

**Binge-Watching and its Impact on Learning Behaviour and Important Daily Life
Activities among University Students:**
A Study using Ecological Momentary Assessment

Bachelor Thesis

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Abstract

With the emerging video-on-demand streaming, the so far known construction of television changes and the so-called phenomenon ‘binge-watching’ (watching two or more episodes of a series in one sitting) rises, especially among university students. Although binge-watching is widely related to unhealthy and excessive behaviour and assumed to have a negative influence on daily live activities and academical achievements, the overall extent and impact on students are hardly researched. Ecological Momentary Assessment (EMA) was used to gather information about prevalence, impact and context of students’ on-demand streaming behaviour and evaluate intended and unintended watching behaviour. Using a mobile application, 23 participants answered a daily questionnaire, regarding their watching and study behaviour and important daily live activities over the course of 15 days. It was observed that the participants used on-demand streaming services on a regular basis and binge-watched on 36% of the measured days. They indicated to watch on average 1.42 hours online series per day whereby the intended and actually observed watching time were closely related. Also noticeable was a strong variation between the 23 participants. One of the main findings of this study was furthermore, that the students who indicated to watch more online series, reported to spent less time than planned on physical activities. Additionally, on days the participants watched more online series and movies, they spent more time than planned on social activities and less time than planned on housekeeping. In contrast, no negative influence of the watching time on neither the learning behaviour nor the grades of the students was found. It was thus indicated that binge-watching is a popular pastime among university students. Although no alarming negative influence of the daily life of the participants was observed, it was well indicated that some students might tend to excessive binge-watching behaviour. Further research in the field of binge-watching is necessary, and EMA was rated as a valid method to get an insight in students’ behaviour in a real-life, real-time setting.

Keywords: binge-watching, university students, Ecological Momentary Assessment (EMA), learning behaviour, important daily life activities,

Introduction

"If we do not change our television habits, our education will soon only be good enough to sew T-shirts for China." (Spitzer, 2005). With this provocative quote, the German psychiatrist, professor and author Manfred Spitzer reflects the view and findings of many experts (Keith, Reimers, Fehrmann, Pottebaum, & Aubey, 1986; Fehrmann, Keith, & Reimers, 1987). Already in the second half of the 20th century, the influence of watching television on academic achievements was discussed and researched widely (Furu, 1971; Keith, Reimers, Fehrmann, Pottebaum, & Aubey, 1986). A negative effect of watching TV on academic achievement is also shown in more recent studies. Razel (2010) indicated that with a small amount of TV-watching, academic achievement increased with viewing, but beyond a certain point of watching, achievement decreased in all examined age groups.

Although the relationship between learning behaviour and screen time has been thoroughly researched, these profound studies regarding its' correlation lose on representativeness, as the traditional habit of watching TV drastically changed in the last years. "The age of broadcast TV will probably last until 2030" presumes Reed Hastings, the CEO of Netflix (Evans, 2014, p. 1). Also, Jenner (2015) stresses that the so far known construction of television changes, because of the emerging video-on-demand streaming. On-demand streaming services are online platforms which provide viewers with the possibility to watch any show or film at any time (Pittman & Sheehan, 2015). With the offering of this serialised content, the phenomenon of the previously known television changes (Jenner, 2016).

With the opportunity of video-on-demand streaming, another phenomenon has risen, referred to as 'binge-watching'. Binge-watching is widely defined as watching two or more episodes of the same TV series in a row (Davis, 2016; Spangler, 2013; Flayelle, Maurage, & Billieux, 2017). This new norm for watching TV (Flayelle et al., 2017) seems to be in particular interesting for a young target group. As shown in a recent study the main users of streaming services like Netflix, Amazon or Videoland, are under the age of 25 (Chastin, DeCraemer, Oppert, & Cardon, 2018). Also, Riddle, Peebles, Davis, Xu and Schroeder (2017) showed that binge-watching is very common among University students. They investigated with 171 students, from which only five of them never experienced binge-watching. Therefore, University students are an interesting group for further research in the field of binge-watching and the chosen target group for this study.

Next, to most other recent studies (de Feijter et al.2016; Jenner, 2017) the named survey of Riddle et al. (2017) focused on the watching behaviour that is classified as bingeing.

In total, the participating students indicated to binge on a regular basis with a mean of 2.52 days per week during the semester and 3.62 during the semester breaks. Hence, they described how often the participants watched more than one episode in a row, but not how much time they spent in one sitting. Certainly, the time spends in front of the screen might differ extremely, dependent on the duration of the episodes (Pierce-Grove, 2016; Pittman, & Sheehan, 2015). Thus, a session of 60 minutes or less can easily be determined as binge-watching as well as a session of several hours. Therefore, the term binge-watching is seen as unspecific and criticised in different scientific articles (Perks, 2014; Pittman & Sheehan, 2015). In one of the few studies also focusing on the total watching time, participants reported a mean of 2.51 hours per binge-watching session and a mean of 1.42 binge-watching sessions in the previous seven days (Walton-Pattison, Dombrowski, & Presseau (2016). That can be extrapolated to 3.56 hours of binge-watching per week. The 86 participants in this study had a mean age of 30 and were chosen out of the broad Canadian population, and therefore not representative of the target group of university students. At present, little reliable data is available, which describes the time students spend watching online TV. For this reason, the overall time watching several episodes in a row must be researched, especially when binge-watching is studied in the context of interference with the students' daily life and unhealthy behaviour.

In line with this, the term 'binge' already relates binge-watching to extreme and unhealthy behaviour like binge eating or binge drinking. 'Binging' on something is typically negative and defined as an 'excessive amount in a short time'. This is, next to its' inaccuracy, also a point of criticism of the currently used term 'binge-watching'. Some researchers, therefore, prefer a more neutral term for the described behaviour, like 'marathon-watching', to anticipate a negative social perception of binge-watching (Perks, 2014; Pittman & Sheehan, 2015). Still, recent studies study relates binge-watching to different health problems like mental health issues (e.g. attachment anxiety and depression) (Wheeler, 2015) sedentary behaviour or unhealthy eating habits (Riddle et al., 2017). However, it is hard to say whether binge-watching is a symptom or cause of the mentioned problems. Wheeler (2015) stated that individuals who are higher in attachment anxiety are more likely to binge-watch because of their greater affiliation with television characters, while persons suffering from depression may find comfort in binge-watching or lack the motivation or cognitive energy to resist the autoplay functions of streaming products. In these cases, a high watching time might indicate an underlying health issue (and potentially influence it) but not cause it.

Related to the excessive consumption that is associated with bingeing, Trouleau, Ashkan, Ding & Eriksson, (2016) stress ‘easy accessibility can often lead to over-consumption’ and by the change from television watching to on-demand streaming, series and movies are no longer portioned accessible by a strict television programme, but accessible all the time and everywhere. Thereby a widely associated with addictive behaviour rises (Heatherston & Baumeister, 1991; Leon, Carroll, Chernyk, & Finn, 1985). For examples headlines like ‘15 Incredibly Addictive Series to Stream on Netflix on a Rainy Day’ (Hannum, 2016, p. 1), are common in the media coverage of series. But not only popular press articles describe a connection between binge-watching and addiction, but also scholarly writings frequently applied binge-watching to the classic criteria used for addictive states (Flayelle et al., 2017). Regarding Schweidel and Moe (2016) and Riddle et al. (2017), the question, therefore, rises if binge-watching might indeed be related to addiction symptoms.

Media addiction has been studied in different contexts, like gaming, internet use or also television watching. To be considered as ‘addictive’ or ‘compulsive’, media consumption must meet different criteria (Tukachinsky & Eyal, 2018). These are (a) heavy media consumption, related to the person’s ‘normal’ levels, (b) interference of media use with the normal activities of the affected person, leading to conflict and personal or social tensions (c) a built tolerance so that consumers’ reward from the media activity is diminished, creating craving for more consumption; and (d) withdrawal symptoms when the media activity is terminated (Horvath, 2004).

These criteria were partially discussed in the study of Kubey and Csikszentmihalyi (2002). While examining the addictive nature of television and comparing it to substance dependence, it was found that participants felt relaxed and passive while watching television. Using electroencephalogram (EEG), studies showed that they simultaneously exhibited less mental stimulation. In contrast, the viewers experienced stress when the viewing session ended. This leads to the tendency to continue watching, to maintain the current state of mind (Schweidel & Moe, 2016) or as Kubey and Csikszentmihalyi (2002, p. 77) concluded, “Viewing begets more viewing”. However, to what extent this tendency leads to an unintended amount of binge-watching, was not further researched by Kubey and Csikszentmihalyi.

According to LaRose, Lin and Eastin (2003), this out of control aspect compared with a negative influence of the persons daily life distinguishes between a (harmless) habit and behavioural addictions, like media addiction. Regarding binge-watching, Flayelle et al., (2017) found that participants sometimes watched series for a longer time than originally

planned. Their qualitative research aimed at a genuine understanding of binge-watching behaviours and gave with its focus group approach with seven participants first indications that must be further researched. Also, the study of Riddle et al. (2017) focused on intentional and unintentional binge-watching to explore the addictive potential of this behaviour. They stated that 19% of the participants experienced unintentional binges and that this unintentional binge-watching was related to symptoms of addiction. The researchers named as a limitation of their study that the frequency of intentional and unintentional behaviour was reported via a 5-point scale (1 never, five very often) and was thus inaccurate. Therefore, the share of intentional and unintentional binges is researched within this study, to estimate whether the target group is in control of their watching behaviour (binge-watching as a habit) or if a closer look is necessary to state if the target group is at risk to show a behaviour that might be related to symptoms of addiction.

As mentioned above a second distinctive feature for an addictive or compulsive behaviour is whether it interferes with the daily life and thereby generate conflicts and personal or social tensions. Considering that the chosen target group for this study were university students, it is assumed that their academic education is a central aspect of their normal lives. Indeed, there is some evidence that suggests that binge-watching can have a negative influence on academic achievements and the time and effort student spend on learning, hereafter referred to as learning behaviour. In a study with 74 College students, 59 % of the participants reported that watching online content is distracting from their studies. One of the limitations of this study was that the students estimated the influence of binge-watching on learning behaviour retrospective and reported difficulties estimating the actual distraction of online watching behaviour (Winland, 2015). Therefore, further research with another study design is necessary. The findings of Winland (2015) are supported by the research of Mohr (2017), who studied the learning behaviour and ideal learning environment for students. They stress the risk of students getting caught up in or lost on, the Internet, through binge-watching. They, therefore, recommend strict guidelines for online searching and viewing, to help students avoid the binge-watching, what can cause them to waste time and lose focus while studying.

Next to the academic achievements other aspects of students' daily life might also negatively been influenced by binge-watching. It has been indicated that this behaviour might also displace activities such as sleeping, exercising and even housework and personal upkeep (Riddle, Peebles, Davis, Xu, & Schroeder, 2017).

On the other hand, there is also evidence that attenuates this negative reputation of binge-watching. Billieux, Schimmenti, Khazaal, Maurage, & Heeren (2015) suggested that daily life activities often are over pathologised and they thereby criticise behavioural addiction research in fields like binge-watching. Although in the focus group of Flayelle et al. (2017) participants sometimes indulged in viewing higher doses by watching for a longer time than originally planned, this was not a concern for the researchers, as most participants reported feeling able to stop watching if necessary (if they could retain the option to watch later). Six out of seven participants did not identify major negative outcomes for daily living. But still, one participant (14.3 %) reported impairing consequences of binge-watching, such as missing classes or declining outings with friends. Therefore, the influence of binge-watching on daily life stays uncertain.

This is also consistent with the findings of de Feijter, Khan & van Gisbergen (2016). Within their group of 32 Dutch participants, aged 18 to 34, the amount of time spent binge-watching correlated with the amount of free time, which indicates that the general viewer watches online TV as a hobby in his leisure time and may, therefore, have adequate control over his binge-watching behaviour. However, these findings, do not give a clear insight into the influence of binge-watching behaviour on the learning behaviour and important daily life activities in the group of university students.

Indeed, the study of Riddle et al. (2017) revealed some of the scenarios in which intentional and unintentional bingeing in the context of academic education might occur. They examined the watching behaviour of 218 undergraduates at a Midwestern university in the United States, which reported higher levels of intentional bingeing during academic breaks (winter, spring, and summer break) compared with unintentional bingeing. Therefore, the students maintain control of their binge-watching behaviour when it was necessary to enable an adequate learning behaviour. The influence on academic achievements might, therefore, be small in the average student, if he or she watched intentionally and controlled in a self-determined time. Nevertheless, the direct influence of binge-watching on academic achievements was not yet researched and is, therefore, a field of interest within this study.

The question, therefore, rises if binge-watching should be graded as a new alarming behaviour or a trend or change in recreational and social behaviour among a large group. Participants indicated that TV series provide a topic for discussion and sharing reactions or impressions. And although binge-watching often remains a solitary hobby, it also appeared to be an important way in which most of the participants spend time with their partner (Flayelle, Maurage, & Billieux, 2017). Moreover, de Feijter et al. (2016) found three main motivations

for binge-watching. Next to immersion and entertainment, the social aspect was crucial. This indicates that binge-watching may be a new hobby, that students share with their friends.

It remains unclear whether binge-watching intervenes in the time students spend on their studies or change other important daily life activities like their hobbies, social activities and/or dating habits. So, it is still not clear if binge-watching constitutes an unhealthy behaviour that impairs their daily life's and especially their academical achievements.

Although previous studies have addressed the topic of binge-watching of University students, they predominantly worked with very small qualitative focus groups (five to seven participants) or used a cross-sectional design with a retrospective assessment of the binge-watching behaviour and its consequences (de Feijter et al., 2016, Flayelle, Maurage, & Billieux, 2017, Riddle et al., 2017). Therefore, it was not considered or only estimated, how the behaviour might fluctuate during the week (e.g. more free time at the weekends). Moreover, the students in these studies had difficulties estimating the time they usually watched series retrospectively, not to mention the direct influence on students learning behaviour and daily life activities.

Therefore, in this study, an experience sampling method (ESM) was used. The purpose of this methodology, which is also known as Ecological Momentary Assessment (EMA), is to study the experience of the participants in a natural environment, to increase ecological validity, meaning that the findings are more representative for the participant's daily lives (Csikszentmihalyi & Larson, 2014). For this, the behaviour is measured in real-life, real-time, by systematic self-reports of experiences, activities, and feelings throughout the day of a normal week. Typically, participants are asked to repeatedly complete short questionnaires. It is an empirically validated structured diary technique (Verhagen, Hasmi, Drukker, van Os, & Delespaul, 2016) that enables the determination of intra-individual variations and fluctuations. EMA studies have been shown to be high reliable and valid (Moskowitz & Young, 2006). Furthermore, the EMA prevents a recall bias, by reducing reliance on retrospective memory (Trull & Ebner-Priemer, 2009).

Four research questions result from the above discussed state of research. First, because of the lack of representative research on the overall extent of (binge-)watching behaviour of university students, the first research question is as follows:

What is the extent of binge-watching behaviour among university students?

Second, although the addictive character of binge-watching is widely discussed, it stays controversial. As a first important indication of an addiction risk among university students, it must be analysed if they regularly indulge in unintended bingeing. It could not yet be shown if university students regular lose control over their on-demand streaming behaviour or if binge-watching is an intentional behaviour within this group. Therefore, the second research question focuses on the share of unintended watching behaviour:

To what extend does the actual binge-watching behaviour deviate from the intended behaviour?

Related to this, it remains questionable whether binge-watching has a negative influence on the students' normal life by interfering with their studies or other important daily life activities, or if it changes other important daily life activities like their hobbies, social activities and/or dating habits. So, it is still not clear if binge-watching constitutes an unhealthy behaviour that impairs their daily life's and especially their academical achievements. Therefore, the two following research questions are examined:

What is the impact of binge-watching on study behaviour and academic achievements?

And

What is the impact of binge-watching on important daily life activities?

Method

Design

For this study, an experience sampling method (ESM) was chosen as study design. For 15 days, the participants' behaviour was measured in a real-life, real-time setting. Each day, the subjects were asked to report their behaviour of the previous day and their intended behaviour for the next 24 hours, regarding binge-watching and eating/learning behaviour for every day at a fixed time. The data collection took place between 02.04.2018 and 16.04.2018, whereby all participants participated from day one. The measurement period included the Easter holidays of this year and therefore, consisted out of 8 school days and seven non-school days. Through repeated reports from each individual participant, the reliability increases and the statistical power is far greater than normally. Therefore, a sample size above 20 persons is recommended and seen as sufficient (Kreft & de Leeuw; 1998; Conner & Lehman, 2012).

Participants

Participants were recruited via convenience sampling and were contacted via social media or face-to-face, as they were mainly family members and friends of the researchers and well known to them. A group of acquaintances was asked to participate, to make it possible to motivate and encourage the participants to fill in the questionnaire regularly. During the study, the students had to fill in a questionnaire in English by using a mobile application. Therefore, it was required that they owned a smartphone and had a sufficient English language proficiency.

Furthermore, this study only included students enrolled in a university who had access to at least one on-demand streaming service and were available for at least ten minutes per day for two weeks. All 23 participants were German nationals, 16 (69.57%) of them were enrolled in Dutch universities and 7 (30.44%) in German universities. Further, the population comprised of 7 males (30.44 %) and 16 females (69.56%). The participants were between 18 and 27 years old, and their mean age was 22.52 years ($SD=2.43$).

Procedure

Firstly, the participants were informed about the duration of the data collection (15 days) and the overall topic of the research (binge-watching). After expressing their willingness to participate in this study, they received an email with more detailed information.

Also included in this email was a link to the baseline questionnaire via the website Qualtrics, this is a subscription software for collecting data.

The experience sampling was conducted via the PACO application (www.pacoapp.com). Within the first email, the participants also received instruction on how to download this application on their smartphone or tablet. The research team proposed to compare the intended and actual behaviour of the participants in a period of respectively 24 hours. To cover the whole day, it was important that the questionnaire was filled in at the same point in time each day. The participants were therefore asked to fill in the questionnaire once a day between 11 am and 2 pm. As a reminder to fill in the questionnaire, they received an automated notification on their mobile devices at 11 am. Nevertheless, also responses which deviated from this period were admitted, to take the participants daily routine into account. Thus, all answers given between on the specific calendar day were used for the analysis.

During the two-week data collection period, the participants received three emails with further instructions and reminders to fill in their daily questionnaires. Additionally, the researchers monitored the individual responding rates and reminded the participants via WhatsApp to fill in the questionnaire. No compensation was given to the students.

Measures

Baseline Questionnaire. Two different questionnaires were used in this study. All questions regarding watching behaviour specifically asked about the on-demand online streaming behaviour and not linear TV-watching. Demographic information was collected with the first baseline questionnaire (see Appendix B). This questionnaire started off with an informed consent form and contained 27 questions, regarding information including age, gender, the enrolled university and an overall estimation of their regular binge-watching, eating and study behaviour. Response options were multiple choice, single words or numbers. Filling in the first questionnaire took around 10 minutes.

The variable binge-watching was measured by six items within the baseline questionnaire. They were mostly based on the research of Walton-Pattison et al. (2016) and Riddle et al. (2017), who also researched binge-watching behaviour and therefore, conducted a similar questionnaire. In order to receive an overview of the extent of their on-demand streaming habits, participants had to give an overall estimation of the hours and number of days per week they spent on watching online series and movies (i.e. 'On average, how many hours do you watch online series and movies per week?'). Furthermore, to receive a clearer

insight into the students' binge-watching frequency, they were asked the number of days per week that they watch two or more episodes in one sitting.

A question included which online on-demand streaming websites they had access to, to make sure all participants could make use of such a service. This needed to be one or more out of the four most common on-demand streaming services (Netflix, Videoland, Amazon Prime Channels and Film1) and the answer 'Others' could be chosen. Based on the findings of Feijter et al. (2016), information regarding the time of day and the social context in which the participants usually watch online series and movies were requested. The choices here were 'Alone', 'With partner', 'With family' and/or 'With friends'.

The students' learning behaviour was assessed by five items. These are based on a survey by Lizzio, Wilson and Simon (2003). The participants were asked about the number of study points they had to obtain and actually obtained in the last academic year and their current weighted average grade, to collect insight into the students' academic achievements. Furthermore, the time the students spent on self-study and university related events in an average week were estimated by the following question: 'On average, how many hours do you spend on your study per week? (incl. going to lectures, tutorials, studying for tests or writing assignments)'. Additionally, their attitude towards academic achievements was measured by asking about how important they considered high grades. They could rate this importance on a 5-point Likert scale ranging from 'Extremely important' to 'Not important at all'.

Seven items were used to assess the three variables snack, beverage and vegetable consumption. Participants were asked to indicate how often these were consumed on average. An example of one of these questions is the following: 'On average, how often do you eat vegetables (cooked/steamed), salad (i.e. lettuce, tomatoes) or fruit?'. The participants had to indicate their answer on a 5-point Likert scale ('Several times per day', 'Once a day', 'Several times per week', 'Several times per month', 'Several times per year', 'Less or Never'). The snack, beverage and vegetable categories are derived from the research of Zenkt et al. (2014). Attitude towards healthy nutrition was measured based on one item, asking the participants how important they consider healthy nutrition.

Questionnaire within PACO application. The second questionnaire was taken within the PACO application (see Appendix A). It consisted of 17 questions each day, which could be answered by selecting one or several answers or by entering single words or numbers. This questionnaire was based on the above described baseline questionnaire but focused on specific behaviour in a short period of 24 hours, instead of giving an overall estimation. The

research team decided to make the questionnaire as short and as easy to answer as possible to increase the response rate. Therefore, the PACO questionnaire can be described as a more concentrated version of the baseline questionnaire.

The 17 items concentrated on the main variables watching-time, binge-watching behaviour (the number of episodes watched in a row), snack and beverage consumption, learning behaviour and important daily life activities. Also, questions regarding the intended binge-watching and learning behaviour for the following 24 hours were asked. Filling in the questionnaire took around 5 minutes per day. These questions are inspired by the article by Hsieh, Li, Dey, Forlizzi, & Hudson (2008). Within this research, binge-watching was measured based on the following three items: 'How many hours did you spend on watching online series/movies in the last 24 hours? Give your answer in decimals (3 h 30 = 3.5)', 'How many episodes of the same series did you watch in one sitting in the last 24 hours? Give your answer in decimals (3 1/2 episodes = 3.5)' and 'How many hours are you planning to spend on watching online series/movies in the next 24 hours? Give your answer in decimals (3 h 30 = 3.5)'. The participants could answer these questions by entering the number of hours or episodes.

The students were asked about the social context of the on-demand watching behaviour, with choices between 'Alone', 'With partner', 'With family' or 'With friend(s)'. Learning behaviour and important daily life activities were assessed based on seven items. The participants were also asked to indicate the intended and past time spent on self-study activities and university related activities. Furthermore, the participants had to indicate if they spent more or less time than planned on the three important daily life activities housekeeping, physical activities and social activities. Therefore, a 5-point Likert scale was used, ranging from 'Much more than planned' to 'Much less than planned'.

The snack and beverage consumptions were assessed by five different items. Snack consumption was measured by asking participants to indicate whether they ate one or more of the following snacks based on the categories: (1) Cookies or sweetened-baked goods, (2) Chocolate or candy, (3) Ice cream or frozen dessert, (4) Salty snacks, (5) Others and (6) None. Beverage consumption was measured by asking participants whether they had consumed one or more beverages based on the following categories: (1) Soda, (2) Fruit juice, (3) Energy drink, (4) Alcoholic drink, (5) Others and (6) None. These categories were mainly derived from the earlier research of Zenk et al. (2014). The number of snacks and beverages were then calculated by summing up the amount of chosen options.

Furthermore, participants were asked whether they had consumed more snacks and beverages than intended during the past 24 hours. Answer options were yes or no. The last item assessed whether the participants were watching online series and movies while eating and drinking.

Analysis

For the data analysis, the statistical program for social sciences (SPSS, version 23) was used. First of all, the data from the PACO application and the data from the baseline questionnaire from Qualtrics was transformed into SPSS. Then, these two datasets were merged into one dataset, so that all the variables were displayed in one file. Erroneous data, such as text input for numerical variables were altered. Also, rows with missing inputs were deleted. Based on the guidelines of Conner and Lehman (2012), participants who did not respond to more than 40% of the prompts were deleted from the dataset.

Descriptive statistics were used to measure the demographics of the population and information regarding watching, study, important daily life activities and eating behaviour of the participants. BMI was calculated with the variables weight and height, to classify the sample as either in the normal weight range (18-25) or as overweight (25-30). Based on the conversion table of the University of Twente (University of Twente, n.d.), the average grade of the participants from German universities was adjusted to the Dutch grading system. To compare the watching behaviour of the higher and lower achieving students, the participants were divided into two groups. The first group with an average grade ranging from 6.5 to 7.5 and the second group with an average grade from 7.5 to 9.

A series of Linear Mixed Models analyses with an autoregressive covariance structure was conducted to analyse the hierarchical and nested structure of the repeated measurements per participant and/or time point. All values gathered by linear mixed model analysis take missing data into account and are therefore estimated. In each Mixed Models analysis, one of the variables watching-time, intended watching-time, number of episodes, self-study-time, time university, snack and beverage intake, unintended snack and beverage intake, BMI and the three important daily life activities were set as the dependent variable. Time_point was set as the fixed independent factor to examine these behaviours over the Effect size was interpreted based on Cohen's conventions (1988), whereas a correlation coefficient of .10 is considered as a weak correlation, a coefficient of .30 as a moderate correlation and a coefficient of .50 as a strong correlation 15 days. Additionally, the participants' number was added as a factor when comparisons on an individual level were made. The output of the

analysis provided a mean estimation of the dependent variables per day and/or per participant. Further, it could be established whether the time had a significant influence on the variables. Excel was also used to compare the estimated means of the different variables and to create graphs to display how the different variables were related to each other. Bivariate Pearson Correlation analysis was used to examine the relationship between the participants overall mean watching-time and the number of episodes and the intended and actual watching-time averaged over the 15 days. Effect size was interpreted based on Cohen's conventions (1988), whereas a correlation coefficient of .10 is considered as a weak correlation, a coefficient of .30 as a moderate correlation and a coefficient of .50 as a strong correlation. An independent-samples t-test was conducted to explore the differences in means in watching-time between the variables of interest.

Results

33 students filled in the introduction survey via the website Qualtrics, from which 26 installed the PACO application on their mobile devices. 23 participants completed the daily survey on a regular basis (responded at least 6 out of 15 days) and were therefore included in the analysis. On average, they responded on 11.74 (78.27%) of the 15 requested days.

In the study period, an average watching-time of 1.42 hours (SD = 1.74) per participant per day was observed, and a mean of 1.49 episodes in a row (SD = 2.04) was observed. The participants watched between 0 hours (0 episodes) and 10 hours (12 episodes) per day.

By using a Linear mixed model analysis, the mean binge-watching behaviour of each participant was analysed (figure 1). The participants showed on average on 36% of the measured day binge-watching behaviour. However, the binge-watching behaviour varied strongly between the participants. While participant 8 never binge-watched in the study period, participant 11 watched on 13 out of the 15 days (86,6%) two or more episodes in one sitting. As illustrated in figure 1, 12 out of 23 participants binged-watched at least on 40 % of the days, while eight others showed this behaviour less than three times.

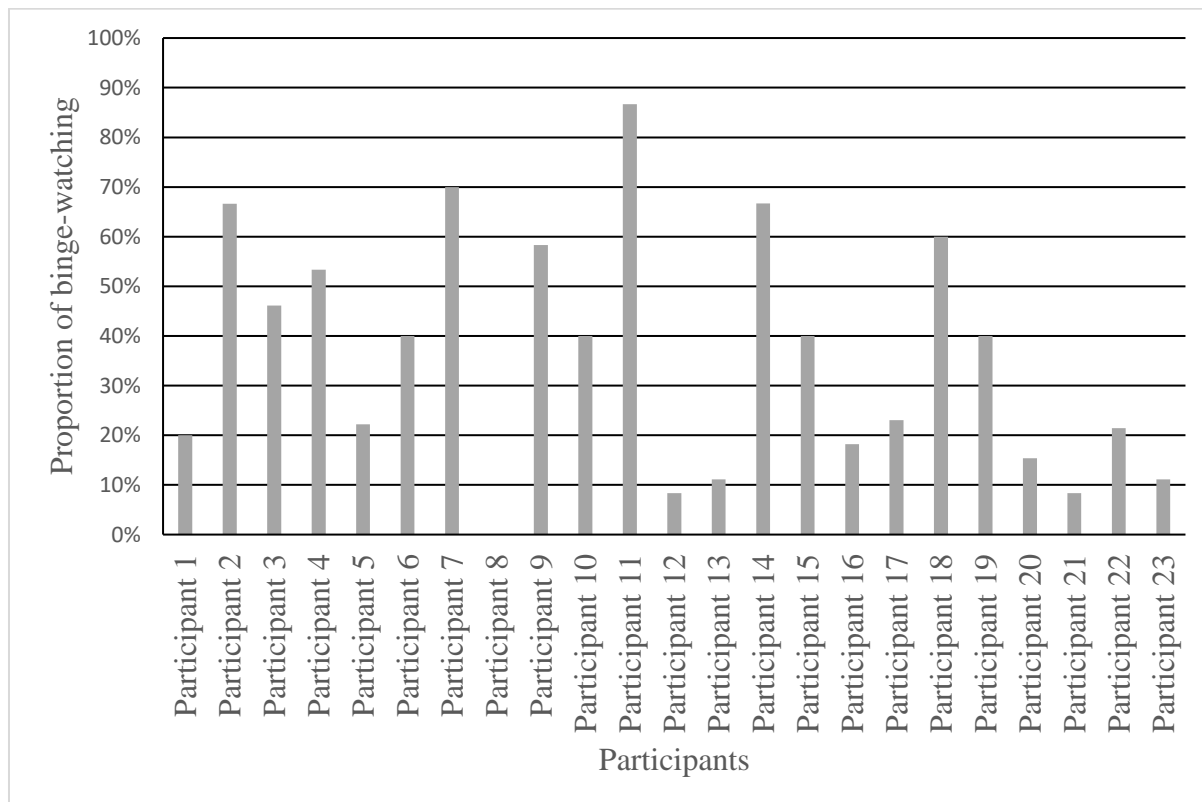


Figure 1. Estimated percentage of days the participants showed binge-watching behaviour.

In the time period, a mean watching time (WT) that varied moderately between 1.03 (SD=0.4) hours and 1.85 (SD=0.39) hours per day was observed. An exception to this was the Easter weekend (Day 6 and 7) on which a mean watching of 0.84 (SD=0.39) and 0.62 (SD=0.39) hours per day was observed (figure 2). Linear mixed model analyses showed that the timepoint (the day the participants watched) had a statistically significant influence on the watching time of the participants (coefficient = 1.06, $p < 0.05$).

Furthermore, a strong significant positive correlation between the time the participants watched online movies and series and the number of watched episodes ($r = .85$, $p < .01$) was found, which is also illustrated in figure 2.

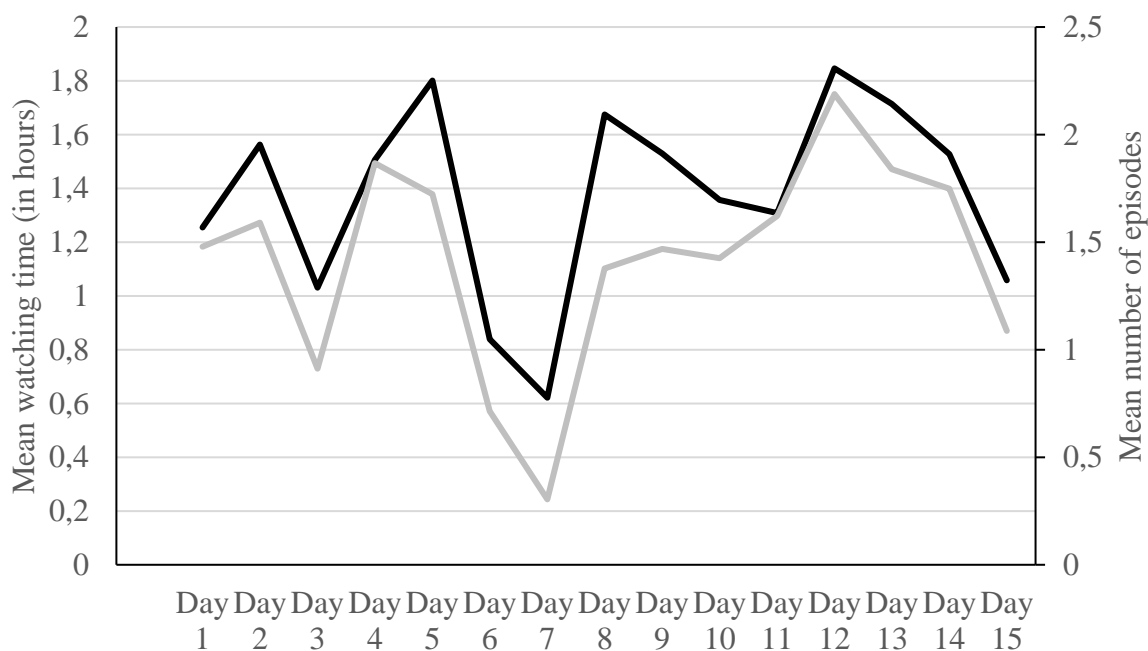


Figure 2: Mean watching time in hours (in black) and number of episodes (in grey) over the measured time.

A strong variation in the watching time was observed between the 23 participants. The mean watching time per day varied between 0.3 (SD = 0.61) hours for participant 16 and 3.74 (SD = 2.95) hours for participant 11 (see figure 3). 10 participants watched on average less than one hour per day on average, while four participants used their on-demand streaming services on more the 2.5 hours per day.

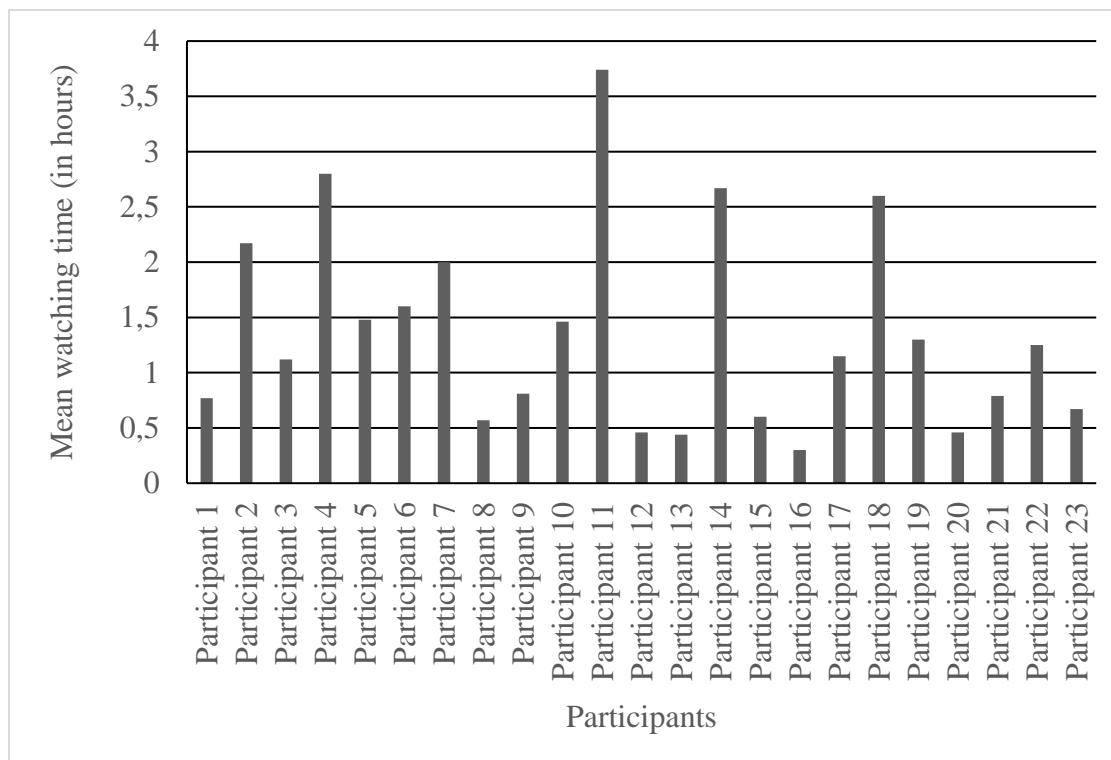


Figure 3: Mean daily watching time in hours per participant.

The duration of the sittings only showed a few extremes. Participant 11 watched on two consecutive days ten hours of online series in a row per day. Also, sittings of 5 to 7 hours were reported by 14 different participants. Still, on 48 % of the reported days, the participants watched less than one hour online series and movies.

With a linear mixed model analysis, the mean watching time per weekday was estimated and displayed in figure 4. In week one, the participants watched on average 1.26 hours (SD = 1.82) online movies and series. In week two the mean watching time was a bit higher with 1.64 hours (SD = 1.16) per day. When comparing the two measured weeks, it can be observed that the watching time of the working days (Monday to Friday) were similar in the two weeks. In both weeks a peak on Fridays and a lower watching time on Wednesdays (figure 4) can be observed. In the weekends the low watching time on the first weekend (Easter holidays) is remarkable, especially compared to the higher watching time in the second week. A moderate significant correlation was revealed between the means per weekday ($r = .37, p < .05$).

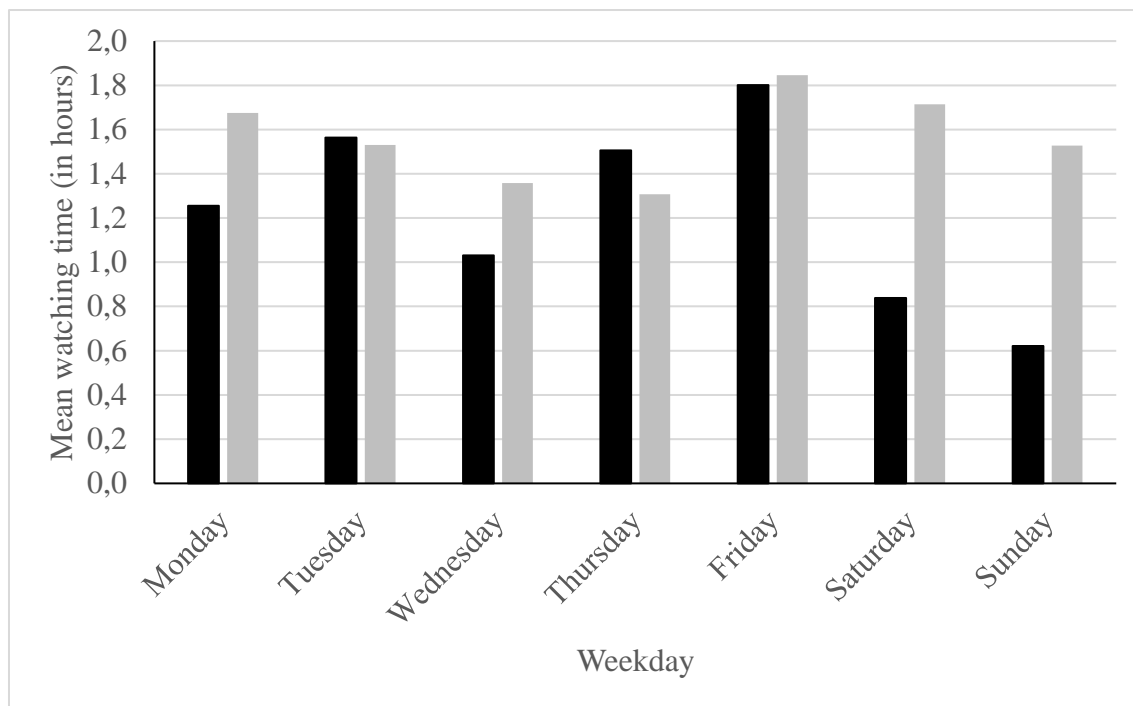


Figure 4: Comparison of the mean watching time in hours per week day. Watching time of week 1 in black, watching time of week 2 in grey.

Comparing the weekly watching time within the persons, it can be observed that the mean watching time for the most participants was similar in the two weeks (figure 5). Certainly, some participants watched much more in one week, compared to the other. In week one, the mean watching time of 5.57 hours per day for participant 11 was much higher than average, while her watching time in week 2, with 2.1 hours per day, is close to average. Also, participant 6 did not watch any online movies or series in week one, while his mean for week two (3.18 hours) was higher the average watching time of 1.42 hours (SD=1.74).

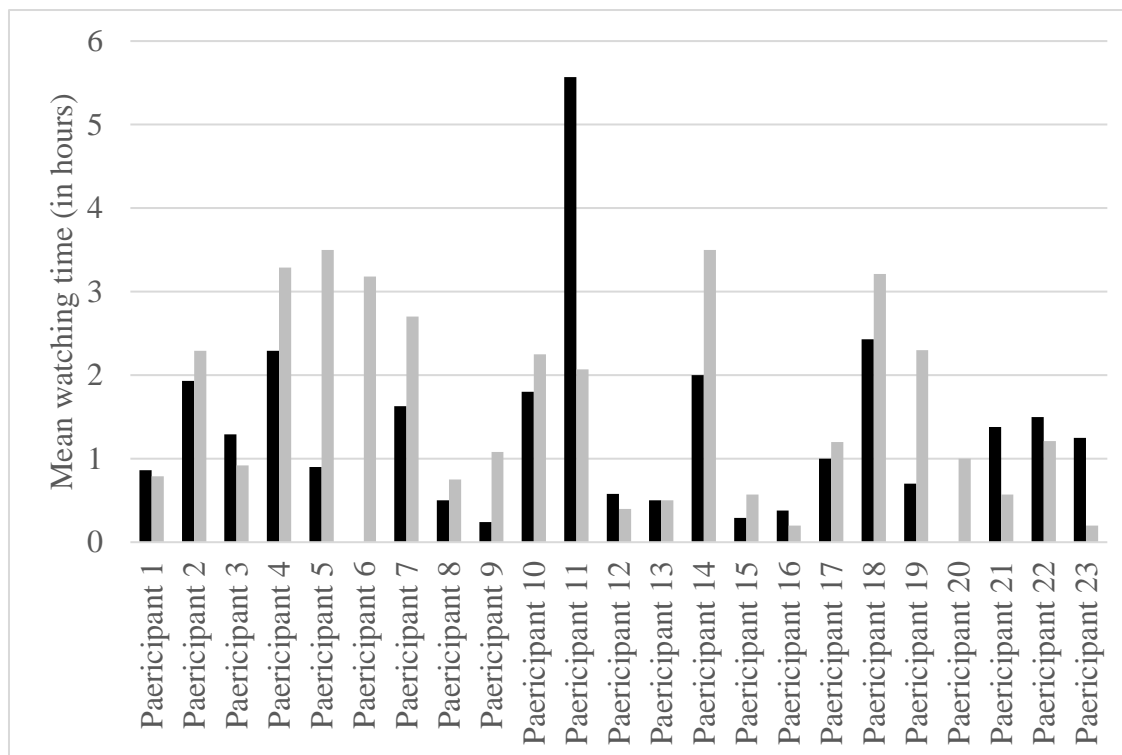


Figure 5. Comparison of watching time in hours, per week and participant. Watching time of week 1 in black, watching time of week 2 in grey.

On average the participants intended to watch 1.43 hours (SD = 1.25) and indicated to have actually watched 1.42 hours per day. In other words, the students approximately spent as much time watching online movies and series as planned (see figure 6). The Pearson correlation revealed a strong positive correlation between intended and actual watching time per person ($r = 0.76$, $p < .01$). However, as shown in figure 5, some participants estimated their watching time considerably higher in advance (participant 1, 7 and 23), while others underestimated the time they would spend with watching online series (participant 11, 14, 18) as 0.51-0.74 hours less (see figure 6).

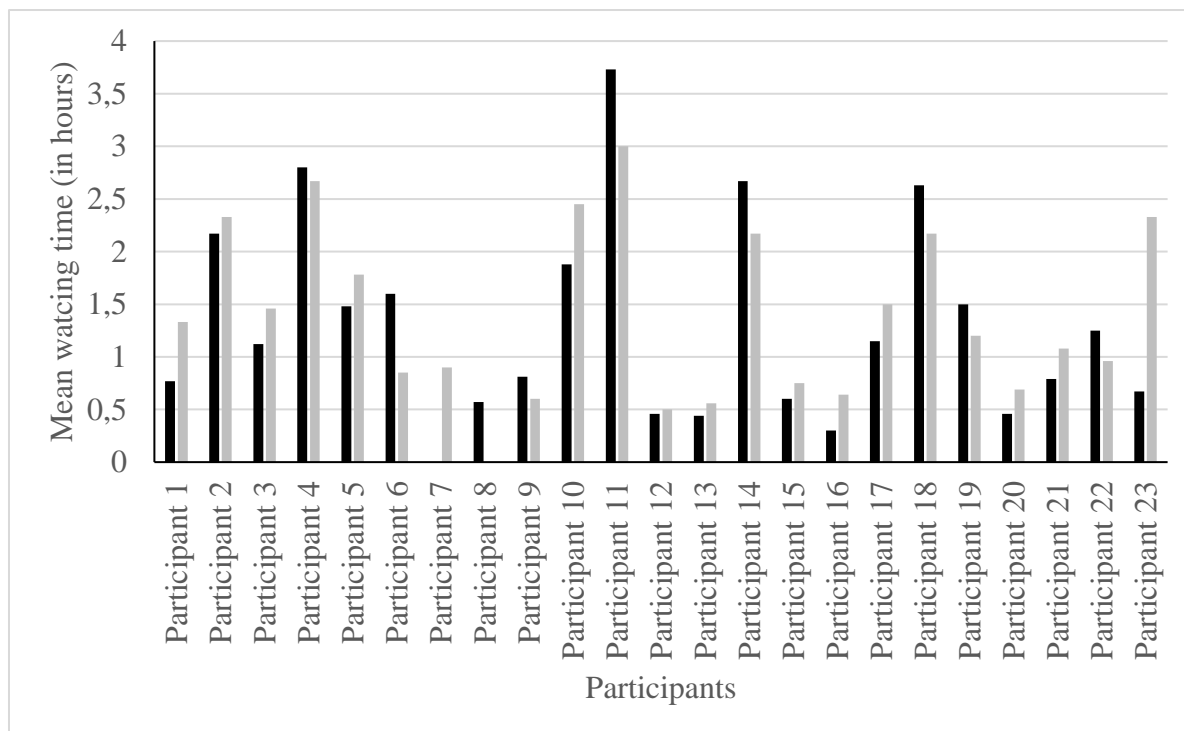


Figure 6. Comparison of the of the earlier intended (in grey) and actually observed mean watching time (in black) in hours per participant.

Within the baseline questionnaire, the participants were also asked about their usual weekly watching time. This stated time was converted to a mean daily watching time per person ($M = 1.16$, $SD = 1.12$). This values also correlated moderately with the observed watching time the participants indicated within the EMA study ($r = .38$, $p < .05$) (see figure 7). As shown in figure 7, the previous usual watching time of most participants was similar to the observed watching time in the two-week period of the study. However, two participants indicated a much higher watching time within the measured 15 days, than indicated before. Participant 11 indicated to watch 1.6 hours more per day within the period of the EMA study than estimated as a usual watching time in the baseline questionnaire. For Participant 14 a nine-times higher watching time (2.67 hours compared to 0.29 hours) was observed within the daily questionnaire than stated as the previous watching time before.

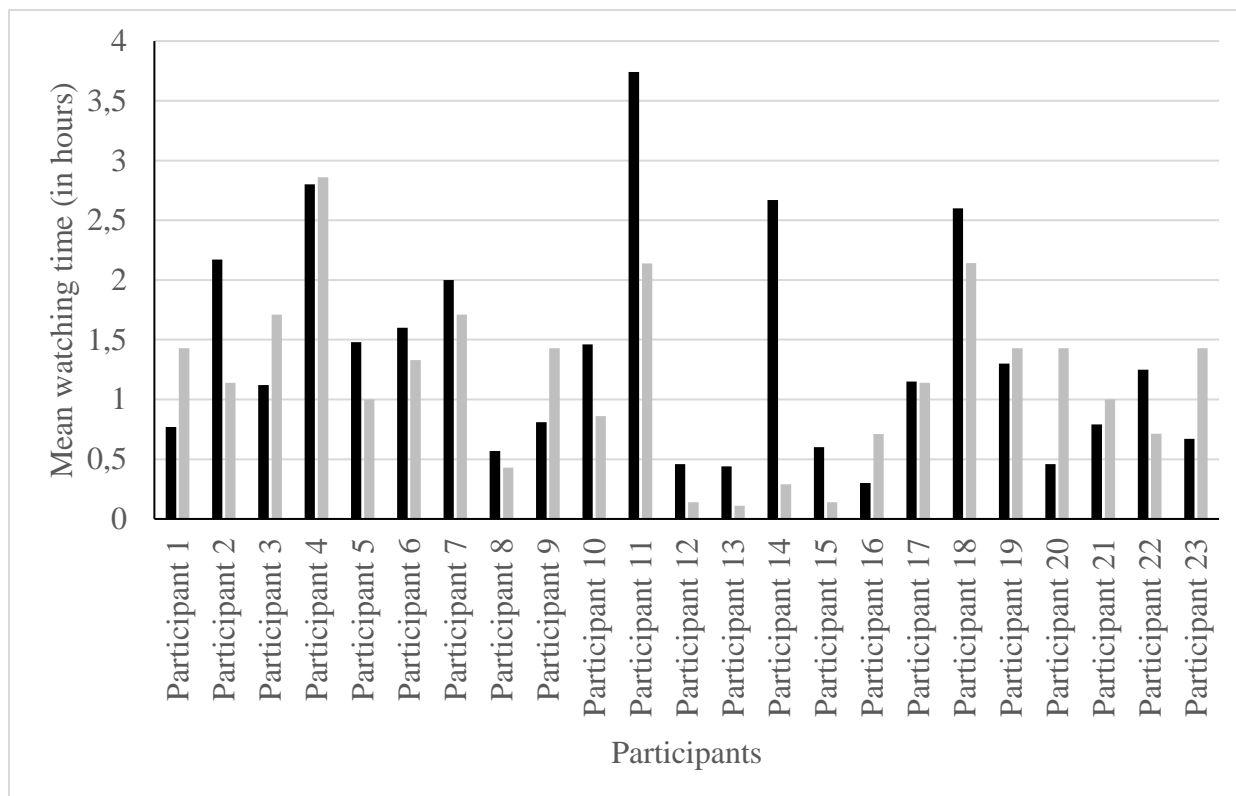


Figure 7. Comparison of the daily watching time observed within the EMA study (in black) and the usual daily watching time, the participants indicated within the baseline questionnaire (in grey).

The participants average grades ranged from 6.5 to 9 ($M = 7.44$; $SD = .72$). They indicated that they consider grades on average as very important ($M = 2,1$; $SD = .70$) (5 point scale; 1 = extremely important, 5 = not important at all) and indicated on 17.4 % of the observed days, that they were not on semester break. Using a linear mixed model analysis, the estimated watching time of the two groups of students with a current average grade under and above 7.5 was compared. It was observed, that the higher achieving group watched on average 19,8 minutes more per day ($M = 1,57$; $SD = 1$) than the lower achieving group ($M = 1.24$; $SD = .87$) (see figure 8). However, regarding the results of an independent sample t-test ($t(21) = 1.19$; $p = .24$), this difference was not significant.

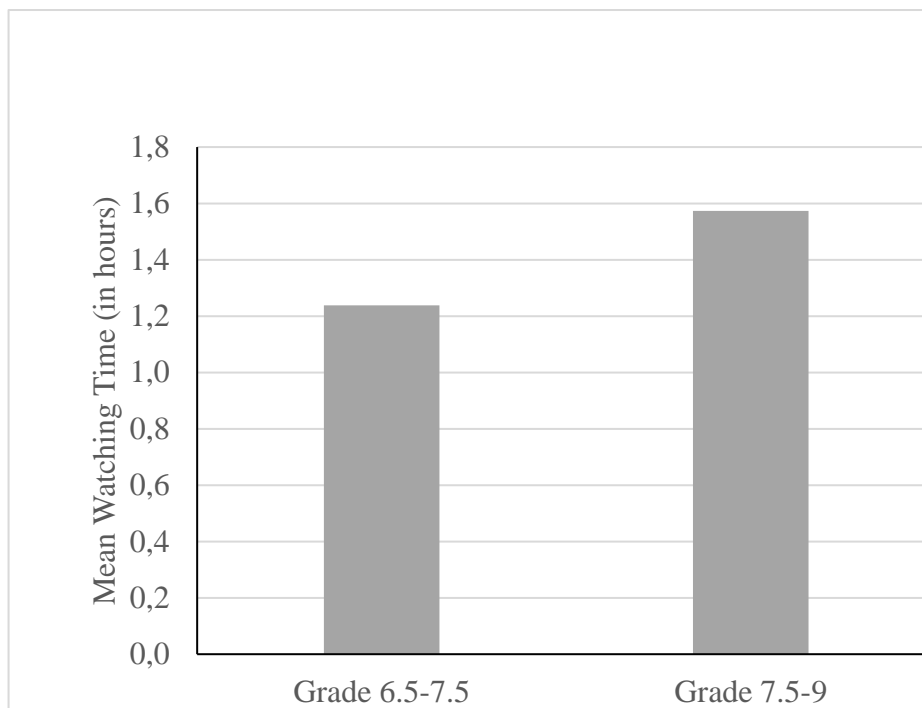


Figure 8: Watching time compared between the two grade groups

In the study period, the participants spent on average 1.24 hours (SD = 2.31) on university related activities like going to lectures or tutorials. They spent 2.22 (SD = 2.71) on self-study activities like studying for tests or writing assignments.

As displayed in figure 9 Pearson correlations revealed no significant correlations between the total study time (self-study and visiting university related events) and the total watching time ($r = .035$, $p=0.17$). There was also no significant correlation between the time watching online series and the time spent on self-study activities ($r = -.026$, $p=0.32$). A small but significant positive correlation was revealed between watching time, and the time the participants spent in university ($r = .111$, $p < .05$). In other words, on days students spent more time in university, they also spent more time watching online series.

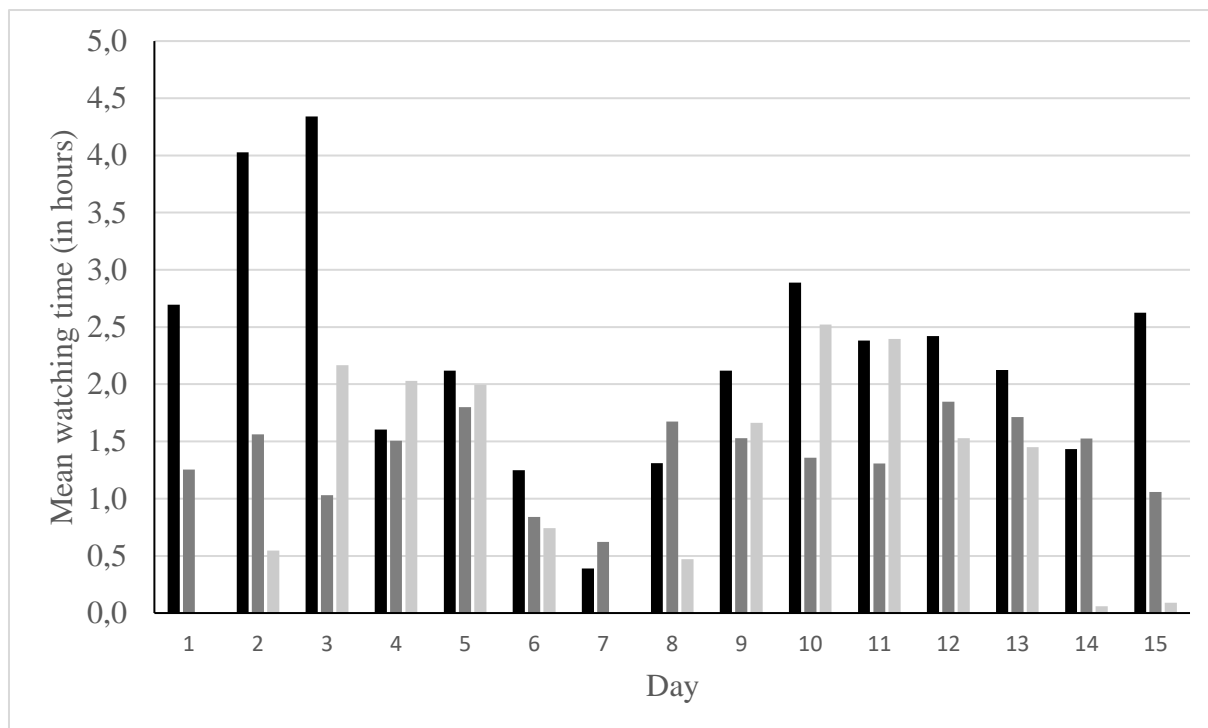


Figure 9. Comparison of time (in hours) participants spend on binge-watching (grey), for university related events (light grey) and self-study (black) per day.

The three daily life activities housekeeping, social activities and physical activity, were not observed in hours. The participants had to indicate whether they spent more or less time than planned for these activities (5 points Likert scale from 5 = much more than planned to much 1 = much less than planned). Bivariate Pearson Correlation of the watching time and the three important daily life activities showed two weak but significant correlations. First, with increasing time of watching online movies and series, the participants tend to spend less time than planned with housekeeping ($r = -.125, p < .05$) (see figure 10).

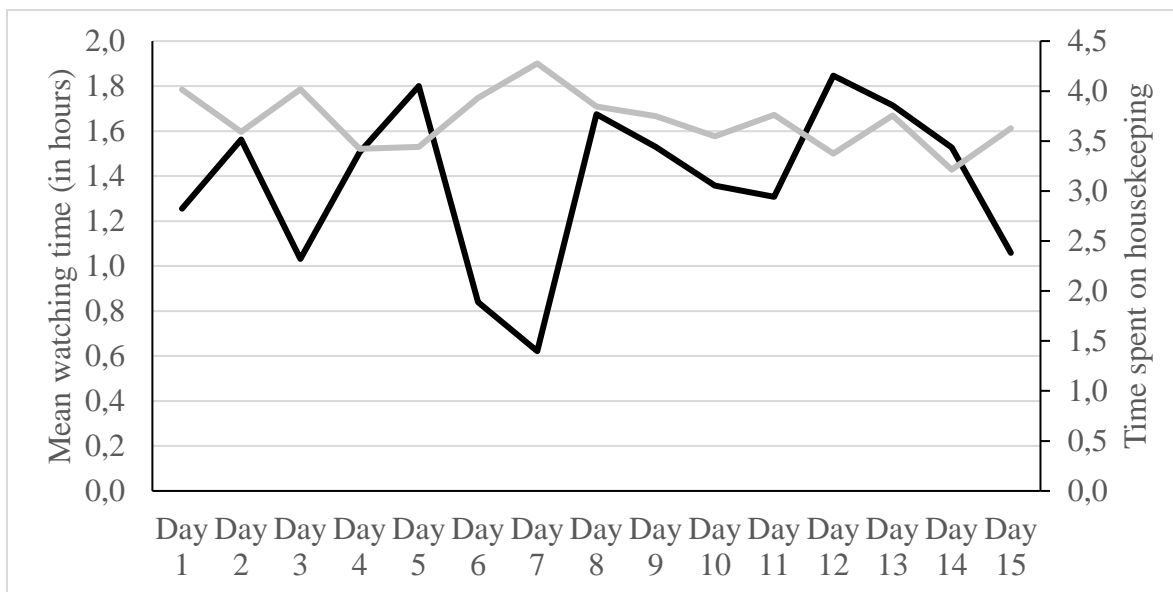


Figure 10. Mean watching time (black) and time spent on housekeeping per day (grey).

Furthermore, there was a weak positive correlation between the watching time and the time spent on social activities ($r = .154, p < .01$). On a day with higher watching time, the participants also spent more time than planned on social activities (see figure 11). There was no significant correlation between the watching time and the time spent on physical activities ($r = -.063, p = .150$).

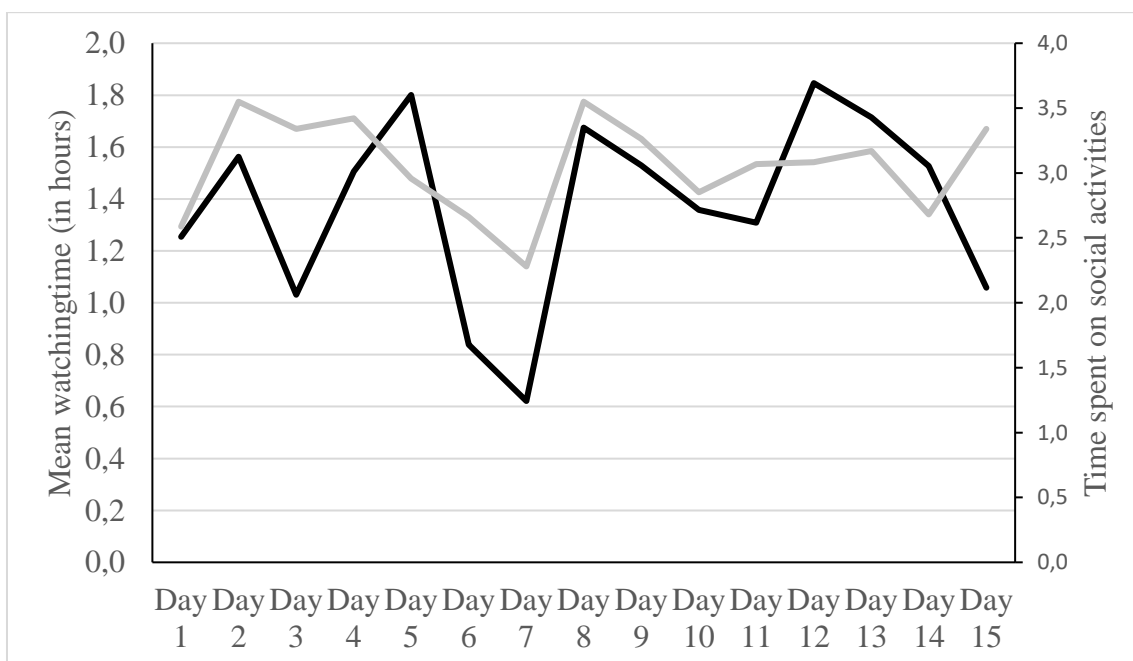


Figure 11. Watching time (in black) and time spent on social activities per day (in grey).

Furthermore, it was observed, that planned physical activity per person was significantly negative correlated with the mean watching time per participant ($r = -.35, p <$

.05). In other words, the participants who spent more time on on-demand streaming, tend to spend less time than planned on physical activities (see figure 12).

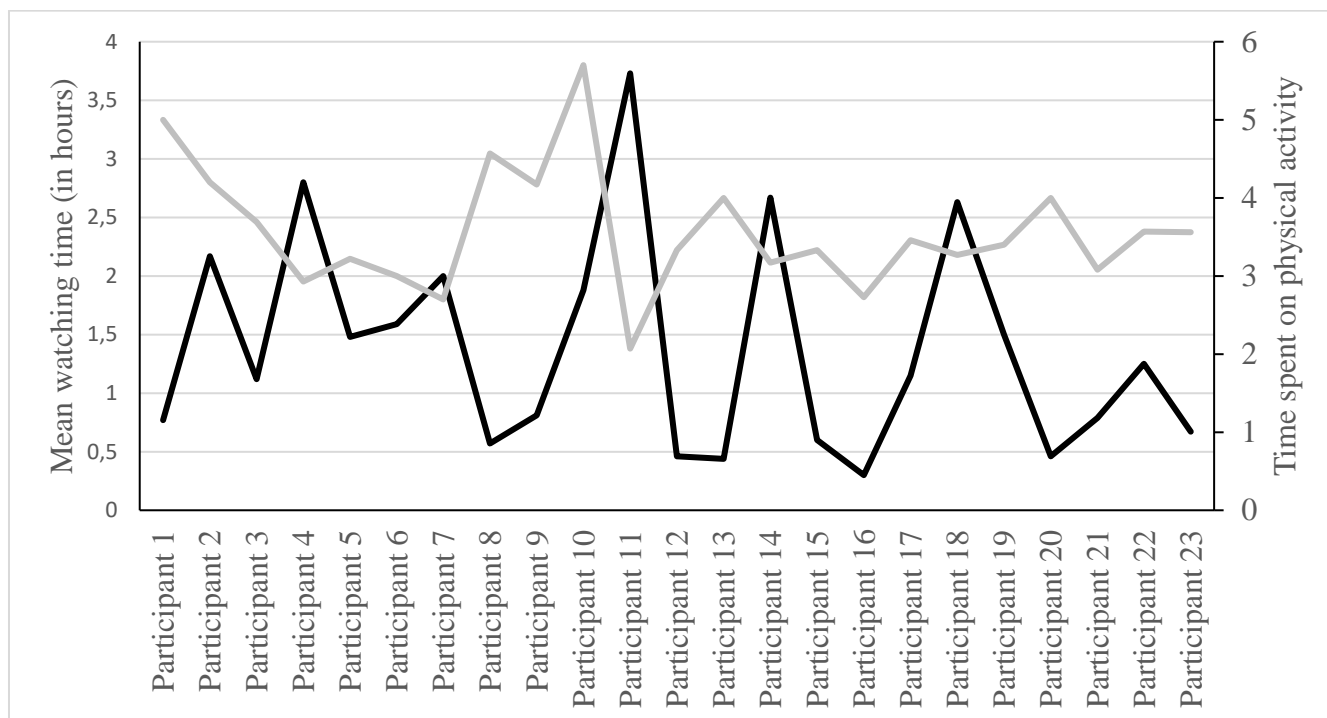


Figure 12. Comparison between mean watching time (in black) and time spent on physical activity (in grey).

It was also observed, that in 51.1 % (138 out of 270 prompts) of the measured days, the participants watched online series with at least one other person. In 85 prompts (31.5 %) the students watched together with friends, 26 times (9.6 %) with their partner, 11 times (4%) with their family and 16 (6.2%) out of the 270 prompts they watched online on-demand series or movies with different persons at the same day (e.g. partner and friends). In other words, in about half of the measured days, (binge-)watching behaviour took place in a social context.

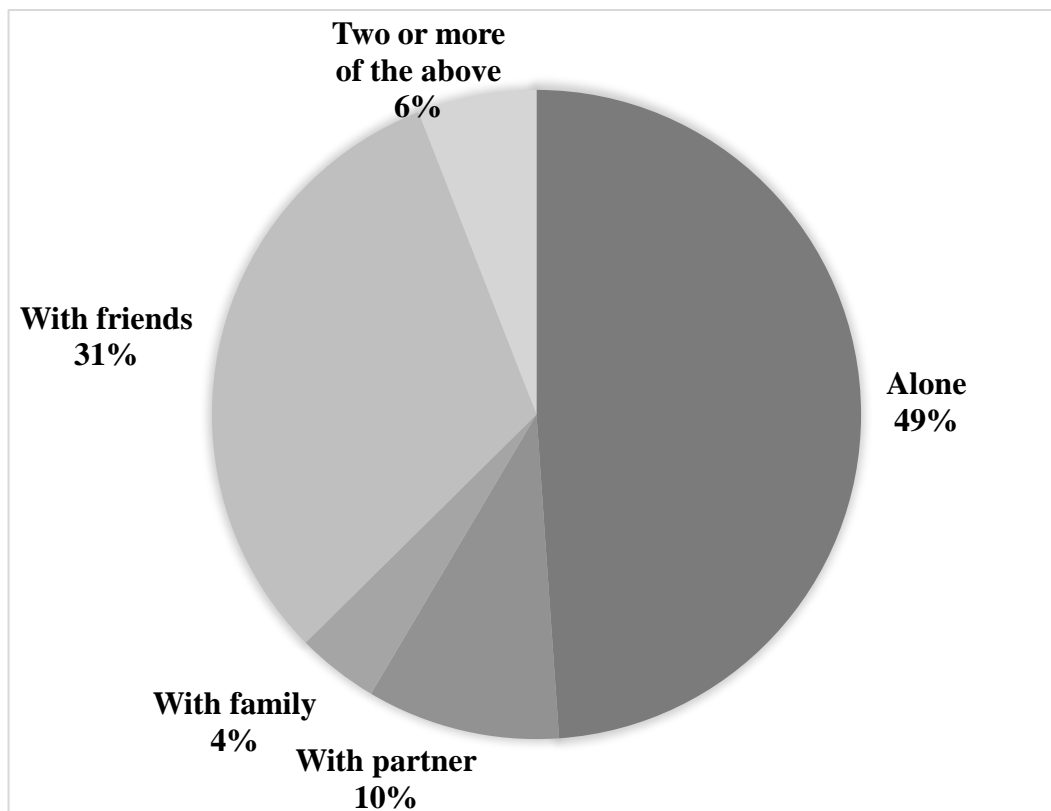


Figure 13. The social context of video-on-demand streaming.

Discussion

This is the first study, reviewed by the authors, to use Ecological Momentary Assessment (EMA) to explore binge-watching patterns of university students and gather information about prevalence, impact and context of their on-demand streaming behaviour. The objective was to get an impression of the impact of binge-watching on the participants' study behaviour and important daily life activities and evaluate intended and unintended watching-behaviour.

As one of the main findings of this study,, it was identified that the students who indicated to watch more online series spent less time than planned on physical activities. Additionally, on days the participants watched more online series and movies, they spent more time than planned on social activities and less time than planned on housekeeping. In contrast, no negative influence between the watching time and neither the learning behaviour nor the grades of the students could be found. The results of this investigation furthermore show that the participants generally used on-demand streaming services on a regular basis, with around one and a half hours on average per day, whereby the intended and actually observed watching time were closely related. A strong variation between the 23 participants was remarkable.

Within the two-weeks period of this study, the participants watched on average 1.42 per day. In 36% (2.31 days per week) of the observed days, the participants showed behaviour that could be classified as binge-watching. Therefore, this rising phenomenon can be seen as an established part of the daily lives of the participants.

These findings partly agree with the current state of research. In many scientific articles, it was stated that binge-watching is common among university students (Riddle et al. 2017; Chastin et al., 2018), which was supported by the current study. However, as discussed earlier, there is no recent comparable data, regarding the overall (binge-) watching time of university students. The levels observed in this investigation are far above those observed by the two years old study by Walton-Pattinson et al. (2016), who detected a much lower watching time of 3.56 hours per week (0.56 hours per day). Still, it must be noted, that the participants in the study of Walton-Pattinson were on average significantly older (mean age of 30) and not exclusively students. This supports the finding, that on-demand streaming may be more common among young people, especially students.

On the contrary, the observed amount of binge-watching (watching two or more episodes in a row) agrees with the obtained within the group of students, Riddle et al. (2017) observed. In this case, the watching behaviour was classified as binge-watching on 2.52 days

of the week. This is another indication that binge-watching is indeed common in the daily life of university students and that the recent findings reflect the watching behaviour of the target group.

It was shown that the watching time and number of episodes were closely related. This indicates that the participants mainly watched episodes with the same duration. Thus, in our group, the criticism that the definition of binge-watching only focusses on the number of episodes and not the total watching time was not confirmed, because both give an adequate and comparable insight in the behaviour of the students. Nevertheless, it remains problematic that other studies often only access whether a behaviour was classified as bingeing or not and not how many episodes were watched.

Comparing the binge-watching behaviour and mean watching time of the 23 individuals, strong differences between the participants, are noticeable. Some participants barely used their on-demand streaming services, while others indicated a much higher watching time as well as a higher percentage of days on which they binge-watched. Therefore, a closer look at the individual level might be necessary. For example, for one participant, binge-watching occupied a large part of his/her day with binges up to 10 hours per day and a mean watching time of more than five hours per day. These observed individual differences are in consistent with the findings of Flayelle et al. (2017). In their focus group, the overall binge-watching behaviour was moderate and not worrying, except one participant, whose excessive binge-watching behaviour resulted in restrictions for his daily life. Aside from this qualitative research, little quantitative information was given on the individual differences in binge-watching behaviour. Of course, some differences might be explained by personal preferences. But since there is no reliable information about mean watching time for the target group given, there are also no critical values available, which could indicate the amount of binge-watching that is alarming. Detecting these critical cases of binge-watching might be important, because it is indicated that in extreme cases, binge-watching might have a negative influence on daily life, by consuming much time or being related to different health issues, like sedentary behaviour or mental health problems (Wheeler, 2015; Riddle et al., 2017).

Some studies indicated that with a higher amount of unintended vs intended watching behaviour the risk for this negative influences on the viewers rises (Riddle et al., 2017; Flayelle, 2017; Winland, 2015). A high amount of unintended binge-watching was furthermore associated with a lose of control and seen as an indication of addictive behaviour (Hovrath, 2004; LaRose et al., 2003; Kubey & Csikszentmihalyi, 2002). Especially a

deviation from the person's 'normal' levels, is used to distinguish between a habitual behaviour and symptoms of addiction (Hovrath, 2004; LaRose et al.,2003).

Within this study the observed watching time differed only slightly from the intended watching time, the students indicated the previous day. Therefore, it might be suggested that the students had an accurate estimation and/or self-control regarding the time they watched online movies and series. The participants seemed to be in control of their binge-watching behaviour. Only three participants estimated that they would watch between 30 and 45 minutes less per day.

Also, the observed watching time and the watching time the participants indicated as usual watching habit within the baseline questionnaire, were related. Certainly, individual deviations were stronger. This difference might be explained by a less accurate estimation of the participants within the cross-sectional baseline questionnaire, or maybe the participants were unaware of their actual watching behaviour. But still, this also can be evoked by a deviation from their habit and therefore an indication for behaviour at risk. This is supported by the fact, that the students concerned by a strong deviation from the indicated usual watching time, also indicated an overall higher mean watching time and more excessive binges (longer durations in a row) than the other participants and might have had less control over their watching behaviour (higher amount of unintended watching time).

Nevertheless, as well the intended as the usual daily watching time of the other 21 participants fitted the observed daily watching time quite good. So, all in all, binge-watching seems to be an in-control behaviour among this sample of university students. This is also indicated by the fact, that the participants watched noticeable less online series and movies during the Easter Holiday. It seems as if the binge-watching behaviour is more determined by other important circumstances than the other way around. These findings were also indicated by de Feijter (2016), but this is the first study showing it within a comparable group.

Another important finding was that the indicated data did not reveal a relation between the time spent on watching online series and learning for the university. Surprisingly, it was found that on days students spent more time in university related events (lectures, tutorials etc.), they also spent more time watching online series. Furthermore, it was observed that students with higher grades watched slightly more online series and movies on average per day. Therefore, the amount of on-demand streaming did not appear to have a negative influence on the learning behaviour of the selected group. This is in line with findings of Razel (2010). They indicated that with a small amount of TV-watching, academic achievement increased with viewing. Also, in the current study, the group had grades above

average and spend moderately time on binge-watching. In contrast, Winland (2015) reported that most of the observed university students estimated binge-watching as distracting from their studies. Nevertheless, the participant might have over-estimated the influence of binge-watching in this cross-sectional study since the actual behaviour was not observed but estimated. Another possible explanation for the two contradictory findings could be, that the students in the current study consider their academic achievements as more important and/or have more self-control than others.

In contrast, a connection between important daily life activities could be observed. On days the participants watched more online movies and series, they spent significantly more time on social activities, which is in line with the findings of de Feijter et al. (2016). They already stated that in binge-watching the social aspect was a crucial motivation for binge-watching. They assumed that students watch online series to spend time with others, which is supported within the current study and in line with the assumption that binge-watching can be seen as a hobby that is also a social activity.

Also, a connection between sedentary behaviour and binge-watching was already described in other studies (Riddle, 2017). This was reinforced by the recent finding that participants who spent more time on binge-watching tend to spend less time than planned on physical activity. This again raises the question, whether binge-watching triggers the sedentary behaviour or if people who like to spend their time binge-watching also tend to skip their training. There are, however, other possible explanations. Since the participants were asked to estimate if they spent more or less time than planned on physical activities, the actual time was therefore not observed, but only a subjective assessment was asked. On days the students spent more time in front of the screen, they might have had the feeling that they should have exercised more, although they did not exercise less, than on other days. Thus, a direct influence of binge-watching on physical activity cannot be ascertained unequivocally. Nevertheless, it was indicated, that the observed participants seemed to be less satisfied with their physical activity when they spent more time binge-watching.

The same can be applied to the estimation, that the participants spent less time than planned on householding, on days they spent more on binge-watching. Little was known about the influence of binge-watching on these two daily life activities. A small negative influence was already described by Flayelle et al., (2017) and de Feijter et al. (2016), although they did not distinguish between the influence the different activities, which might be classified as obligatory (studying for university) and more or less optional activities like sport, spending time with friends or cleaning. As mentioned earlier, the participants considered high

grades as very important. Hence, it could conceivably be hypothesised that they consider binge-watching as a pastime, that might interfere with activities which are not crucial to fulfilling, while they take their study more serious and do not let binge-watching interfere with their academic achievements. This would be another indication, for binge-watching being a hobby of the students, that slightly interferes with other free time activities, but not with study behaviour.

This is the first study, using EMA in the context of binge-watching, while most other studies used a cross-sectional approach and relied on retrospective estimations of the participants. Hence, a lot of new and more precise information about the watching behaviour of the target group was found. For example, this was the first study that made it possible to recognise variation in watching time over the week and estimate the amount of unintended binge-watching. With a retrospective approach, these results would probably not be found. Furthermore, this quantitative research enabled to observe intra-individual fluctuations, like excessive binges of individual participants in a natural environment. It minimised a recall bias, by reducing the reliance on retrospective memory. All in all, by using an EMA the findings appear to be more representative of the participant's daily lives.

Also, the significant correlation between the watching time of the two weeks can be seen as an indication for test-retest reliability of the study and indicates stability and reliability of the used instrument over time. The strong correlation between the observed watching and the number of episodes indicates validity of the used test and that the students filled in the daily questionnaire conscientious.

Even though the used EMA approach offers several benefits, it is time consuming and places a burden on respondents that is higher than some other methods. The daily questionnaire required thus perverseness and some engagement from the participants. Seen the fact, that one third of the first contacted students did not install the PACO application or did not use it on a regular basis; a self-selection bias might have occurred. Therefore, the chosen group might score higher in reliability and self-control, what is also supported by some findings, like the high grades and the small amount of unintended binge-watching. This sample might thus not be representative of the population of university students.

The 23 participants were all family or friends with the researchers. It might be assumed, that this fact might have strengthened a social desirability bias. Knowing that a friend or sister can observe how many hours a day someone binges or if he or she visits the university, might have motivated the participants to answer in a way that will be viewed

favourably by others. Indeed, several participants repeatedly asked if the researchers were able to monitor individual results.

Another bias that might have influenced the results is the reactivity of the measurement. This has already been described and analysed by different studies as one weak point of EMA (Hufford, Shields, Shiffman, Paty, J., & Balabanis, M. (2002). Simpson, Kivlahan, Bush, & McFall, 2005). Because of the intensive monitoring involved in EMA, measurement reactivity is a concern. It might be possible, that the participants became aware of their binge-watching behaviour because they were daily confronted with it and modify it because of this rising awareness. By estimating a planned watching time for the next day, they additionally might have been motivated to comply with the plan. Therefore, the watching time might normally be higher.

Several questions remain to be answered. A longer study period with a bigger sample might enable deeper insight that is more representative. Since the total study load in the time period was not high, in another time of the academic year, the influence of binge-watching on the learning behaviour might be stronger. As indicated before,

To get an insight into symptoms of addiction it might be logical, to address a target group that is already concerned about their watching behaviour. Thereby it would probably be possible to observe extreme watching patterns, and a clearer distinction between habitual and deviant behaviour would be possible.

It was shown that binge-watching is a popular pastime among university students. Although no alarming negative influence of the daily life of the participants was observed, it was well indicated that some students might tend to excessive binge-watching behaviour. The etymological link to unhealthy behaviour was thus only partially supported. Anyway, extreme values in the watching time should be accessed thoroughly, and more information about which behaviour can be seen as alarming is necessary since it was shown that extreme cases indeed occur. Within this study, it was not possible to give an overall estimation of the proportion of students with extreme watching behaviour. To assess the risk that derives from binge-watching, further research is necessary. Therefore, the issue of binge-watching should continue to be observed. As shown before, EMA is a promising research method in this field, which helps to overcome limitations of biases of other approaches and should thus be considered for further investigations.

To summarise, the present observation induces the impression that binge-watching - for the majority of participants - is a harmless pastime. Contrary to Spitzer's quote from the beginning, a successful academic education seems to be possible even in times of Netflix.

References

- Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of behavioral addictions*, 4(3), 119-123.
- Chastin, S. F., DeCraemer, M., Oppert, J. M., & Cardon, G. (2018). Dynamics of Sedentary Behaviours and Systems-Based Approach: Future Challenges and Opportunities in the Life Course Epidemiology of Sedentary Behaviours. In *Sedentary Behaviour Epidemiology* (pp. 595-616). Springer, Cham.
- Cohen, J. (2009). *Statistical power analysis for the behavioral sciences*. New York: Psychology Press Taylor & Francis Group.
- Conner, T. S., & Lehman, B. J. (2012). Getting started: Launching a study in daily life. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 89-107). New York, NY, US: Guilford Press.
- Csikszentmihalyi, M., & Larson, R. (2014). Validity and reliability of the experience-sampling method. In *Flow and the foundations of positive psychology* (pp. 35-54). Springer Netherlands.
- Fehrmann, P. G., Keith, T. Z., & Reimers, T. M. (1987). Home influence on school learning: Direct and indirect effects of parental involvement on high school grades. *The Journal of Educational Research*, 80(6), 330-337.
- de Feijter, D., Khan, V. J., & van Gisbergen, M. (2016, June). Confessions of a 'guilty' couch potato understanding and using context to optimize binge-watching behavior. In Proceedings of the ACM International Conference on Interactive Experiences for TV and Online Video (pp. 59-67). ACM.
- Flayelle, M., Maurage, P., & Billieux, J. (2017). Toward a qualitative understanding of binge-watching behaviors: A focus group approach. *Journal of behavioral addictions*, 6(4), 457-471.

- Furu, T. (1971). *The Function of Television for Children and Adolescents*. Tokyo: Sophia University.
- Hannum, C. (2016, May 7): 15 Incredibly Addictive Series to Stream on Netflix on a Rainy Day, *Self*. Retrieved from <https://www.self.com/story/15-incredibly-addictive-series-to-stream-on-netflix-on-a-rainy-day>
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological bulletin*, *110*(1), 86.
- Horvath, C. W. (2004). Measuring television addiction. *Journal of Broadcasting & Electronic Media*, *48*(3), 378-398.
- Hsieh, G., Li, I., Dey, A., Forlizzi, J., & Hudson, S. E. (2008, September). Using visualizations to increase compliance in experience sampling. In *Proceedings of the 10th international conference on Ubiquitous computing* (pp. 164-167). ACM.
- Hufford, M. R., Shields, A. L., Shiffman, S., Paty, J., & Balabanis, M. (2002). Reactivity to ecological momentary assessment: An example using undergraduate problem drinkers. *Psychology of addictive behaviors*, *16*(3), 205.
- Jenner, M. (2016). Is this TVIV? On Netflix, TVIII and binge-watching. *New media & society*, *18*(2), 257-273.
- Jenner, M. (2015). Binge-watching: Video-on-demand, quality TV and mainstreaming fandom. *International Journal of Cultural Studies*, *20*(3), 304-320.
- Keith, T. Z., Reimers, T. M., Fehrmann, P. G., Pottebaum, S. M., & Aubey, L. W. (1986). Parental involvement, homework, and TV time: Direct and indirect effects on high school achievement. *Journal of Educational Psychology*, *78*(5), 373.
- Kreft, I., & de Leeuw, J. (1998). *Introducing multilevel modeling*. London: Sage Publications

- Kubey, R., & Csikszentmihalyi, M. (2002). Television addiction is no mere metaphor. *Scientific American*, 286(2), 74-80.
- LaRose, R., Lin, C. A., & Eastin, M. S. (2003). Unregulated Internet usage: Addiction, habit, or deficient self-regulation?. *Media Psychology*, 5(3), 225-253.
- Leon, G. R., Carroll, K., Chernyk, B., & Finn, S. (1985). Binge eating and associated habit patterns within college student and identified bulimic populations. *International Journal of Eating Disorders*, 4(1), 43-57.
- Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: implications for theory and practice. *Studies in Higher education*, 27(1), 27-52.
- Mohr, K. A. (2017). Understanding Generation Z students to promote a contemporary learning environment. *Journal on Empowering Teaching Excellence*, 1(1), 9.
- Moskowitz, D. S., & Young, S. N. (2006). Ecological momentary assessment: what it is and why it is a method of the future in clinical psychopharmacology. *Journal of Psychiatry and Neuroscience*, 31(1), 13.
- Perks, L. G. (2014). *Media marathoning: Immersions in morality*. Lexington Books.
- Pierce-Grove, R. (2016). Just one more: How journalists frame binge watching. *First Monday*, 22(1).
- Pittman, M., & Sheehan, K. (2015). Sprinting a media marathon: Uses and gratifications of binge-watching television through Netflix. *First Monday*, 20(10).
- Razel, M. (2001). The complex model of television viewing and educational achievement. *The Journal of Educational Research*, 94(6), 371-379.
- Riddle, K., Peebles, A., Davis, C., Xu, F., & Schroeder, E. (2017). The Addictive Potential of Television Binge Watching: Comparing Intentional and Unintentional Binges.

Psychology of Popular Media Culture. Advance online publication. doi: 10.1037/ppm0000167.

Schweidel, D. A., & Moe, W. W. (2016). Binge watching and advertising. *Journal of Marketing*, 80(5), 1-19.

Simpson, T. L., Kivlahan, D. R., Bush, K. R., & McFall, M. E. (2005). Telephone self-monitoring among alcohol use disorder patients in early recovery: a randomized study of feasibility and measurement reactivity. *Drug & Alcohol Dependence*, 79(2), 241-250.

Spitzer, M. (2005). *Vorsicht Bildschirm!: elektronische Medien, Gehirnentwicklung, Gesundheit und Gesellschaft*. Stuttgart: Klett.

Trouleau, W., Ashkan, A., Ding, W., & Eriksson, B. (2016). Just one more: Modeling binge-watching behavior. In *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (pp. 1215-1224). ACM.

Tukachinsky, R., & Eyal, K. (2018). The Psychology of Marathon Television Viewing: Antecedents and Viewer Involvement. *Mass Communication and Society*, (just-accepted).

University of Twente. (n.d.). GERMAN AND DUTCH GRADE CONVERSION IN THE JOINT DEGREE. Retrieved May 12, 2018, retrieved from <https://www.utwente.nl/en/pa/bachelor-epa/gradeconversion/>

Verhagen, S. J., Hasmi, L., Drukker, M., van Os, J., & Delespaul, P. A. (2016). Use of the experience sampling method in the context of clinical trials. *Evidence-based mental health*, 19(3), 86-89.

Walton-Pattison, E., Dombrowski, S. U., & Preece, J. (2016). 'Just one more episode': Frequency and theoretical correlates of television binge watching. *Journal of health psychology*, 23(1), 17-24.

Winland, C. (2015). An exploration of binge-watching and its effects on college academics. *Pediatrics*, 75(5), 807-812.

Zenk, S. N., Horoi, I., McDonald, A., Corte, C., Riley, B., & Odoms-Young, A. M. (2014). Ecological momentary assessment of environmental and personal factors and snack food intake in African American women. *Appetite*, 83, 333-341.

Appendices

Appendix A: PACO Application Questionnaire

Did you spend more or less time than planned on housekeeping (e.g. cleaning, grocery shopping, cooking etc.) in the last 24 hours?

Please select an option

Did you consume one or more of the following snacks in the last 24 hours?

MAKE SELECTIONS

Did you consume one or more of the following sweetened beverages in the last 24 hours?

MAKE SELECTIONS

Did you eat more snacks than intended in the last 24 hours?

Please select an option

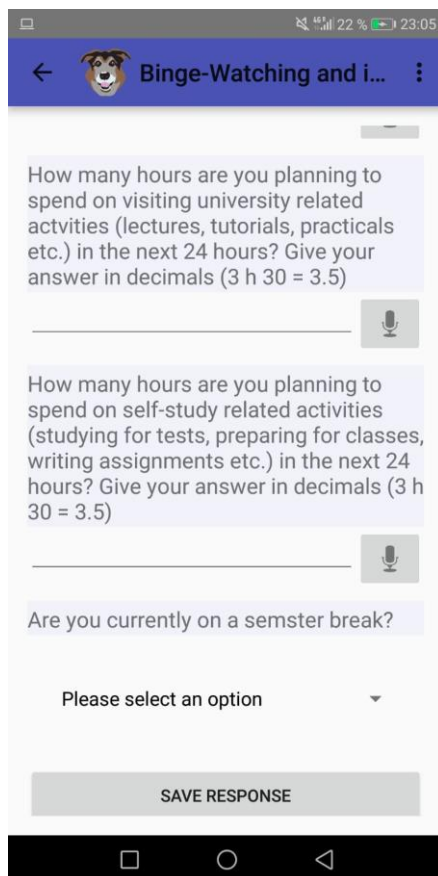
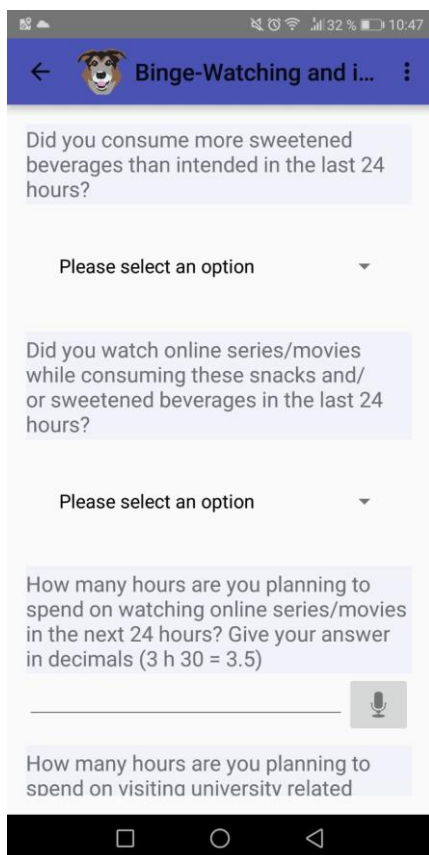
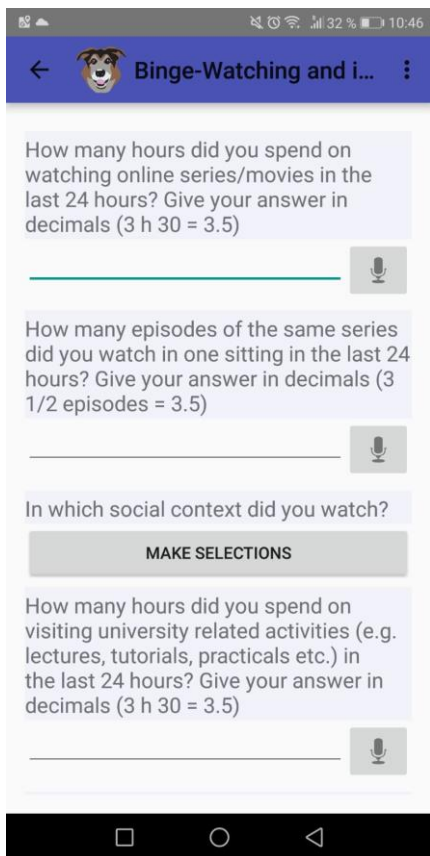
How many hours did you spend on self-study activities (e.g. studying for tests, preparing for classes, writing assignments etc.) in the last 24 hours? Give your answer in decimals (3 h 30 = 3.5)

Did you spend more or less time than planned on physical activities (e.g. doing sports, going for a walk, cycling etc.) in the last 24 hours?

Please select an option

Did you spend more or less time than planned on social activities (e.g. going out for a drink, spending time with friends and family, chatting with flatmates etc.) in the last 24 hours?

Please select an option



Appendix B: Informed Consent and Baseline Questionnaire

INFORMED CONSENT

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Faculty of Psychology, Health & Technology
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2nd supervisor: Dr. M. E. Pieterse

Binge-Watching and its Impact on Learning and Eating Behaviour and Important Daily Life Activities among University Students

PURPOSE OF STUDY

You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researchers if there is anything that is not clear or if you need more information.

The purpose of this study is to find out more about online television watching. Due to increasing popularity of on-demand streaming websites, such as Netflix, Amazon Channels or PopcornTime.to, watching online series and movies becomes more and more frequent, especially among university students. Within this study we want to learn more about the influence of online television watching on learning and eating behaviour and important daily life activities, as this has not yet been examined in depth.

STUDY PROCEDURES

If you participate in this study, you have to fill out a short-online questionnaire with demographic questions and also questions regarding your overall behaviour concerning learning, eating and binge-watching (approximately 10 minutes). After this, you will be asked to download the PACO application on your mobile device. You will use this application for a period of two weeks to answer a short daily questionnaire (approximately 3-5 minutes). For the purpose of this study, it is important that these questions are answered between 11am and 2pm.

CONFIDENTIALITY

The information that we collect from this research project will be kept confidential. This means that only the researchers have insight into your answers. All personal data (such as e-mail, age, gender etc.) will be anonymized and will not be published and/or given to a third party.

CONTACT INFORMATION

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

VOLUNTARY PARTICIPATION

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

CONSENT

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

1. Please enter your google mail address (with which you were invited to this survey)

2. How old are you?

3. What is your gender?

- male
 female

4. At which university are you currently enrolled?

5. What are you studying?

6. On average, how many hours do you spend for your study per week? (incl. going to lectures, tutorials, studying for tests or writing assignments).

7. What is your current weighted average grade? (For University Twente students: this can be found on osiris.utwente.nl under the point 'Progress') Give your answer in decimals (e.g. 6.5 for Dutch students or 2.7 for German students)

8. How many credit points did you have to obtain in the last full academic year in order to finish your study in the standard period?

9. How many credit points did you actually obtain in the last academic year?

10. How important do you consider high grades?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

11. What is your height (in cm)?

12. How much do you weigh (in kg)?

13. On average, how often do you eat cookies or sweetened baked goods (e.g., cake, donuts)?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

14. On average, how often do you eat chocolate or candy?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

15. On average, how often do you eat ice cream or frozen dessert?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

16. On average, how often do you eat salty snacks (e.g. potato chips)?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

17. On average, how often do you eat other snacks not mentioned above?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

18. On average, how often do you drink sugar-sweetened beverages (e.g. soda, fruit juice, alcohol)?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

19. On average, how often do you eat vegetables (cooked/steamed), salad (e.g. lettuce, tomatoes) or fruit?

- several times per day
- once a day
- several times per week
- several times per month
- several times per year
- less or never

20. How important is a healthy nutrition for you?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

21. Do you have access to any video on demand streaming portal, such as...? (Multiple answers possible)

- Netflix
- Videoland
- Amazon Prime Channels
- Film1
- Others, namely...
- None

22. On average, on how many days per week do you watch online series/movies?

23. On average, how many hours do you spend watching these online series/movies per week? Give your answer in decimals (for example, 12 hours and 45 minutes = 12.75)

24. On average, how often do you watch more than two episodes of a series in one sitting per week? Give your answer in decimals (for example, 4-5 times = 4.5)

25. When do you usually watch series/movies? (Multiple answers possible)

- 5am-11am
- 11am-14pm
- 14pm-18pm
- 18pm-22pm
- 22pm-5am

26. In which context do you usually watch online series/movies? (Multiple answers possible)

- Alone
- With partner
- With family
- With friend(s)

Q27. Who do you currently live with?

- Rommate(s)
- Family
- Partner
- Alone