

**The association of binge-watching and depressive symptoms,
especially feelings of guilt over time: An experience sampling study.**

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Abstract:

Introduction: With the rising use of video on demand (VoD) services, a new phenomenon called binge-watching (BW) arose, defined as watching at least one hour and two episodes of a TV show in succession. BW has been suggested to be correlated with several health issues. The aim of this study was to investigate the association between BW and depressive symptoms, particularly feelings of guilt, over time.

Method: In a 14-day experience-sampling study, respondents (N = 38) documented their VoD use once daily and emotional states twice a day in the smartphone application *Ethica*. Linear Mixed Modelling was applied to analyse the effects of BW on mood, energy, guilt, concentration problems and sleeping problems.

Results: Overall, no associations between VoD watching and most symptoms of depression were found, but feelings of guilt ($B = 0.15$; $SE = 0.07$; $p = .03$) and concentration problems ($B = 0.15$; $SE = 0.07$; $p = .04$) were higher the morning after. Specifically, BW was associated with increased feelings of guilt in the next morning ($B = .14$; $SE = 0.07$; $p = .04$) and also immediately after watching ($B = 0.10$; $SE = 0.03$; $p = .003$). All the associations appeared rather short-term and small.

Discussion: Only feelings of guilt were consistently increased in association with BW. It is assumed that societal pressure and goal conflicts may play a meaningful role in this context. The lack of a common definition of BW displays a great obstacle to research in this field. For future research, it is recommended to focus on further clarifying the question of whether the users' health is seriously at risk when engaging in BW.

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The association of binge-watching and depressive symptoms, especially feelings of guilt over time: An experience sampling study.

In the past decades, digitalization has pushed forward the development of media and has widened the scope of its influences. Along with this expansion process, many advantages and possibilities have emerged for modern societies. Most information is now available online and can be retrieved within a few seconds. This is also the case for a multitude of TV shows, which are now available on video-on-demand (VoD) websites such as Netflix or Amazon Prime Video, where the episodes of a new season are often published all at once. By being able to choose what and when they want to watch (McDonald & Smith-Rowsey, 2016; Netflix, n.d.) the viewers' comfort is increased. They do not have to wait for the weekly release of another episode on TV as in the case of traditional television. The content is free from the fixed programming structure of linear television networks (Mikos, 2016) and the viewers can "play, pause and resume watching, all without commercials or commitments" (Netflix, n.d.). The advent of VoD services also popularized a new phenomenon called "binge-watching" (BW), referring to excessive VoD watching, usually of the same show, in one sitting. Previous research revealed several consequences of this behaviour and emphasised the importance to be able to estimate the risk for the viewer's mental health. The aim of this study is to explore the impact of BW on the emergence and development of feelings of guilt and depressive symptoms in general, over time. In the following, a definition is acquired and characteristics, as well as potential predictors and consequences are compiled.

Binge-Watching

The term "binge" is generally used to describe an excessive amount of a certain behaviour. It is already used in combination with drinking or eating to label alcoholism or bulimia (Jenner, 2015; Pittman & Sheehan, 2015), whereby BW already has a negative connotation in such a way that it is associated with a disorder. It is identified with self-harming behaviour (Jenner, 2015), lack of control and somewhat "shameful indulgence" (Ramsay, 2013). However, reading a whole book at once or listening to music for a long time is not called bingeing and is therefore not negatively accented (Ramsay, 2013). It seems that these activities are socially more accepted than watching multiple episodes of a series (Ramsay, 2013), regardless of the fact that BW is a widely spread activity.

As it is a quite new phenomenon though, there is no consensus on the operationalization of binge-watching in research. Most attempted definitions are broad and not consistently used by different researchers. However, there have been approaches to

outline the most important characteristics of engaging in BW behaviour. Wheeler (2015) defined “watching back-to-back episodes of a television program[me] in a single sitting” (pp. 29-30) as the closest depiction of BW. Walton-Pattison et al. (2016) were somewhat more explicit and defined it as “watching more than two episodes of the same TV show in one sitting” (p. 19). Flayelle et al. (2020) recently conducted a systematic review of a number of existing studies about BW. They found that it is mostly defined by means of a number of episodes being watched with a cut-off point of two or three, mainly referring to the same programme or series and one single sitting. Only a few researchers included the duration of the activity or aspects such as intention in the operationalization of the term (Flayelle et al., 2020). Likewise, the review outlines the finding that “the lack of a validated and common definition of BW is clearly identified by the authors as a major obstacle to coherence and reproducibility” (Flayelle et al., 2020, p. 5). Only focusing on the number of episodes that have been watched may be problematic because the length of the episodes of different shows can differ from anywhere between 20 and 60 minutes. Watching two shorter episodes still would take less time than watching a movie of average duration. Therefore, defining this behaviour as BW seems somewhat overstated. In this research, the duration of BW is included in the definition in addition to the number of episodes in order to be able to make a distinction between potentially problematic BW behaviour and the casual reception of a series. So, for this research binge-watching is defined as watching at least two episodes of the same show and at least one hour of time in a single sitting, based on the definition of Panda and Pandey (2017), except that they used “or” instead of “and”.

Having decided on a definition of BW, it is interesting to look at some characteristics and descriptives of it. A survey by YouGov (McCarriston, 2017) showed that 58% of all Americans had engaged in BW at least once. In the Digital Democracy Survey (2018) it was found that even 73% of US consumers and around 90% of people between 14 and 33 years had binge-watched whereby 40% of the latter engaged in BW weekly. The survey revealed that this age group consumed 6 episodes or 5 hours of content on average in a BW session. In a questionnaire by Ahmed (2017), most of the respondents reported to binge alone and at home where around half of them used laptops or smartphones. The Digital Democracy Survey (2018) disclosed that nearly all consumers multitask, thus engage in other activities as well while watching. Binge-watching describes media other than traditional linearly scheduled TV (Ramsay, 2013; Jenner, 2015). It is possible that BW already has its origins in the early 2000s, when full seasons were sold in DVD box sets (Lotz, 2014). Owning a set of a series enabled the consumers to watch back-to-back episodes while being independent from any TV

programme or schedule. Now BW is preferred as their regular way of watching a series by 72% of those who have ever binged (McCarriston, 2017).

Predictors and consequences of binge-watching

Besides establishing prevalence rates of BW, several studies have examined the predictors, motives and potential (health) consequences of it. Across different studies, some factors have been found to predict the behaviour. First, demographic factors such as being of younger age (under 30 years) and being single are associated with BW in several studies (Ahmed, 2017; Exelsmans & Van den Bulck, 2017; Flayelle et al., 2020). Also, certain personality traits, for example low conscientiousness and high neuroticism were indicators for being more likely to engage in the behaviour than others. Moreover, high impulsivity and self-regulation deficits (Flayelle et al., 2020; Shim et al., 2018) as well as dysfunctional coping with emotions (Flayelle et al., 2019), emotional disorders, self-control problems and being lonely (Starosta et al., 2019) have been found to predict higher, even problematic levels of BW. Riddle et al. (2018), who made a distinction between intentional and unintentional BW, add that unintentional bingeing is directly influenced by impulsivity. YouGov Omnibus' survey revealed that the viewers engage in BW because they prefer to see the whole story at once over waiting a week to find out what happens" (McCarriston, 2017). Netflix (2016) stated that shows that evoke an emotional response in the viewers, for example thrillers or dramatic comedies are more likely to be binged. BW was also revealed to be a compensatory act for passing time, dealing with loneliness and escaping everyday worries (Starosta et al., 2019; Flayelle et al., 2020). Further motives were avoidance expectancies (Flayelle et al., 2019), procrastination and emotion regulation (Flayelle et al., 2020). Social factors may as well act facilitating in regard to BW if the people that are present share the affection for it (Hofmann et al., 2012). So, it seems that the combination of situational factors or motives and personality or traits determine whether a person is likely to excessively watch a series or not.

Besides the above-mentioned motives and antecedents of binge-watching, it is interesting to investigate the consequences as well. In general, watching traditional television was found to lead to high relaxation (Kubey & Csikszentmihalyi, 1990). Flayelle and her colleagues (2020) found that viewers perceived certain benefits in BW such as "better engagement with the content", "greater fan enthusiasm", "deeper experience of suspense/anticipation" and "stronger feeling of getting swept away in the story" (p. 6), compared to when they do not binge a series. In a survey into VoD watching, most of the respondents stated that they feel 'happy' and 'fulfilled' after bingeing (McCarriston, 2017).

Flayelle and colleagues (2020) summarized the findings of different studies, mostly online surveys, in which people reported enjoyment, perceived autonomy and meaningful and positive affect related to the activity. The viewers apparently experience many favourable outcomes after bingeing. However, no positive outcomes in the context of mental health were found so far. Also, these studies reflect rather short-term outcomes.

Despite the viewers' perceived benefits, not all consequences of VoD bingeing may be that positive. In the review by Flayelle and her colleagues (2020), it was noted that binge-watchers experienced more sleeping problems or even symptoms of insomnia and thereby, daytime fatigue and tiredness (Exelmans & Van den Bulck, 2017), also, goal conflicts and addiction symptoms. Additionally, an association between television viewing and concentration difficulties was found (Schoeni et al., 2016), especially for two hours or more of TV watching in children (Kavyashree et al., 2013). It was also discovered in previous studies that binge-watchers are generally higher in depression than non-binge-watchers (Ahmed, 2017; Wheeler, 2015). Also, college students reported that they perceived "depressive like symptoms" (Vaterlaus et al., 2018, p. 7) and also, Tukachinsky and Eyal (2018) found depression to be a mechanism involved in media marathoning. Again, depressive symptoms but also anxiety, feelings of guilt, and in general negative feelings or affect were reported in reviewed studies (Flayelle et al., 2020). Specifically, guilty feelings were found to be correlated with online video use in several studies (Flayelle et al., 2020; Panek, 2013; Reinecke et al., 2014) as were regret and goal-conflicts (Walton-Pattison et al., 2016). Reinecke and colleagues (2014) summarized the results of a one-time online survey among young adults that especially procrastination, so engaging in other activities while postponing more important tasks, was associated with negative affect and very often, particularly, feelings of guilt. Granow et al. (2018) argued that due to the rising possibilities of VoD streaming websites, the risk of goal conflicts increases and with this, feelings of guilt. Regret and guilt were again discovered to predict subsequent BW behaviour (Flayelle et al., 2020), which seems to point to a vicious circle between BW and feelings of guilt.

All in all, the consequences of binge-watching may be detrimental to the viewers' well-being and can lead to pathological states of health or more problematic behaviour. However, there are severe discrepancies and inconsistencies between the results of previous studies. Moreover, most of this information resulted from cross-sectional, one-time surveys. These appeared to leave important aspects of the relationship between the variables undetected (Wheeler, 2015). For instance, no causality can be tested in such a survey but only a correlation (Exelmans & Van den Bulck, 2017; Reinecke et al., 2014; Tóth-Király et al.,

2017). Likewise, the direction of the effect is unclear due to the measurement of all variables at the same time (Granow et al., 2018; Reinecke et al., 2014). Another problem might be recall error and misestimations on behalf of the respondents (Panek, 2013).

Some of these problems are attempted to be solved by making use of the experience sampling method (ESM) in the present study. This study design is becoming increasingly feasible and popular in research as it seems to overcome some constraints of previous methods: It includes multiple daily measurements over a few weeks within a relatively small group of respondents and by this, allows to learn about the momentary thoughts, feelings and behaviours in different situations in the daily life of the participants and its course over time (Barrett & Barrett, 2001; Connor & Lehman, 2012; Hektner et al., 2007). The longitudinal design enables a more reliable assessment of complex dimensions such as experiences (Larson & Csikszentmihalyi, 2014) and the examination of possible patterns of emotions or actions among individuals (Barrett & Barrett, 2001). By means of time-displaced inquiries about state and behaviour an ESM study can provide clues about the directions of certain relationships and possible temporal correlation can be detected which is not possible in one-time surveys (Wheeler, 2015). The momentary assessment in the daily life of the respondents requires less retrieval from memory but only the information available to conscious awareness of that time by which errors in memory or cognitive bias can be avoided to some extent (Barrett & Barrett, 2001). For the purpose of this study, ESM allows for a more detailed view on BW behaviours and the development of its potential consequences over time.

Aim of the study

The aim of this study is to explore the consequences of BW in greater detail. The research question that is attempted to be answered in this study is “What is the association of binge-watching and depressive symptoms, especially feelings of guilt, over time within individuals?”. Based on the above-mentioned findings on the consequences of BW on the viewers’ mental health, it will be examined to what extent low mood, fatigue, feelings of guilt, concentration problems and sleeping problems develop contingent on the respondents’ engagement with binge-watching. In this regard, the present research also aims at investigating the development of these effects over time, thus, ESM is applied. An at most weak, but significant positive association between the symptoms, especially guilt and binge- and VoD watching is expected. Since

Methods

Design

Within the context of ESM, interval contingent sampling was used in the present study. This entails that the questionnaires were presented to the respondents repeatedly in predetermined time slots. For this, *Ethica Data* was used, which is a platform that enables conducting research studies without physically meeting the respondents for every assessment. On the website, the study is designed including all surveys, triggering logics and notifications. In the respective smartphone app, respondents can enrol for the study and take part in the surveys. Meanwhile, the progress of the study can be monitored by the researcher (Ethica Data, 2020). Therefore, the platform is well-suited to perform experience sampling.

In the present study a correlational survey design was employed. The first variable is “VoD watching engagement” with two levels (BW, no BW) whereof “BW” is defined by means of a cut-off point of watching more than one hour and a number of at least two episodes. The second variable is “feelings of guilt after watching” which has four levels (1 = Slightly guilty, 2 = Moderately guilty, 3 = Very guilty, 4 = Extremely guilty) and the third one is “depressive symptoms”, which contains five scales named by the respective symptom (“Low/sad mood”, “Low energy/fatigue”, “Feelings of guilt”, “Problems with concentration”, and “Sleeping problems in the last night”) with five levels each (1 = Not at all, 2 = Slightly, 3 = Moderately, 4 = Strongly, 5 = Extremely).

Participants

The participants were recruited by means of convenience sampling from the researchers’ social environment. The group of researchers consisted of four psychology bachelor’s students. It was aimed to recruit up to 40 participants, so around 10 for each researcher. This is in line with the guidelines of van Berkel et al. (2018) and in general, it is common in this kind of studies to have rather small samples (Connor & Lehman, 2012). Besides, it was aimed for oversampling young adults aged between 18 and 30 years, because VoD watching was found to be more popular in this age group than in older adults (Ahmed, 2017; Exelsmans & Van den Bulck, 2017; Flayelle et al., 2020). The participants were recruited mostly via the messenger application ‘Whatsapp’ and, sometimes, respondents further distributed the recruitment message in their own social environment.

In total, 42 people were recruited to participate in the study, whereof 3 participants were excluded from the dataset due to a high number of missed or expired survey sessions. Based on the guidelines of Connor and Lehman (2012), participants who responded to less

than 40% of the surveys should be excluded. One participant completed more than 40% of the assessments but did not complete the evening state assessments and hence, was excluded from the analysis. The final sample consisted of 38 participants aged between 18 and 51 years whereof most had a German nationality and were students (see Table 1). Moreover, the mean age was 23.7 years and more than half were male. Besides, 86.8% reported using Netflix. All respondents participated voluntarily in the study and gave their informed consent. Ethical approval for the study was obtained by the *Ethics Committee of the University of Twente* (200366).

Table 1

Demographics of the respondents (N=38)

Category	Subcategory	Frequency (n)	%	M	SD
Gender	Male	21	55.3	23.7	5.3
	Female	17	44.7		
Age					
Nationality	German	35	92.1		
	Dutch	1	2.6		
	Other, European	2	5.3		
Occupation	Apprentice	3	7.9		
	Employed full-time	9	23.7		
	Employed part-time	1	2.6		
	Pupil	1	2.6		
	Student	22	57.9		
	Other	2	5.3		

N.B. M = Mean; SD = Standard Deviation.

Materials

To participate in the study the respondents needed the *Ethica* mobile application (Version 157) on their smartphone and an account in the system. Three types of questionnaires were used in this study, firstly a one-time demographics questionnaire at baseline, second a once-daily behaviour assessment, and third two daily state assessments. As this was a joint research, not all questions presented in the Appendices were relevant for this particular study.

Demographics questionnaire

The demographics questionnaire (Appendix A1) collected the gender, age, nationality

and occupation of the respondents. Moreover, some basic information about their VoD watching behaviour and context in general was investigated. This contained questions about which streaming-service they used and whether or not one of these streaming services are used at least once a week.

Behaviour assessment

The once-daily behaviour assessment (Appendix A2) contained 11 questions regarding the respondents' VoD watching engagement of the day before, more specifically whether binge-watching was present. The questionnaire starts with the basic question "Did you watch a series on a video-on-demand platform such as Netflix or Amazon Prime Video yesterday?" of which the single-choice answer "No" leads to the end of the survey session while "Yes" enables the following items. It is asked whether the participant watched in the morning (6 a.m. - 12 p.m.), the afternoon (12 p.m. - 6 p.m.), the evening (6 p.m. - 11 p.m.), or at night (11 p.m. - 5 a.m.) whereof multiple answers were possible. For the number of hours watched, an up/down arrow key with 0.25 intervals allowed the respondents to indicate quarter-hours without having to round to full hours. To assess whether the participant engaged in BW according to the definition, the items "Did you watch for more than 1 hour?" with the answer possibilities "Yes" and "No", and "Please indicate how many episodes you watched. If you watched more than 20 episodes, choose 21" were used. The latter was answered by means of an up/down arrow key with intervals of 0.5 to allow half episodes. Further, it was asked to mark the type of content, with the answer possibilities comedy, documentary, action and thriller among others, and the reason for watching, for example entertainment, boredom, procrastination or curiosity. Lastly in this part, it was assessed whether the respondent watched alone, with family, friends or a partner.

In the next part, variables related to "feelings of guilt" were assessed. These items were asked in the same assessment because they only had to be assessed once a day and refer to the VoD watching engagement directly. The participant was asked whether they felt guilty for watching afterwards, of which the answer possibility "No" ended the questionnaire. If the respondent marked "Yes", the next item examined to what extent that was the case, giving four answer possibilities ranging from slightly guilty to extremely guilty. Lastly, it was asked why the respondent felt guilty. Answer possibilities were "I watched more episodes or for a longer time than I wanted/planned to", "I neglected other obligations that I should have fulfilled", "I neglected bodily needs, for example sleep" and others.

State assessment

The state assessment (Appendices A3 & A4) examined the variable “depressive symptoms” twice each day, namely in the morning, triggered between 11 a.m. and 1 p.m., and in the evening, triggered between 7 p.m. and 9 p.m. It contains five symptoms of depression sampled from the diagnostic criteria for a depressive disorder from the DSM Manual (American Psychiatric Association, 2013) that have been found to correlate with BW, namely low mood, guilt (Flayelle et al., 2020), fatigue/low energy, sleep (Exelmans & Van den Bulck, 2017) and concentration problems (Kavyashree et al., 2013; Schoeni et al., 2016). It was decided to assess specific symptoms rather than depression in general in order to receive more detailed information about the singular problems that can arise as a consequence of BW. The items were specifically developed for this study by the researchers. On a 5-point-Likert scale (Not at all, Slightly, Moderately, Strongly, Extremely) it was assessed to which extent the respondents experienced the symptoms “Low/sad mood”, “Low energy/fatigue”, “Feelings of guilt”, “Problems with concentration”, and “Sleeping problems in the last night”. The latter was only presented in the morning state assessment as it regards the previous night and therefore, was not considered relevant for the evening assessment.

Procedure

The recruitment of participants began on March 30 so that they registered for the study in *Ethica* and began completing daily assessments on April 9. With a number of 14 measurement days the study ended on 22nd of April. This study duration served to obtain detailed insight into the daily VoD watching routines and allows for comparison and connections of data between days. It is the recommended length for this type of research topic (Connor & Lehman, 2012).

After having recruited the participants an information mail (Appendix B), including an overview and a guide through the following activities, was sent to them. On the start date, the invitations for the participation were sent via *Ethica*. After that, the participants were asked to check their e-mail and to begin on that day, so that all participants took part simultaneously.

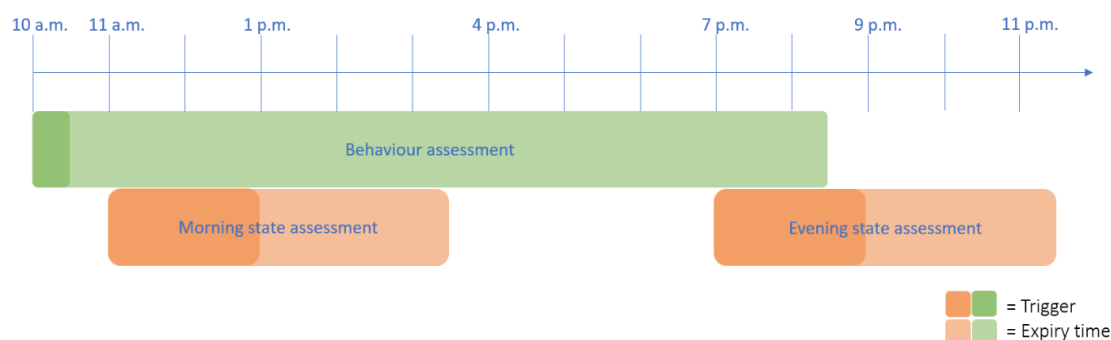
Once the respondents registered for the survey in the app, they were asked to give their informed consent (Appendix C) agreeing to the requirements for participation and to fill out the baseline- and demographics questionnaire. After that, the data collection began.

Similar to a daily diary, a behaviour assessment (Appendix A2) took place once a day and assessed the VoD watching behaviour the day before, which is a very common technique (Connor & Lehman, 2012). It was triggered at a random point of time between 10 a.m. and

10:30 a.m. and disappeared after 10 hours. This was done to remind the respondents to think about their behaviour the day before at an early time, to avoid memory bias, while still giving them a sufficient amount of time to fit the assessment into their daily schedule. In case a respondent did not complete a questionnaire, a further notification was set for 90 minutes later. The state assessment (Appendices A3 & A4) took place twice a day to gather enough occasions of state observation in order to allow for generalizability and for creating an association of fluctuations with the assessed behaviour, as recommended by Connor and Lehman (2012). They were triggered randomly within the time slots 11 a.m. – 1 p.m. and 7 p.m. – 9 p.m., in order to prevent mental preparation on the assessment and self-presentation (Connor & Lehman, 2012). From this point of time on the questionnaires expired after 2.5 hours to provide enough time to fill out the questionnaires. A further notification was set for 30 minutes later. The time-schedule of the questionnaires can be seen in figure 1.

Figure 1

Overview of the time frames of behaviour- and state assessments from Day 1, 09.04. until day 14, 22.04.2020



Data Analysis

After the data collection phase was finished the data were transformed into a coherent dataset and analysed with the IBM Statistical Program for Social Sciences (SPSS, version 24). Several variables were recoded or transformed. Descriptive statistics were applied to analyse the demographics of the participants. Frequencies were analysed to explore the patterns of VoD watching behaviour of the respondents. A new, dichotomous variable “binge-watching” coding “1” for those VoD occasions that fulfil both requirements for the definition of BW.

A series of Linear Mixed Models (LMMs) with first-order autoregressive (AR1) covariance matrix with homogeneous variances allowed for the analysis of the nested structure of the longitudinal data. As the aim of this study is to explore associations several LMMs were built. For all analyses the time point (day) of the assessment was the repeated measure and the participant numbers were indicated to be the subjects. The dichotomous

variables VoD watching and BW were set as a factor while the continuous variables hours and episodes were indicated as covariate. Both were set as fixed effects. The morning and evening scores on all depressive symptoms were set as dependent variable (DV). To answer the research question about the association of BW with the depressive symptoms, parameter estimates and marginal mean variables were estimated for each time point and respondent while taking missing values into account. Unstandardised values were used.

As guilt was additionally assessed individually a further analysis was conducted. Firstly, some frequency tables were created to get an overview of the occurrence and characteristics of guilt. After that, a further LMM was conducted to estimate the association of the same fixed factors as above with guilt after watching and its level as the DV.

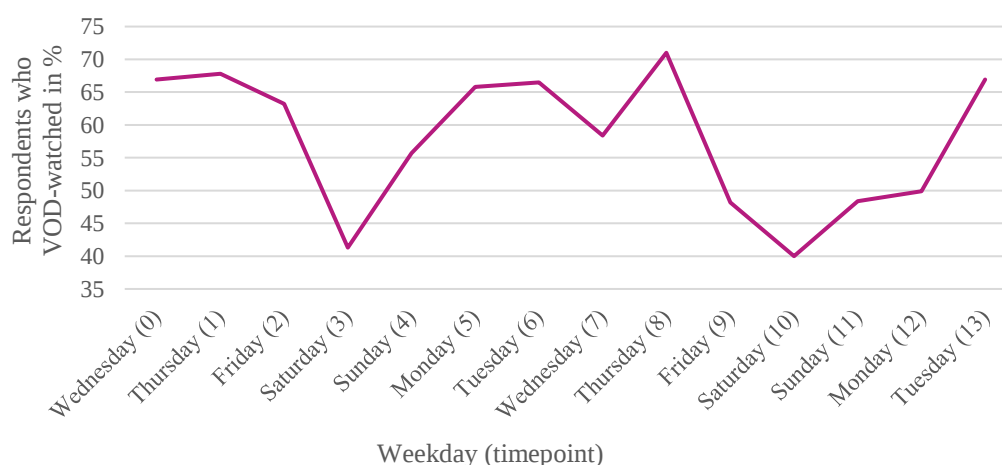
Results

VoD watching and depressive symptoms

In 57.8% of the 524 survey responses, respondents reported to have engaged in VoD watching the previous day. The proportion of participants who reported to have engaged in VoD watching the day before ranged from 40.0% to 70.0% of the sample over the course of the two weeks. The mean over all days was 58%. Notably, the lowest scores were reached on Saturdays and the higher scores during the week, especially on Thursdays (see Figure 2), which causes a strong variation over the course of the week. As the item assessed VoD-engagement the day before, the values have already been matched with the day of interest.

Figure 2

Proportion of respondents who engaged in VoD watching per weekday (in %)



To test the effect of VoD watching (yes/no) on the depressive symptoms, nine LMMs were conducted. For most of the depressive symptoms, no significant association was found (see Table 2). However, feelings of guilt in the next morning were found to be significantly

affected ($p = .03$) by VoD watching with a positive estimate of 0.15 ($SE = 0.07$). Second, concentration problems in the next morning were significantly influenced ($p = .04$) with an estimate of 0.15 ($SE = 0.07$). These are both, given a 5-point scale, a rather small effect. Still, VoD watching seems to be associated with a higher level of guilty feelings and more concentration problems in the next morning.

Table 2

Results of the Linear Mixed Models with VoD watching as the fixed factor and its effect on the five depressive symptoms (morning and evening)

DV	Mean	95% CI	B (SE)	[df1, df2] = F	p
Low/sad mood: 1	0.44	[0.32, 0.56]	0.09 (0.07)	[1, 442.38] = 1.63	.20
Low/sad mood: 2	0.49	[0.36, 0.61]	0.09 (0.08)	[1, 422.56] = 1.4	.24
Low energy: 1	0.71	[0.67, 0.93]	0.05 (0.09)	[1, 440.61] = 0.38	.54
Low energy: 2	0.86	[0.70, 1.03]	0.01 (0.09)	[1, 420.68] = 0.01	.93
Feelings of guilt: 1	0.42	[0.30, 0.54]	0.15 (0.07)	[1, 440.14] = 4.87	.03
Feelings of guilt: 2	0.35	[0.24, 0.46]	0.02 (0.07)	[1, 421.89] = 0.10	.76
Concentration pr.: 1	0.58	[0.47, 0.69]	0.15 (0.07)	[1, 439.62] = 4.12	.04
Concentration pr.: 2	0.56	[0.45, 0.68]	0.01 (0.08)	[1, 398.94] = 0.03	.87
Sleeping problems	0.54	[0.40, 0.68]	-0.04 (0.09)	[1, 439.14] = 0.22	.64

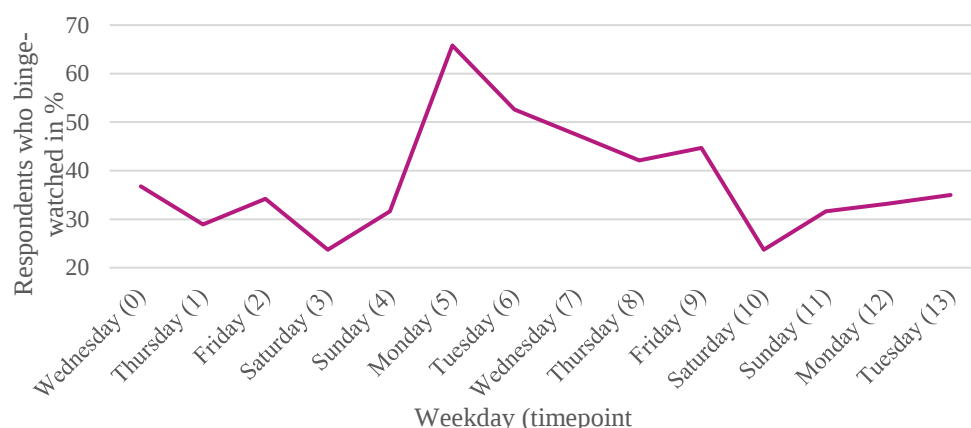
Note. 1 = Morning, 2 = Evening

Binge-watching and depressive symptoms

In 68.6% ($n = 199$) of the VoD watching occasions, respondents reported to have binge-watched according to the definition; having watched at least two episodes and at least one hour of time. In 31.4% ($n = 91$) of the occasions, one or both of these criteria were not fulfilled, so it was not regarded as BW. The proportion of participants who had binge-watched the day before ranged from 23.7% to 65.8% of the sample over the course of the two weeks. The mean over all days was 37.95%. In contrast to the case of VoD watching, the figure displays no pattern in regard to watching frequencies on specific weekdays (see Figure 3).

Figure 3

Proportion of respondents who binge-watched per weekday (in %)



To test the effect of BW (i.e., watching at least one hour and two episodes) on the depressive symptoms, nine LMMs were conducted with BW as a fixed factor. Table 3 shows that there was no significant effect on most of the variables but only on feelings of guilt in the next morning ($p = .04$). The rather small, but positive effect with a B-estimate of 0.14 ($SE = 0.07$) indicates that if a person had binge-watched, the guilt in the next morning was on average slightly higher than if the person had not.

Table 3

Results of the Linear Mixed Models with binge-watching as the fixed factor and its effect on the five depressive symptoms (morning and evening)

DV	Mean	95% CI	B (SE)	[df1, df2] = F	p
Low/sad mood: 1	0.48	[0.34, 0.62]	0.12 (0.07)	[1, 443.64] = 2.77	.10
Low/sad mood: 2	0.52	[0.38, 0.66]	0.10 (0.08)	[1, 435.95] = 1.6	.21
Low energy: 1	0.78	[0.63, 0.93]	0.01 (0.08)	[1, 449.78] = 0.02	.89
Low energy: 2	0.89	[0.71, 1.08]	0.03 (0.09)	[1, 426.42] = 0.09	.77
Feelings of guilt: 1	0.45	[0.31, 0.58]	0.14 (0.07)	[1, 442.51] = 4.21	.04
Feelings of guilt: 2	0.36	[0.24, 0.48]	0.03 (0.07)	[1, 434.69] = 0.14	.71
Concentration pr.: 1	0.55	[0.42, 0.68]	0.05 (0.07)	[1, 477.86] = 0.46	.50
Concentration pr.: 2	0.63	[0.50, 0.77]	0.09 (0.08)	[1, 418.57] = 1.17	.28
Sleeping problems	0.61	[0.45, 0.76]	0.07 (0.09)	[1, 448.23] = 0.56	.46

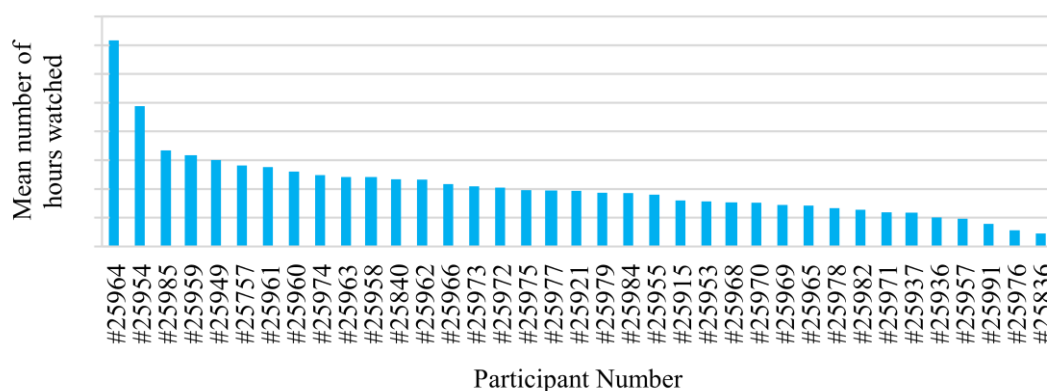
Note. 1 = Morning, 2 = Evening.

Watching hours and episodes and depressive symptoms

On average, respondents watched 2.27 hours per day ($SD = 1.97$) with a minimum average of 0.45 hours and a maximum of 7.16 hours. Figure 4 displays the large variability between persons and that the participant ID had a significant effect on it ($F [36, 86.84] = 3.90$, $p < .0001$).

Figure 4

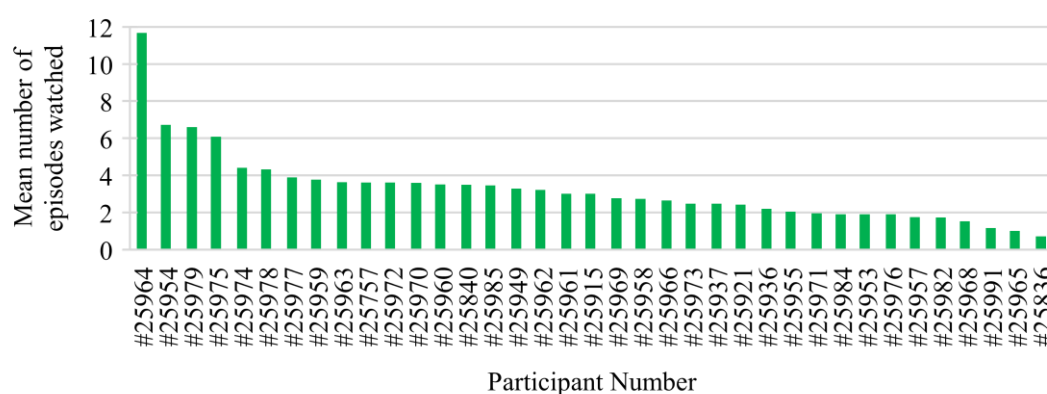
Average number of hours watched per participant per day during the study sorted by hours watched in descending order



The average of episodes watched was 3.54 ($SD = 3.23$) with a minimum average of 0.71 and a maximum of 11.67 episodes (see Figure 5). Again, the figure shows that there was large variability among the participants and the effect of the Participant ID on the episodes watched was significant ($F [36, 62.61] = 2.94$, $p < .0001$).

Figure 5

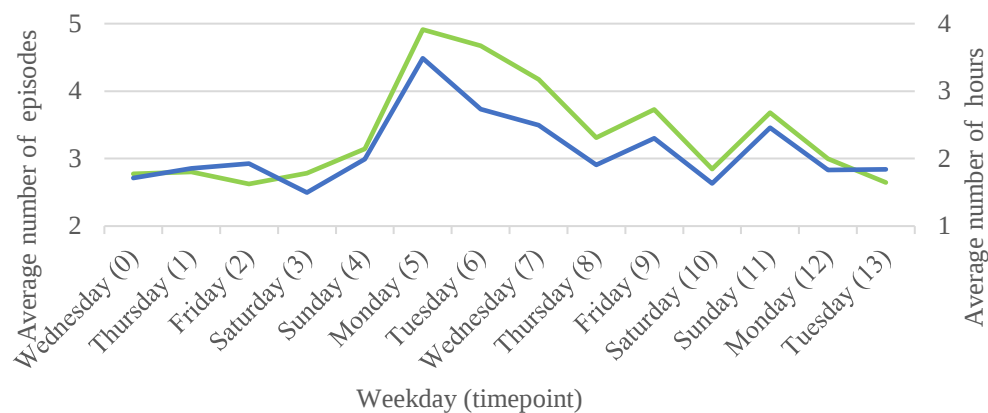
Average number of episodes watched per participant per day during the study sorted by episodes watched in descending order



As expected, the number of hours and the number of episodes watched were significantly correlated over time (Figure 6). A strong positive relationship ($r = .724$, $p < .0001$) between the estimated marginal means over time was found.

Figure 6

Average number of hours (blue) and episodes (green) watched by all participants per day over time



There was no significant association of the time point as a fixed factor with either the hours watched as a DV ($F [1, 139.01] = 0.02, p = .90$), nor on the number of episodes ($F [1, 136.23] = 0.01, p = .91$). This indicates that there was no linear effect of the time on the variables but does not eliminate the possibility that individual weekdays are associated with a different number of hours and episodes watched.

For the effect of the time watched on the depressive symptoms, LMMs were conducted with hours watched as the fixed covariate. There was no significant association with any of the depressive symptoms (see Table 4). This indicates that overall, there was no impact of the number of hours watched on the development of the investigated health issues.

Table 4

Results of the Linear Mixed Models with hours as the fixed factor and its effect on the five depressive symptoms (morning and evening)

DV	B Estimate (SE)	[df1, df2] = F	p
Low/sad mood: 1	0.02 (0.02)	[1, 254.79] = 0.41	.52
Low/sad mood: 2	0.02 (0.03)	[1, 236.34] = 0.38	.54
Low energy/fatigue: 1	-0.03 (0.03)	[1, 253.24] = 1.24	.27
Low energy/fatigue: 2	-0.04 (0.03)	[1, 242.98] = 1.32	.25
Feelings of guilt: 1	-0.02 (0.02)	[1, 255.85] = 0.58	.45
Feelings of guilt: 2	-0.01 (0.02)	[1, 245.14] = 0.06	.81
Concentration problems: 1	-0.01 (0.03)	[1, 249.67] = 0.19	.67
Concentration problems: 2	-0.02 (0.03)	[1, 200.89] = 0.37	.55
Sleeping problems	-0.01 (0.03)	[1, 237.11] = 0.04	.85

Note. 1 = Morning, 2 = Evening.

The same analyses were conducted with the episodes watched as the covariate factor. There was also no significant effect of the episodes watched on any of the depressive symptoms (see Table 5).

Table 5

Results of the Linear Mixed Models with episodes as the fixed factor and its effect on the five depressive symptoms (morning and evening)

DV	B Estimate (SE)	[df1, df2] = F	p
Low/sad mood: 1	.02 (.02)	[1, 259.00] = 1.87	.17
Low/sad mood: 2	.01 (.02)	[1, 214.84] = .15	.70
Low energy/fatigue: 1	-.01 (.02)	[1, 238.13] = .61	.44
Low energy/fatigue: 2	-.02 (.02)	[1, 226.27] = 1.17	.28
Feelings of guilt: 1	-.00 (.02)	[1, 258.80] = .03	.86
Feelings of guilt: 2	-.00 (.01)	[1, 252.68] = .01	.94
Concentration problems: 1	-.01 (.02)	[1, 234.06] = .21	.65
Concentration problems: 2	-.02 (.02)	[1, 180.08] = 1.20	.28
Sleeping problems	.01 (.02)	[1, 217.61] = .44	.51

Note. 1 = Morning, 2 = Evening

Feelings of guilt

It was also assessed whether the respondents experienced feelings of guilt immediately after engaging in VoD watching. Out of the “Yes”-answers on VoD watching the day before ($n = 290$), only in 7.6% ($n = 22$) of the cases respondents reported to feel guilty about it at all. This confirms that most respondents generally did not feel guilty immediately after watching. On a scale from 1 to 4 most of these respondents reported to feel slightly guilty (54.55%), several moderately (36.36%) and fewest of all very guilty (9.09%). Nobody reported to feel extremely guilty.

The reasons for that guilty feeling were “I think that I wasted time or could have spent that time more wisely/useful” in 59.09% ($n = 13$) of the guilt-responses, “I watched more episodes or for a longer time than I wanted / planned to” ($n = 9$; 40.91%), “I neglected bodily needs, for example sleep” ($n = 9$; 40.91%), “I neglected other free-time activities that I wanted to pursue” ($n = 5$; 22.73%) and “I neglected other obligations that I should have fulfilled” ($n = 3$; 13.64%) out of 22 responses (multiple answers were possible).

In all cases of guilt right after watching, the respondent had engaged in BW as defined as watching at least two episodes and at least one hour of time. The effect of whether the

respondent had engaged in BW or not as a fixed factor on whether guilt was present or not was significant ($p = .003$), but small with a B-estimate of 0.10 ($SE = 0.03$; see table 6). The mean level of guilt for non-binge-watching respondents was 0.01 (95% CI [-0.03, 0.06]) and for binge-watchers it was 0.15 (95% CI [0.10, 0.21]). Hence, the effect of whether the person was bingeing or not on the level of immediate guilt was significant ($p < .001$), but rather small with a B-estimate of 0.14 ($SE = 0.03$; see table 7). Still, guilt immediately after watching was more likely and more likely to be higher when the respondent watched at least one hour and 2 episodes or more.

Accordingly, it was expected that the number of hours and episodes as covariate fixed factors might have an effect on guilt and its level. However, this was not for case for either the hours or episodes (see Table 6 & 7).

Table 6

Results of the Linear Mixed Models with the emergence of immediate guilt as the DV

Factor	B Estimate (SE)	[df1, df2] = F	p
Binge-watching	.10 (.03)	F [1, 282.26] = 9.05	.003
Hours	.01 (.01)	F [1, 238.29] = 0.93	.34
Episodes	.01 (.01)	F [1, 217.41] = 1.02	.32

Table 7

Results of the Linear Mixed Models with the level of immediate guilt as the DV

Factor	B Estimate (SE)	[df1, df2] = F	p
Binge-watching	0.14 (0.03)	F [1, 494.40] = 21.20	<.001
Hours	0.02 (0.01)	F [1, 253.06] = 1.65	.20
Episodes	0.01 (0.01)	F [1, 233.39] = 0.68	.41

Other findings

The main reasons for watching were entertainment in 42% of the VoD occasions, relaxation (17.3%), and boredom (17%). Less frequent were peer activity (9.5%), interest (8.2%), escape from reality (2.5%), information seeking (2.4%), stress (0.9%), and procrastination (0.2%). The most popular time of day for VoD watching among the respondents was the evening from 6 p.m. to 11 p.m., in 36.64% (multiple answers were possible). Second most was marked afternoon (12 p.m. - 6 p.m.) with 19.46% and third most the night (11 p.m. - 5 a.m.) with 17.17%. The least was watched in the morning (6 a.m. - 12 p.m.) with only 8.2% of the occurrences of VoD watching.

Discussion

The aim of this study was to investigate the effect of BW in general on the emergence and development of several symptoms of depression. A special focus was placed on guilt in regard to the time point directly after engaging in BW. As it is a new, but widely spread phenomenon, it is essential to be informed about possible consequences of the behaviour for the individual, but probably also for society.

The findings of the present study do not substantiate that the increasingly prevalent phenomenon binge-watching has clear immediate negative consequences for self-reported depressive feelings. Overall, no association of BW and VoD watching in general with most depressive symptoms was found. However, guilt was slightly, but statistically significantly, increased immediately after the BW activity, as well as in the next morning after both binge- and VoD watching. Additionally, concentration problems were slightly increased in the next morning after VoD watching.

Major findings and their meaning

The conclusion that, in general, most of the investigated depressive symptoms turned out to be unassociated with VoD watching and BW over time contradicts earlier studies that found overall depression to be associated with VoD engagement (Ahmed, 2017; Flayelle et al., 2020; Tukachinsky & Eyal, 2018; Wheeler, 2015). In previous research, effects specifically on fatigue/low energy, sleeping problems (Exelmans, & Van den Bulck, 2017) and lower mood (Flayelle et al., 2020; Shim et al., 2018) were found already, which could not be reconfirmed in this study. The reason for these discrepancies might be due to the different methodological approaches. All of the mentioned authors reported on cross-sectional assessments which are more prone to recall bias (Exelmans & Van den Bulck, 2017; Granow et al., 2018; Tóth-Király et al., 2017) while by using ESM such bias can be reduced by means of short-term retrospective and thus, more direct assessment of the behaviour and associated processes (Granow et al., 2018).

The finding on associations between VoD engagement and increased concentration problems in the next morning cannot be connected to previous literature in the case of adults. Other authors merely found that increased concentration problems were associated with television viewing in a cohort study with adolescents (Schoeni et al., 2016) and children (Kavyashree et al., 2013). In the DSM Manual (American Psychiatric Association, 2013) concentration problems are among the eight symptoms describing a depressive episode, yet they have to be present for two weeks in combination with lower mood or loss of interest in

other activities. Thus, concentration problems in this context cannot be considered as a depressive symptom. Still, it is notable that BW seems to have some impact on the level of concentration in different age groups. In this research, the effect was small, short-term and not very consistent among different analyses of VoD engagement, so, future research, preferably an ESM study, is required before conclusions can be drawn.

In contrast to concentration problems, feelings of guilt were consistently found to be slightly associated with VoD watching and BW immediately after watching and in the next morning. However, the association with guilt regarding the time point immediately after watching only occurred after having engaged in BW and no direct effect of the number of hours or episodes was found which indicates that the quantity of watching matters. The effect of watching behaviour on guilt may not be linear in nature but it might only be present for high intensity watching and not for moderate watching. A lower amount of VoD or BW engagement probably does not produce such outcomes immediately. More research on this topic might reveal valuable information on the emergence of guilt in this context. Important to note is at this point that guilt immediately after watching was reported very rarely, in less than 8% of the VoD occasions, which confirms that the association is likely to be small in its strength. Additionally, it limits the possibility to generalise the findings about the characteristics of and reasons for guilt to general guilt in association with VoD consumption.

Still, the most frequently reported reason for guilt after watching was that the time was considered wasted and not spent wisely or useful enough. Guilt in general might also be explained in this way. In modern high-demand societies in a constantly accelerating world with new technologies and rising possibilities the image of being productive and hardworking is presented to be standard. Recipients, especially young people, might perceive an obligation to fulfil this standard and experience feelings of guilt and regret if they do not because of the fear of being considered as idle or lazy. Guilt being socially constructed based on discrepancies between the behaviour and social standards like values and norms was already proposed by Baumeister et al. (1994) and O’Keefe (2000). Baumeister et al (1994) even argued that guilt might be an essentially social emotion, evoked by the adaption to living in a civilised society. Other authors also suggested different explanations for guilt in the context of VoD use, for example, Granow et al. (2018) and Walton-Pattison et al. (2016) both found in an online survey that guilt emerges as a result of an increased goal conflict of obligations with entertainment consumption. Panek (2013) conducted interview surveys and explained guilt by means of low self-control leading to a higher online video use and Reinecke et al. (2014), by means of an online survey, found procrastination to be strongly associated with guilt in the

context of entertaining media use. Yet, in contrast to these cross-sectional assessments, the present ESM study can provide information on the temporal direction of the effect and therefore, allows to exclude the possibility that guilt in the next morning predicts the VoD or BW engagement. However, Panda and Pandey (2017) as well as other authors cited in Flayelle et al. (2020) found that guilt as a negative gratification provoked even more engagement in BW. This issue was not taken into account in the current study, which is why further research on it is recommended. To that end, ESM and Linear Mixed Modelling with the help of lagged variables are well suited.

Implications, Limitations and Further Recommendations

This research contributes to existing knowledge on the consequences of VoD use and BW. As no sum score of the different symptoms were used for the analyses, no reliability measures were estimated. The potential depressive symptoms as a consequence of BW suggested in some previous studies were not that apparent in this sample, but feelings of guilt as an individual phenomenon were associated with binge-watching. This emphasizes the importance to focus on specific aspects of mental health rather than whole constructs such as depression. When scores or symptoms are summed up together, results might be misleading, information would be lost, and no significant effect would have been found in this research. To that end, it is recommended to also differentiate timewise to allow for contrast between, for example morning- and evening-scores, since the current study only showed a short-term association with guilt the next morning and no association with guilt the next evening. Using ESM allowed for drawing conclusions on the direction of the found effects, compared to cross-sectional surveys. In addition, this research could provide a clue to the reasons for the feelings of guilt as it was found that most binge-watchers regarded the time as not spent wisely or useful enough. Hence, this research might also even tell something about how socially desirable the users perceive their own behaviour.

However, there are certain limitations. It should be kept in mind that the study was conducted during the peak of the Corona pandemic which presumably led our sample, consisting mainly of students, to perceive less obligations on average. This limits the generalisability of the results to everyday conditions since less obligations in daily life lead to decreased goal conflicts, and according to the explanation by Granow et al. (2018), so would the feelings of guilt. Without these circumstances, VoD watching frequencies are expected to be lower due to less free-time and associated feelings of guilt might be stronger. In addition, less daily structure and increased time at home might have led to less structure sleeping

patterns, generally higher mood and lower levels of energy expenditure among the respondents.

An appropriate sample size was chosen for the ESM (van Berkel et al., 2018), one that would be considered as rather small for cross-sectional surveys. Also, the sample was well chosen regarding age and gender distribution, as BW is known to be more prevalent among young adults (Ahmed, 2017; Digital democracy survey, 2018; Flayelle et al., 2020), hence, it is quite representative of those people “at-risk”. On the other hand, this research presents a relatively highly educated sample, as mostly university students took part. This can also indicate a possibility of being at less risk for high BW levels probably due to being more conscious and reflective of their own behaviour patterns and its health consequences. Or, students might not consider going to bed late in the night as problematic, while young adults who already have a full-time job and more structure in their daily life, would. So, different occupations or educational levels might evoke different results in regard to VoD engagement and associated psychological consequences. Further research on this might be interesting.

As with all questionnaire-based studies, self-report measures are always prone to bias, for example through social desirability or distorted recall, which reduce measurement validity (Exelsmans & Van den Bulck, 2017; Granow et al., 2018; Tóth-Király et al., 2017). By using ESM, these can be mostly reduced by means of a more direct and objective assessment of the behaviour and associated processes (Exelsmans & Van den Bulck, 2017; Granow et al., 2018). However, misestimations and systematic biases or even a possible lack of reflection on behalf of the respondents are still possible (Panek, 2013) in terms of the number of watched episodes, for example. Additionally, response shift or the change of internal standards as well as an intervention effect might have led to changes in the VoD consumption or its documentation over time. Even self-selection bias may play a role regarding what type of people participated in the study (Exelsmans & Van den Bulck, 2017).

The discrepancies of the results with previous research may also be a result of the differences in the operationalisation of BW used across different studies which points to the need for a common definition for comparability of results (Exelsmann & Van den Bulck, 2017; Flayelle et al., 2020). Especially since this topic displays a developing research area with a promising future, a stable view on the construct is needed (Flayelle et al., 2020). The fact that in the current study, a significant effect of BW on guilt was found but not of the hours or episodes watched, indicates that the cut-off score in the operationalisation of BW highly matters. But, instead of a dichotomous measure, a continuous assessment regarding the intensiveness of BW would be helpful to get more detailed insight. For example, could

watching 1 hour and 2 episodes be considered as ‘level 1, watching 2 hours and 4 episodes as ‘level 2’ and watching 3 hours and 6 episodes as ‘level 3’ BW, whereby even more categories could be possible. This variable type allows for drawing conclusions from an increased amount of BW on according scores in depression or specific symptoms. Within the scope of this research, this was not possible but it is strongly recommended in order to avoid the loss of information on the VoD use due to the dichotomous measure of BW.

Further, there was a deficiency in the formulation of some questionnaire items. In the behaviour assessment it was asked whether feelings of guilt were present or not after watching of which the answer “Not at all” inhibited the following questions (see Appendix A2). Instead, it is recommended to firstly ask “Does one (or more) of the following issues apply to you?”, giving the answer possibilities “I watched more episodes or for a longer time than I wanted / planned to”, “I neglected other obligations that I should have fulfilled” and others (see Appendix A2, Item 11). After that, the questions “Do/did you feel guilty about this?” (Item 9) and “To what extend do/did you feel guilty?” (Item 10) should follow. This way, the respondents are led to think about these issues, which might otherwise not be the case. The issues addressed can still be examined regardless of whether this led to feelings of guilt or not, whereby more detailed information is delivered on VoD watching consequences. Worth mentioning is that the collected data also allow for the analysis of the symptoms as predictors of VoD watching and BW, which was considered beyond the scope of the current study. However, it cannot be excluded that guilt or any other depressive symptom might be an antecedent rather than a consequence of BW, which demonstrates the importance of these analyses. ESM is well suited to that end.

In general, it is questionable whether the examined complaints in this context can be considered as depressive symptoms. It was assumed that they were associated with depression based on the fact that they are among the symptoms describing a depressive episode in the DSM Manual (American Psychiatric Association, 2013). However, these must be present for at least two weeks and in combination with lower mood or loss of interest in other activities. As most of the symptoms were not found to be associated with BW, no conclusions can be drawn on the development of a depressive disorder anyways.

Lastly, this research could only reveal a short-term association between BW and guilt. Further research might be able to reveal whether BW can be seen as a risk-factor for developing long-term depressive symptoms as a consequence of the extended behaviour. To that end, in regard to health concerns of modern societies, it is interesting to see whether it might also contribute to the development of a depressive disorder (Wheeler, 2015). If it does,

it might be advisable to reconsider the implementation of streaming services and to extend education about the backgrounds and potential risks for the user's health and well-being (Flayelle et al., 2020). On the other hand, the label of binge-watching might be reconsidered in case it cannot be proved to be related to mental health issues. The negative connotation of the term could in that case be eliminated and the behaviour dissociated from obsessive and addictive actions. Just like Pittman and Sheehan (2015) stated, the formulation might even provoke or contribute to the emergence of feelings of guilt. Further research is suggested, given the rather vague findings on the reasons for guilt in this study.

Conclusion

To answer the research question for this study, it is to say that with most investigated depressive symptoms, no association with BW could be found in the present study. But, a small association between BW and guilt directly after engaging in it and in the next morning was found. There are many possible explanations for the findings among which social desirability and perceived societal expectations might play a significant role. To that end, ESM turned out to be a suitable method to investigate several depressive symptoms in the context of VoD watching and BW. An important question to ask is whether the emerging guilt is an intrinsic feeling of the recipient or an externally produced pressure to feel bad about not conforming societal standards. To that end, one might reconsider whether VoD watching, online media use and possibly even binge-watching has become the societal standard already. Still, further research is required to consolidate these findings and to create a complete picture with a view on the antecedents, predictors and outcomes and consequences of BW, on the individual and societal level.

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Appendices

Appendix A: 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.
 - ☐ Male
 - ☐ Female
 - ☐ Other (or do not wish to answer)
2. How old are you?
3. What is your nationality?
 - ☐ Dutch
 - ☐ German
 - ☐ Other, European
 - ☐ Other, non-European
4. Please indicate your current occupation.
 - ☐ Pupil
 - ☐ Student
 - ☐ Apprentice

- Employed full-time
- Employed part-time
- Unemployed
- 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.
 - Netflix
 - Amazon Prime Video
 - Hulu
 - Disney+
 - Maxdome
 - Sky Home
 - Youtube
 - Other
6. Do you use one of these services at least once a week?
 - Yes
 - 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?
 - Yes
 - 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”.
 - Morning (6 a.m. - 12 p.m.)

- Afternoon (12 p.m. - 6 p.m.)
 - Evening (6 p.m. - 11 p.m.)
 - Night (11 p.m. - 5 a.m.)
3. Did you watch for more than 1 hour?
- Yes
 - 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
- I watched more episodes or for a longer time than I wanted / planned to.
 - I neglected other obligations that I should have fulfilled.
 - I neglected other free-time activities that I wanted to pursue.
 - I neglected bodily needs, for example sleep.
 - I think that I wasted time or could have spent that time more wisely/useful.
 - 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.
 - Low/sad mood
 - Not at all
 - Slightly
 - Moderately
 - Strongly
 - Extremely

- Low energy/fatigue
 - ...
- Feelings of guilt
 - ...
- 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

Robert Preißler: r.h.preissler@student.utwente.nl

Dino Erker: d.d.erker@student.utwente.nl

Johanna Lehmkuhler: j.k.lehmkuhler@student.utwente.nl

Olivia Buschmeyer: o.buschmeyer@student.utwente.nl

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 Lehmkuhler, 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.