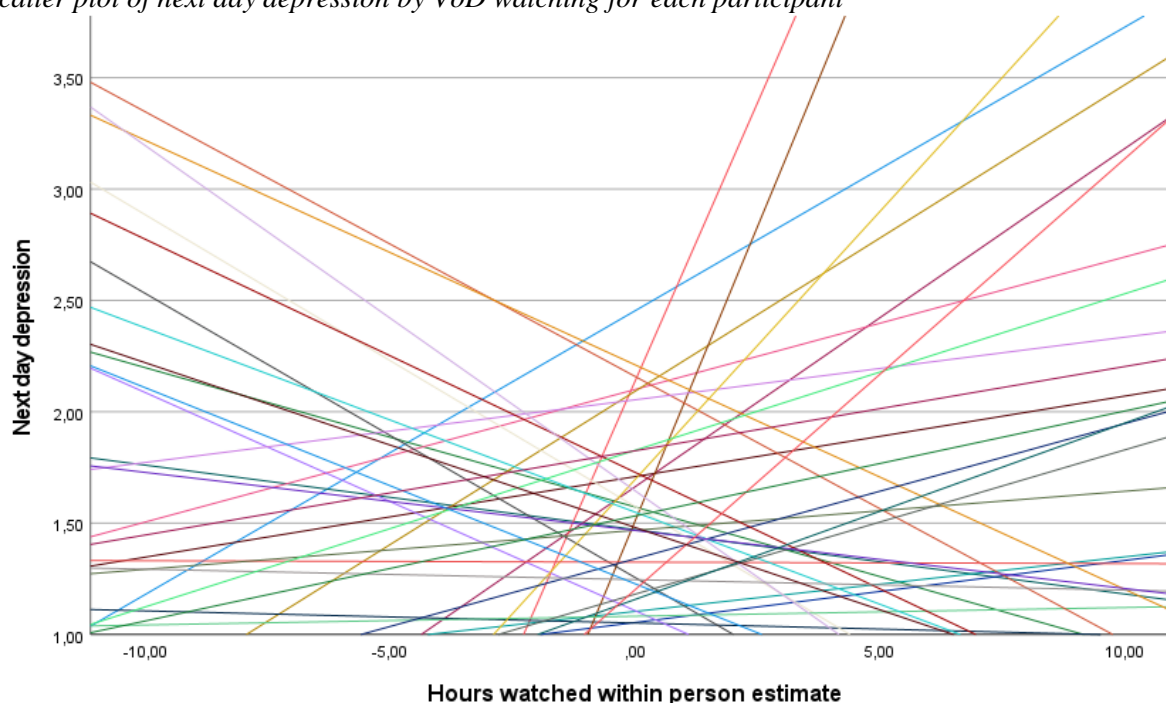
Table 2

Estimates of fixed effects of VoD watching on next day depression (N = 36)

Covariate	B (SE)	β	F (df1, df2)	p
Hours watched	-0.002 (0.013)	-0.008	.03 (1, 451.84)	.862
Hours watched between person association	-0.021 (0.038)	-0.045	.32 (1, 72.96)	.572
Hours watched within person association	0.000 (0.014)	0.001	.00 (1, 377.08)	.981

*Note*. Dependent variable = next day depression

Figure 3

Scatter plot of next day depression by VoD watching for each participant

Table 3

Estimates of fixed effects of depression on next day VoD (N = 36)

Covariate	*B* (*SE*)	*β*	*F* (df1, df2)	*p*
Depression	0.117 (0.170)	0.034	.48 (1, 3867.0)	.490
Depression between person association	-0.129 (0.461)	-0.023	.08 (1, 83.6)	.780
Depression within person association	0.160 (0.185)	0.036	.75 (1, 343.2)	.388

Note. Dependent variable = next day VoD watching

Figure 4

Scatter plot of next day VoD watching by depression for each participant
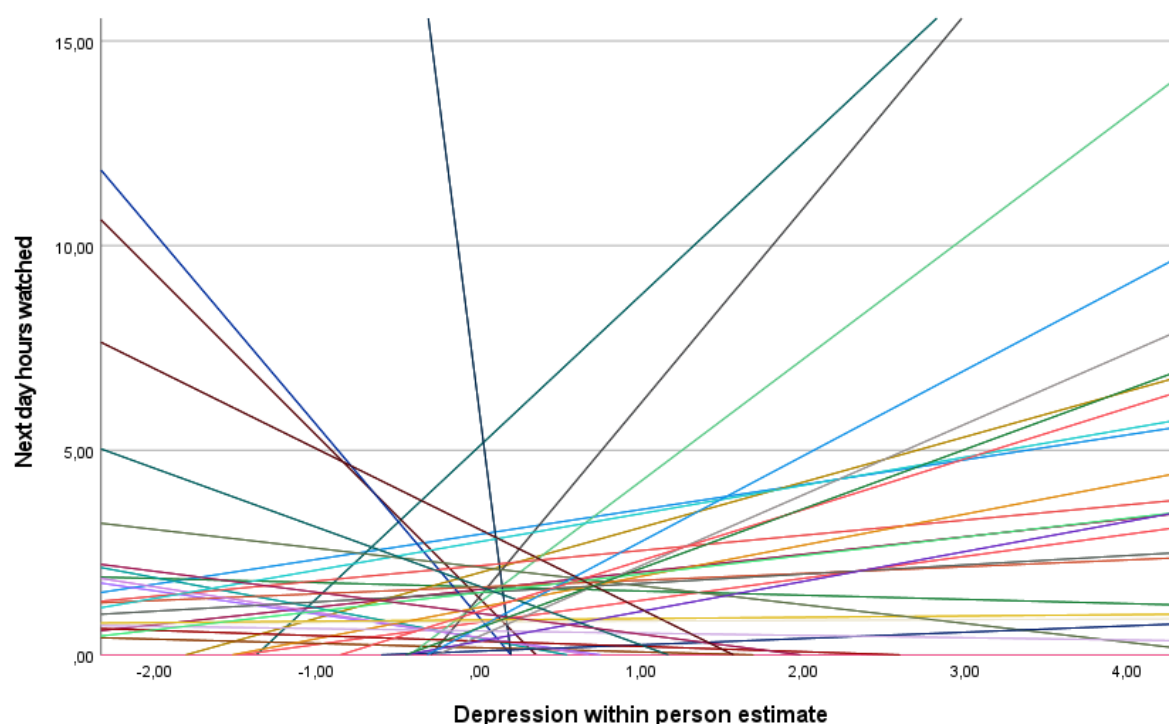
Discussion

The aim of the present study was to investigate in detail the association between VoD watching and depressive symptoms with a special emphasis on the type and temporal directional nature of the relationship. Overall, the results of the LMMs suggest that at the group level there is no association between the two variables over time, neither between nor within persons. The LMMs investigating the directional nature of the relationship showed somewhat larger estimates when depression was used as a predictor of VoD watching, indicating that depressive symptoms lead to more VoD watching. But standardized estimates were still very small and not significant. Therefore, VoD watching was found to be neither a

predictor nor a consequence of depressive symptoms. Looking at the between and within-person associations, associations between individuals tended to be stronger than associations within individuals at the group level when depression was used as the dependent variable. When VoD watching was used as the dependent variable, associations tended to be stronger within individuals, indicating that individuals differed more from themselves than from others. However, neither the results of the analyses of the between- nor within-person associations were significant.

The study's main finding that there is no significant association between VoD watching and depressive symptoms is in line with the work of Tefertiller and Maxwell (2018), who could also not find any association between the two variables. Other studies, however, did find a relationship (Ahmed, 2017; Sun & Chang, 2021; Wheeler, 2015). There are several possible explanations for the discrepancies between the present study and other research. First, the differences in results may be due to different samples. The sample of the present study consisted mainly of people from Germany who are currently studying and are on average about 24 years old. In contrast, the study of Ahmed (2017) analysed mostly Emirati people and Sun and Chang (2021) used a sample consisting of Taiwanese people. Therefore, VoD watching may have different effects in different countries. While in the present study the participants were approximately equally distributed on both genders, the study of Sun and Chang (2021) had around 75% females in their sample. As some studies have shown that females engage more in BW (Flayelle, Maurage, et al., 2020) and use it more often to reduce aversive emotional states, the differences in gender distribution may be another explanation for the contrary results.

Another difference between the present study and other studies is the operationalization of BW. The present study classified VoD watching behaviour as BW and solely relied on the number of hours watched as a continuous measure of VoD watching. The study by Ahmed (2017) divided respondents into binge-watchers and non-binge-watchers, depending on the amount hours and episodes watched. Sun and Chang (2021) on the other hand used the Problematic Series Watching Scale (Orosz et al., 2016) to assess BW and investigated the association between problematic BW and depression. As has been pointed out before, the inconsistent definition of BW and the different operationalizations may also play a role in the conflicting results. Moreover, this study used ad-hoc items while Ahmed (2017) and Sun and Chang (2021) relied on a validated scale to assess depressive symptoms. The different methods of data collection may have influenced the results as well.

Furthermore, there are some major methodological differences. The present study investigated longitudinal data that was collected using experience sampling, while those studies that could find an association were of cross-sectional nature (Ahmed, 2017; Sun & Chang, 2021). The use of the ESM has numerous advantages over cross-sectional data as has been pointed out before. The different results may therefore be due to recall bias in cross-sectional studies since participants had to answer the questionnaires retrospectively (Myin-Germeys & Kuppens, 2021). Furthermore, cross-sectional studies assess behaviour and states only once in contrast to the longitudinal design of ESM studies. Hence, it is possible that during one-time assessments there is an association between VoD watching and depression, but this kind of effect diminishes in the long term. For instance, in the present study people engaged least in VoD watching on Sundays, compared to other weekdays. This leads to the assumption that when cross-sectional studies took place on weekdays where people engaged a lot in VoD watching, there may be an association. In longitudinal studies, however, such an effect could be cancelled out by the effects of the other days. These findings underline the advantages of the ESM over traditional, cross-sectional studies. Since ESM assessments happen close to the moment they occur and over a longer period of time, the results of ESM studies tend to display a more natural and realistic impression of behaviour and psychological states (Myin-Germeys & Kuppens, 2021).

Next, the statistical analyses not showing any significant effects could also be due to low statistical power. In the LMMs with depressive symptoms as the dependent variable, the fixed estimates for the between-person association were always higher than for the within-person association but with less degrees of freedom. Since a higher number of degrees of freedom leads to higher power, this could be a possible explanation for the nonsignificant results of the analyses. This argument is supported by the relatively small simple size of 36 participants, which can also affect the statistical power negatively (Haas, 2012). Nonetheless, standardized estimates were also small in magnitude.

Another possible explanation for the findings of the present study showing no association between VoD watching and depressive symptoms is that on the group level the effects of individuals may cancel out. The visual analysis of the association between VoD watching and depressive symptoms showed that for some participants there appears to be a strong positive association, but for others there is a moderately negative association or no association. Thus, it can be concluded that on the group level there is no association between VoD watching and symptoms of depression but looking at the individual level, there is an association for some participants. Hence, for most individuals BW is not harmful at all and

may even display positive characteristics. But for other individuals, this kind of behaviour can have adverse effects on their (mental) health. Therefore, it is important to identify those who are at risk to intervene in time and prevent the emergence of negative consequences. Future studies should focus on individual case analyses to further investigate the association between VoD watching and depression to identify individuals at risk. For further information on individual case analyses see for instance McDonald et al. (2017). Moreover, it should be studied what factors make people vulnerable to the adverse effects of BW. Previous research has proposed that for instance the coping style may play a significant role in this context (Flayelle, Maurage, et al., 2020; Starosta & Izydorczyk, 2020).

The findings of the present study suggest that for most people, BW is truly not associated with negative moods. Looking at the present literature, BW is often stated or assumed to have many negative effects, especially on (mental) health. Studies have looked at an association between BW and depression, anxiety, addiction-like symptoms, feelings of regret or guilt after watching and sleep deprivation, but could not find clear evidence for such an association (Flayelle, Maurage, et al., 2020; Starosta & Izydorczyk, 2020). This could indicate that BW is neither the cause nor the consequence of anything negative. Indeed, BW is increasingly assumed to have many potential positive effects. Studies have shown that BW can be used for relaxation and a way of spending free time (Starosta & Izydorczyk, 2020). Furthermore, BW was shown to be related to higher levels of enjoyment, narrative transportation and identification with featured characters (Flayelle, Maurage, et al., 2020). Moreover, it is argued that BW is simply a new way of watching a series (Jenner, 2017). This assumption is substantiated by a study from Tryon (2015), who argued that Netflix promotes BW as a normal and desirable behaviour that is possible due to technological advancements. The findings of the present study contribute to this hypothesis and underline the call of Flayelle et al. (2019) for less confirmatory and more exploratory research on BW. Thus, it can be concluded that BW may simply be the new norm of watching a series and is neither a predictor nor consequence of depressive symptoms.

The results of the present study once again highlight the problematic nature of the term "binge-watching". The unstandardized definitions and operationalizations have led to incoherent research results in the past, which make it difficult to compare the results with each other. Many studies have assessed how many hours and episodes an individual watched per day and determined whether they engaged in BW based on a cut-off value. For most studies, people had to watch for at least two hours to be categorized as a "binge-watcher". But this kind of conceptualization is highly problematic since BW appears to be very subjective.

For some people, watching three or more hours in one sitting may be a normal and daily behaviour, while for others it would be unusual if they watched for more than one hour. Another issue about the term "binge-watching" is that the prefix "binge" is usually associated with something negative due to the association with other binge-behaviours. Therefore, the term implies a negative behaviour with adverse effects for (mental) health for most people. Since the present study has substantiated the findings of other studies, namely that BW does not affect the (mental) health of most people negatively, the term may be simply misleading. Hence, several authors have suggested the use of alternative terms with a more positive connotation, such as "marathon viewing" or "marathon watching" (Perks, 2014).

Implications for Further Research

The results of the present research indicate a need for further research to develop a deeper understanding of how BW and depressive symptoms are associated. Although the present study could not show an association between VoD watching and depressive symptoms on the group level, the results suggested a strong negative association for some individuals but also a positive association for others. These findings suggest that BW may not have any adverse effects for most individuals, but it might be problematic for some. Therefore, future research should focus on the analysis of individual cases to identify individuals for which BW is associated with negative effects. Moreover, it should be explored which factors make people prone to problematic BW to be able to intervene. The literature suggests different characteristics that may be potential risk factors for experiencing the adverse effects of BW, like personality traits, low self-control or the coping style of an individual (Flayelle, Maurage, et al., 2020; Starosta & Izydorczyk, 2020). Referring to the coping style, research suggests that when BW is used as an emotion-focused coping strategy, BW can have adverse effects on (mental) health (Flayelle, Maurage, et al., 2020; Starosta & Izydorczyk, 2020). To investigate this assumption, further research should for instance assess the motivation for BW next to watching behaviour and depressive symptoms. For this purpose, the Problematic Series Watching Scale (PSWS) (Orosz et al., 2016) could be used. Statistical analyses could also be aimed at exploring a possible interaction effect as it can be assumed that the motivation moderates the relationship between BW and depressive symptoms. For these analyses, a larger sample would be needed to have sufficient power. Moreover, further research should focus on finding ways to help at-risk groups and avoid the development of any negative consequences.

Conclusion

The aim of the present study was to investigate the association between VoD watching and depressive symptoms using the ESM in a sample of 36 participants. Two further research questions were aimed at the directional nature of the relationship. In the present study, no association between the two variables was found on the group level. VoD watching appeared to be neither a predictor nor a consequence of depressive symptoms. Possible explanations for these results are the chosen methodology, low statistical power and that individual effects are cancelled out on the group level. However, results indicated that for some individuals, VoD watching was associated with depressive symptoms. The findings of the present study suggest that for most individuals, VoD watching is a normal and harmless activity, but some people experience adverse effects. Future research should focus on individual case analyses to identify those individuals that may be at risk for problematic binge-watching.

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