Computers in Human Behavior 90 (2019) 26–36

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

Assessing binge-watching behaviors: Development and validation of the "Watching TV Series Motives" and "Binge-watching Engagement and Symptoms" questionnaires

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ARTICLE INFO

Keywords:
Questionnaire validation
Psychometric properties
Behavioral addictions
Binge-watching
Addictive behaviors
TV series

ABSTRACT

The widespread practice of binge-watching (i.e., watching multiple episodes of a TV series in one session) recently generated concerns about associated negative outcomes. Its psychological investigation, however, remains fragmentary. Based on the previous phenomenological investigation of TV series watching, we developed and validated two original assessment instruments, assessing TV series watching motives and binge-watching engagement and symptoms, respectively. Preliminary items were created for each questionnaire, and a focus group with TV series viewers was conducted and analyzed to generate the final instruments. The questionnaires were then administered via an online survey (N = 6556), together with complementary measures of affect, problematic Internet use and substance use. Exploratory and confirmatory factor analyses, along with correlational analyses, were performed to examine both structural and external validity of the scales. The factorial analyses resulted in a 4-factor model (i.e., emotional enhancement, enrichment, coping-escapism and social) for the Watching TV Series Motives Questionnaire (WTSMQ), and in a 7-factor model (i.e., engagement, positive emotions, desire-savoring, pleasure preservation, binge-watching, dependency and loss of control) for the Binge-Watching Engagement and Symptoms Questionnaire (BWESQ). The results suggest good psychometric properties for both scales. The current study thus provides theoretically-driven and psychometrically sound instruments for further research on binge-watching behaviors.

Anytime, anywhere, on nearly any internet-connected device and as much as desired … With the remarkable advent of on-demand viewing and online streaming services over the past five years, a dramatic change has happened in the way viewers consume TV series. In this regard, binge-watching (i.e., watching multiple episodes of the same TV series in one session) has progressively become the way the majority of viewers enjoy TV shows (Deloitte's Digital Democracy Survey, 2017; YouGov Omnibus, 2017).

In view of this genuine societal phenomenon, research on binge-watching has recently flourished, bringing in its wake some concerns about worrying consequences for viewers' physical and mental health. For a long time the ill-effects on physical health of a sedentary lifestyle in general have been in the focus of research, but more recently binge-watching in particular has been linked to potential long-term health issues such as heart disease and obesity (American Heart Association, 2014; Brookes & Ellithorpe, 2017; Grøntved & Hu, 2011; Kubota, Cushman, Zakai, Rosamond, & Folsom, 2018; Morris, Bradbury, Cross, Gunter, & Murphy, 2018; Reid et al., 2017; Shirakawa et al., 2016; Sung, Kang, & Wee, 2015; Veerman et al., 2012). Moreover, the available initial evidence suggests that excessive binge-watching might also impair day-to-day functioning (De Feijter, Khan, & Van Gisbergen, 2016), sleep hygiene (Brookes & Ellithorpe, 2017; Exelmans & Van den Bulck, 2017), and

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[1] Pierre Maurage (research associate) is funded by the Belgian Fund for Scientific Research (F.R.S. - FNRS, Belgium).

https://doi.org/10.1016/j.chb.2018.08.022
Received 14 May 2018; Received in revised form 6 August 2018; Accepted 11 August 2018
Available online 13 August 2018
0747-5632/

social life quality (De Feijter et al., 2016; Hernández Pérez & Martínez Díaz, 2016). Early reports have even argued about binge-watching being a potential addictive disorder. This view seems plausible, as many people report feeling compelled to watch one specific TV show or to watch "just one more" episode before bedtime. Some authors have, therefore, described the potential addictiveness of binge-watching (Devasagayam, 2014; Riddle, Peebles, Davis, Xu, & Schroeder, 2017; Sung et al., 2015), which seems to demonstrate similar phenomenological characteristics to other behavioral addictions, such as loss of control over watching time (De Feijter et al., 2016; Devasagayam, 2014; Flayelle, Maurage, & Billieux, 2017; Sung et al., 2015).

Nevertheless, binge-watching should be seen within the broader context of the digital age in which we live nowadays, where increasingly more sophisticated and "addictive" technologies (Alter, 2017) contribute to new consumer behavior patterns with the potential for harmful overuse. Recent studies on such conditions (e.g., "Facebook" addiction, Andreassen, Torsheim, Brunborg, & Pallesen, 2012; problematic Tinder use, Orosz, Tóth-Király, Böthe, & Melher, 2016; "selfie" addiction, Balakrishnan & Griffiths, 2018), however, tend to neglect the exploration of their uniqueness, but aim at identifying potential similarities with other addictions. By merely recycling substance abuse criteria, leisure activities are, therefore, now on the verge of becoming new potential disorders. This trend has notably sparked debate among scholars in the addiction research field (Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015; James & Tunney, 2016; Kardefelt-Winther et al., 2017; Mihordin, 2012; Starcevic, 2016), as the adoption of such a confirmatory approach may result in the pathologization of everyday life, and may therefore ultimately lead to deleterious effects for both theory and clinical practice related to these conditions (Billieux et al., 2015; Kardefelt-Winther et al., 2017). Taking the opposite perspective, Flayelle, Maurage, Vögele, Karila, and Billieux (2018) have recently called for adopting a psychological processes-based approach towards binge-watching investigation in order to propose an adequate understanding of this particular behavior. For this purpose, the analysis of the relationships between various motives of and the engagement in binge-watching is a primary exploration to undertake. However, to do so, reliable assessment tools, whose construction is based on the preliminary phenomenological study of TV series watching, are required.

1. Taking the motivations into account

It is known from media psychology that a careful examination of individual motivations for media use is the first step to undertake for exploring the complexity of media effects (Uses and Gratification theory, see Katz, Blumler, & Gurevitch, 1973; Rubin, 2009). Moreover, there are various motivations for engaging in recreational appetitive behaviors that might turn problematic, and that are involved in their onset and perpetuation (Billieux et al., 2013; Chen & Pang, 2012; Kuntsche & Kuntsche, 2009; Lannoy, Billieux, Poncin, & Maurage, 2017; Maraz, Király, Urbán, Griffiths, & Demetrovics, 2015; Sherry, Lucas, Greenberg, & Lachlan, 2006; Wéry & Billieux, 2016). Therefore, focusing the assessment on the functional outcomes of TV series watching is likely to be of particular relevance for problem binge-watching research.

Up to now, a range of motivations for engaging in TV series watching (e.g., social interaction, hedonism, relaxation, escape from reality, aesthetics) has been identified across distinct fields of research through exploratory factor analytic investigations (Panda & Pandey, 2017; Pittman & Sheehan, 2015; Shim & Kim, 2018). Still, currently there is no validated measure to properly assess TV series watching motivations.

2. Passion or addiction?

Distinguishing between high engagement in TV series watching (what might be termed "passion") and problematic binge-watching (so-called "addiction") is critical for an adequate assessment to avoid the risk of overpathologization regarding what has actually become in recent years an extremely popular leisure activity. Current conceptualizations of recreational behaviors that have the potential of becoming problematic, however, tend to overlook this distinction, and there is often a blurred line between pure leisure habits and problematic addictive behaviors. This line has been obscured further by discussions of "positive addictions" (Glasser, 1976; Shapira et al., 2003), defined as habitual behaviors that are considered beneficial for the individual, rather than destructive. Yet, maintaining the demarcation between such antagonistic aspects is imperative as heuristic to map out problematic-like conditions related research. This claim falls, for example, completely within the dualistic model of passion (Vallerand et al., 2003), which states that within the concept of "passion" (i.e., any activity in which people invest time and energy) two distinct facets (i.e., either "harmonious" or "obsessive") must be distinguished, depending on whether or not the activity takes disproportionate space in the person's life and causes conflict with other occupations. In the same vein, some authors already claimed that, in defining "pathological" use of technology, it is critical to distinguish between pathological and non-pathological high engagement (Brockmeyer et al., 2009; Gentile, Coyne, & Bricolo, 2013). For example, studies on problematic use of video games support this approach. These investigations have found that high (but healthy) involvement has to be distinguished from problematic involvement or addiction (Charlton & Danforth, 2007; Deleuze, Long, Liu, Maurage, & Billieux, 2018) by highlighting that high and repeated engagement is not problematic *per se* (Deleuze et al., 2017; Király, Tóth, Urbán, Demetrovics, & Maraz, 2017), nor is it necessarily associated with adverse consequences (Billieux, King et al., 2017; Charlton & Danforth, 2007; Kardefelt-Winther et al., 2017).

So far, two short quantitative instruments have already been developed and validated with regard to TV series watching: (1) the Problematic Series Watching Scale (PSWS) (Orosz, Böthe, & Tóth-Király, 2016) to assess problematic TV series watching, and (2) the Series Watching Engagement Scale (SWES) (Tóth-Király, Böthe, Tóth-Fáber, Gyözö, & Orosz, 2017) to measure engagement in TV series watching. However, both questionnaires present significant limitations: while the design of the PSWS is purely based on a confirmatory approach, by having merely transposed the core criteria of addiction in the context of TV series watching, the SWES appears, for its part, to not relate clearly to the construct of engagement whose measurement is confounded with the assessment of auxiliary facets such as motivational features (i.e., "social interaction", "self-development") or associated booster (i.e., "identification"). The use of the latter as one of the core determinants of engagement is indeed questionable given that the definition of similarity-identification as covering connectedness with media characters is not empirically supported (Konijn, 1999) and has received various criticism in the media psychology literature as it falls short of charting the emotive complexity of media exposure (Hoffner & Buchanan, 2005; Konijn, 1999; Konijn & Horn, 2005; Mayne, 1993; Oatley, 1994; Smith, 1995; Tannenbaum & Gaer, 1965; Zillmann, 1994; Zillmann, Hezel, & Medoff, 1980). Thus, a reliable scale, which takes its roots from a detailed analysis of the phenomenon and that discriminates elevated (but healthy) and problematic engagement in binge-watching, is still lacking in current research.

The aim of the current study was, therefore, to create and test the psychometric properties of two scales, assessing respectively TV series watching motives and binge-watching engagement and symptoms, both being based on the prior phenomenological investigation of TV series watching. To this end, a three-step procedure was followed. First, a pilot qualitative exploration of TV series watching was carried out to generate the two questionnaires. Second, the factor structure of the scales was tested through exploratory and confirmatory factor analytic approaches. Third, the relevance of both instruments for problem binge-watching research was tested by exploring its links with affect, problematic Internet use and substance abuse.

3. Method

3.1. Procedure and participants

This study was conducted via an online survey disseminated to French-speaking TV series fan communities through social networks or Internet discussion boards. Data collection took place in November–December 2016. All participants were informed about the aims of the study and gave their consent before starting the survey, which took approximately 30 min to complete. Due to the exploratory nature of the current research, inclusion criteria for participation were intentionally broad as follows: being at least 18 years old and having watched TV series episodes on a regular basis or more intensively (several episodes in one session) on DVD, USB, SVOD, or streaming devices, over the last six months. Anonymity and confidentiality were guaranteed as no data allowing the identification of participants was collected. The study obtained approval from the Psychological Sciences Research Institute Ethics Committee of the Université catholique de Louvain (Belgium).

After having answered a short demographic questionnaire, participants completed (1) items assessing TV series watching motives (Watching TV Series Motives Questionnaire; WTSMQ) and (2) items measuring binge-watching engagement and symptoms of problematic binge-watching (Binge-Watching Engagement and Symptoms Questionnaire; BWESQ). Participants also completed additional French-validated scales in the following order: (a) the Positive and Negative Affect Schedule (PANAS; Gaudreau, Sanchez, & Blondin, 2006); (b) the Compulsive Internet Use Scale (CIUS; Khazaal et al., 2012); (c) the Alcohol Use Disorders Identification Test (AUDIT; Gache et al., 2005); and (d) the Fagerstrom Test for Nicotine Dependence (FTND; Etter, Duc, & Perneger, 1999). A total number of 8326 respondents started to fill in the questionnaires, and 46% of them completed the whole survey. Given this reduction in numbers throughout completion, together with the fact that we only used the complete set of responses of participants for statistical analyses, the sample sizes are different for each scale. The final sample sizes for analyses were n = 6556 for the WTSMQ (female = 77.6%; M_{age} = 24.45; SD_{age} = 7.27), and n = 5272 for the BWESQ (female = 79.5%; M_{age} = 24.67; SD_{age} = 7.43). For both questionnaires, the original sample was then divided into two independent subsamples according to gender and age in order to maximize the likelihood of randomly drawing two samples. A first sample was used for conducting an exploratory factor analysis (EFA) and the second one served as a pool for subsequent confirmatory factor analyses (CFAs). Participants' characteristics for each of the four subsamples are reported in Table 1.

Table 1
Sociodemographic characteristics.

Sociodemographic variables	Watching TV Series Motives Questionnaire (WTSMQ)		Binge-Watching Engagement and Symptoms Questionnaire (BWESQ)	
	Sample 1 (*N* = 3278)	Sample 2 (*N* = 3278)	Sample 1 (*N* = 2636)	Sample 2 (*N* = 2636)
Age (year), M (SD); range	24.8 (7.5); 18 – 69	24.1 (7); 18 – 68	24.6 (7.4); 18 – 69	24.7 (7.5); 18 – 68
Female (%)	76.8	78.5	80.2	78.8
Professional status (%)				
Student	52.6	66.9	55.6	62.8
Active worker	39	27.1	36.2	30.6
Unemployed	8	5.8	7.8	6.3
Retired	0.4	0.2	0.4	0.3
Relationship status (%)				
Single	54.4	55.9	55.5	54.1
In a relationship	34.6	34.3	34.3	34.6
In a civil partnership	3.8	3	3.5	3.5
Married	7.2	6.8	6.7	7.8

3.2. Measures

All alpha values reported below were obtained from the current whole sample.

3.2.1. Watching TV Series Motives Questionnaire (WTSMQ) and Binge-Watching Engagement and Symptoms Questionnaire (BWESQ)

A preliminary set of items was first created for each scale. Their selection was inspired by the current knowledge about: (a) the screening and diagnosis of substance use and addictive disorders, impulse control disorders, and obsessive-compulsive disorders (American Psychiatric Association, 2013), and (b) emotion regulation related behaviors (Mikolajczak & Desseilles, 2012; Nock, Wedig, Holmberg, & Hooley, 2008; Selby, Anestis, & Joiner, 2008). Then, a focus group was conducted with seven regular TV series viewers (five women; age range 21–67 years old) to identify central and more specific features that were not already captured at the first step. This qualitative pilot exploration, the results of which have been described elsewhere (Flayelle et al., 2017), led to updating the instruments accordingly. Finally, the scales were further improved, in terms of content, by taking into account (c) sociological research on TV series watching (Combes, 2013), (d) core principles of storytelling (Field, 2005; Iglesias, 2005; Lavandier, 2011), and (e) testimonies of binge-watching enthusiasts accessed via different medias (e.g., Youtube channels). In terms of form, their wording was inspired by existing scales regarding (a) TV series watching behavior (Camart & Zebdi, 2016), (b) video gaming motives (Yee, 2007), and (c) Internet use and misuse (Decamps, Battaglia, & Idier, 2010; Khazaal et al., 2008). This process resulted in a 25-item, 4-point, agree-disagree scale for the WTSMQ and a 49-item, 4-point, agree-disagree scale for BWESQ in their initial versions.

3.2.2. Positive and Negative Affect Schedule (PANAS)

The French version of the PANAS (Gaudreau et al., 2006), adapted from Watson, Clark, & Tellegan (1988), consists of two 10-item mood scales measuring positive affect (Cronbach's alpha = 0.73) and negative affect (Cronbach's alpha = 0.83). Respondents were asked to rate the extent to which they generally experience each particular emotion with reference to a 5-point scale ranging from 0 (*very slightly or not at all*) to 5 (*very much*). The total score was derived by summing the scores of all individual items.

3.2.3. Compulsive Internet Use Scale (CIUS)

The French version of the CIUS (Khazaal et al., 2012) is a 14-item scale assessing several key aspects of addiction regarding Internet use (Cronbach's alpha = 0.91): loss of control (e.g., “Do you find it difficult to stop using the Internet when you are online?”), preoccupation (e.g., “Do you think about the Internet, even when not online?”), withdrawal symptoms (e.g., “Do you feel restless, frustrated, or irritated when you cannot use the Internet?”), coping or mood modification (e.g., “Do you go on the Internet when you are feeling down?”), and conflict [e.g., “Do you neglect your daily obligations (work, school, or family life) because you prefer to go on the Internet?”]. Items were scored on a 5-point scale ranging from 0 (*never*) to 4 (*very often*). The total score was derived by summing the scores of all individual items.

3.2.4. Alcohol use disorder identification test (AUDIT)

The validated French version of the AUDIT (Gache et al., 2005), adapted from Allen, Litten, Fertig, and Babor (1997), is a 10-item scale assessing the intensity of alcohol consumption (Cronbach's alpha = 0.84). The scale measures: recent alcohol use (e.g., “How often do you have a drink containing alcohol?”), alcohol dependence symptoms (e.g., “How often during the last year have you found that you were not able to stop drinking once you had started?”), and alcohol-related problems (e.g.,

"How often during the last year have you had a feeling of guilt or remorse after drinking?"). The total score was derived by summing the scores of all individual items, its total maximum being 40.

3.2.5. Fagerström Test for Nicotine Dependence (FTND)

The validated French version of the FTND (Etter et al., 1999), adapted from Heatherton et al. (1991), is a 6-item point scale measuring the intensity of physical addiction to nicotine (Cronbach's alpha = 0.70). The scale evaluates: the quantity of cigarette consumption (e.g., "How many cigarettes/day do you smoke?"), the compulsion to smoke (e.g., "Do you find it difficult to refrain from smoking in places where it is forbidden, for example in a church, at the library, in cinema, etc.?"), and dependence (e.g., "Do you smoke when you are so ill that you are in bed most of the day?"). Items are scored either from 0 to 3 or from 0 to 1, and are summed to yield a total score ranging from 0 to 10.

3.3. Statistical analyses

In the current study, IBM SPSS Statistics 24 (IBM Corp., 2015) and open-source software R (R Development Core Team, 2013) were used to perform statistical analyses. In a first step, descriptive statistics were computed regarding sociodemographic characteristics. Then, the factorial structure of each scale was examined by relying on exploratory and confirmatory factor analyses conducted in independent subsamples. The exploratory factor analysis (EFA) was computed in sample 1 and the factors were derived from a principal component analysis and oblique rotation (Promax given that the factors of the scales were not assumed to be orthogonal). The number of factors suggested by the EFA was then cross-validated on the second sample by means of CFAs. As suggested by Rhemtulla, Brosseau-Liard, and Savalei (2012), and given that the data were ordinal (e.g., Likert scale), the Weighted Least Squares Mean and Variance (WLSMV) robust estimator was employed in all CFAs. Since the $\chi 2$ statistic is extremely sensitive to sample size, three widely used indices to determine the acceptability of model fit (Kline, 2010) were used in the present study: (1) the standardized root-mean-square residual (SRMR; an absolute index of fit less affected by sample size and model complexity; values lower than 0.08 suggest acceptable fit), (2) Bentler's comparative fit index (CFI; a fit index based on the noncentrality parameter; values above 0.90 suggesting acceptable fit); (3) the root-mean-square error of approximation (RMSEA, an absolute measure of fit based on the non-centrality parameter; values lower than 0.07 are indicative of acceptable fit). CFA models were then compared according to two criteria. First, a qualitative evaluation of the fit indices of each model was considered. Second, the fit of the model derived by the EFA relative to the competing models (e.g., models with uncorrelated factors or one-dimensional factor) was evaluated using the CFI criterion (Cheung & Rensvold, 2002). Specifically, if the difference in the CFIs between two nested models (CFI) is smaller than 0.01, the hypothesis of null difference in fit between the two competing models should not be rejected and the more parsimonious model should be retained. Internal consistency was examined by computing Cronbach's alpha with values close to 1 implying good homogeneity of the items (0.70 is acceptable and 0.80 is good). As Cronbach's alpha is less reliable if the number of items is low (e.g., Hair, Black, Babin, & Anderson, 2014), we also calculated the composite reliability (Raykov, 1997) based on the identified factors. Composite reliability was computed using an online calculator (Colwell, 2016). Finally, concurrent validity was assessed by examining the relationships between the WTSMQ/BWESQ scores and other measured variables. Exploration of the data revealed that the total scores of the factors for each scale (WTSMQ and BWESQ) were not normally distributed. Therefore, two-tailed Spearman's correlation was used to detect the potential associations between TV series watching motives, binge-watching engagement and symptoms, age, gender, PANAS, CIUS, AUDIT and FTND scores. The Benjamini–Hochberg procedure (Benjamini & Hochberg, 1995) was used in addition to hold the false discovery rate at 5% for all the correlations.

4. Results

4.1. Watching TV Series Motives Questionnaire (WTSMQ)

4.1.1. Exploratory factor analysis and items removal (Sample 1)

An EFA using principal component analysis was conducted on the initial 25-item version of WTSMQ and the results suggested a five-factor solution. This finding was successfully confirmed by parallel analysis. However, following the examination of each item, three of them were excluded because of low factor loading (less than 0.30; Brown, 2014). The fifth factor of the yielded model was thus deleted since it no longer consisted of at least three items, which is a requirement to constitute a factor (Raubenheimer, 2004), and its remaining item was automatically reallocated to the second factor on which it loaded more. As a result, 22 items (and four factors explaining 45% of the total variance) were retained for the subsequent analysis.

4.1.2. Confirmatory factor analysis and model comparisons (Sample 2)

In the CFA the four-factor model produced an acceptable fit [RMSEA (0.067), CFI (0.942), SRMR (0.066)]. ΔCFIs showed that the model allowing covariances among the four latent factors fit the data better than a model treating the latent factors as independent and a one dimensional model (all ΔCFIs were larger than 0.132, see Table 2). As expected, the indicators all showed significant positive factor loadings, with standardized coefficients ranging from 0.40 to 0.77 (see Table 3). Internal consistency (α = 0.64–0.79) and composite reliability (CR = 0.71–0.83) indices were adequate and the motives were moderately associated with one another (r_s = 0.18–0.44).

4.2. Binge-Watching Engagement and Symptoms Questionnaire (BWESQ)

4.2.1. Exploratory factor analysis and items removal (Sample 1)

Following the same procedure as described above, an EFA was performed on the initial 49-item version of BWESQ. The principal component analysis resulted in seven factors, which was supported by parallel analysis. Nine items were excluded (factor loadings < 0.30), resulted in 40 items (and seven factors explaining 47% of the total variance) to be submitted to the subsequent analysis.

4.2.2. Confirmatory factor analysis and model comparisons (Sample 2)

In the CFA the seven-factor model produced an acceptable fit [RMSEA (0.073), CFI (0.951), SRMR (0.072)]. ΔCFIs showed that the model allowing covariances among the seven latent factors fit the data better than a model treating the latent factors as independent and a one dimensional model (all ΔCFIs were larger than 0.06, see Table 2). As expected, the indicators all showed significant positive factor loadings,

Table 2
Fit statistics for the CFA models (Samples 2).

Model	Chi-sq	df	p	CFI	SRMR	RMSEA	ΔCFI
WTSMQ (22 item)							
4-Factors (correlated)	3175.747	203	< .001	0.942	0.066	0.067	–
4-Factors (uncorrelated)	19,588.242	209	< .001	0.621	0.164	0.168	0.321
1-Factor	9911.041	209	< .001	0.810	0.112	0.119	0.132
BWESQ (40 item)							
7-Factors (correlated)	10,728.017	719	< .001	0.951	0.072	0.073	–
7-Factors (uncorrelated)	135,025.716	740	< .001	0.344	0.260	0.262	0.607
1-Factor	23,146.560	740	< .001	0.891	0.103	0.107	0.06

CFI, comparative fit index (> 0.90); SRMR, standardized root-mean-square residual (< 0.08); RMSEA, root mean square error of approximation (< 0.07); ΔCFI, difference among CFIs between the 4-Factors/7-Factors (correlated) model and the associated competing model.

Table 3
The estimated four factor model (Sample 2 WTSMQ).

	Standardized Factor Loadings	Internal consistency (α)	Composite reliability
Coping/Escapism		0.79	0.83
Item 4 - I watch TV series to pass the time and escape from boredom	0.42		
Item 6 - I watch TV series to relieve stress, anxiety or negative emotions	0.60		
Item 11 - I watch TV series to get away from the daily hassles	0.75		
Item 17 - I watch TV series to overcome loneliness	0.62		
Item 20 - I watch TV series to escape a number of responsibilities	0.65		
Item 9 - I watch TV series in order to feel like I am floating in a secondary state for a while	0.58		
Item 16 - I watch TV series to escape the routine	0.56		
Item 22 - I watch TV series to escape reality and seek shelter in fictionary worlds	0.77		
Enrichment		0.70	0.77
Item 3 - I watch TV series to discover whole new worlds and to increase my knowledge on a number of subjects	0.67		
Item 7 - I watch TV series to learn or familiarise myself with a new language	0.40		
Item 12 - I watch TV series because they give me food for thought on a number of subjects	0.68		
Item 14 - I watch TV series to extend my audiovisual knowledge	0.66		
Item 19 - I watch TV series to develop my personality and broaden my views	0.73		
Emotional enhancement		0.64	0.71
Item 2 - I watch TV series to feel strong emotions like the excitement or the thrill they give me	0.55		
Item 5 - I watch TV series because I know I'll have a good time if I get carried away by the story	0.43		
Item 8 - I watch TV series to get attached to characters and feel joy watching them in each episode	0.60		
Item 15 - I watch TV series in the hopes of feeling again the elation I felt watching another TV series previously	0.58		
Item 18 - I watch TV series to be captivated and experience extraordinary adventures by proxy	0.72		
Social		0.67	0.75
Item 1 - I watch TV series not to be out of touch, because most of my friends do it	0.45		
Item 10 - I watch TV series to relate to others more easily, because TV series give me something to discuss	0.77		
Item 13 - I watch TV series because I bow to my close circle's pressure when they advise me to watch a given series	0.63		
Item 21 - I watch TV series to feel valued in others' eyes thanks of the extent of my knowledge on the subject	0.74		

All standardized factor loadings are significant at $p < .01$.

with standardized coefficients ranging from 0.32 to 0.93 (see Table 4). Internal consistency (α = 0.62–0.83) and composite reliability (CR = 0.75–0.88) indices were adequate and the factors were moderately associated with one another (r_s = 0.17–0.63).

4.3. Scales inter-correlations and convergent validity

The main correlations are presented according to their effect size on the basis of Cohen's terminology (Cohen, 1988; "small" effect size, $r = 0.10$; "medium" effect size, $r = 0.30$; and "large" effect size, $r = 0.50$). As reported in Table 5, positive correlations involving at least a small effect size were found among the whole sample between the subscales of the BWESQ and all types of TV series watching motives assessed with the WTSMQ. Correlations of a medium effect size were more frequent with the emotional enhancement and coping-escapism motives, and it is noticeable that emotional enhancement is more strongly associated with non-problematic binge-watching related facets factors (e.g., desire/savoring, engagement), whereas coping-escapism is more strongly related to binge-watching and problematic binge-watching factors (e.g, loss of control, dependency). Medium effect sized correlations were also observed between positive emotions and both motives. Finally, a moderate relationship was found between enrichment motive and engagement as well as between social motive and dependency.

Regarding age and gender, there were no particular associations with the notable exception of a small effect size association between gender and the coping/escapism motive. Similarly, although dependency and loss of control were found to share a small effect size relation with the AUDIT and FTND scores, correlation analyses showed that all WTSMQ and remaining BWESQ subscales' scores were poorly associated with them (all r_s below 0.10).

However, they revealed positive significant correlations between the CIUS total score and BWESQ subscales, with a large effect size for loss of control, a medium effect size for binge-watching, dependency, desire/savoring, positive emotions, and a small effect size for engagement and pleasure preservation. In addition, a moderate positive relationship emerged with the coping/escapism motive whereas small effect size associations were observed with the other types of motivations.

A moderate correlation appeared between negative affect measured by the PANAS and coping/escapism, the rest of motives being either associated with a small effect size (e.g., emotional enhancement, social) or not at all (i.e., enrichment). A medium effect size relationship also emerged with dependency whereas other BWESQ subscales were found to share a small effect size relation with negative affect. In contrast, positive affect was poorly correlated (r_s below 0.10) to both BWESQ and WTSMQ subscales except for the enrichment motivation with which a small effect size relation was found. All these results are reported in Tables 6 and 7.

5. Discussion

The purpose of this study was to develop and test the psychometric properties of two scales that measure TV series watching motives and binge-watching engagement and symptoms, on the basis of a prior phenomenological study of TV series watching. Current approaches in the investigation of emerging problematic-like behaviors tend to neglect the investigation of their unique nature and merely focus on the identification of potential similarities with other forms of addiction, thus engendering potential overpathologization of everyday life activities. Following the pilot qualitative exploration that allowed generating both quantitative instruments (Flayelle et al., 2017), the current study tested the structural validity of the WTSMQ and BWESQ by conducting exploratory and confirmatory factor analyses in two independent samples, as well as their external validity by exploring their mutual relationships with complementary measures of positive and

Table 4
The estimated seven factor model (Sample 2 BWESQ).

	Standardized Factor Loadings	Internal consistency (α)	Composite reliability
Loss of control		0.83	0.88
Item 11 - I watch more TV series than I should	0.71		
Item 32 - I occasionally feel guilty or regretful after watching a number of episodes	0.51		
Item 36 - I sometimes conceal how much time I've been spending watching TV series from my family	0.70		
Item 15 - I sometimes try not to spend as much time watching TV series, but I fail everytime	0.68		
Item 29 - My school, university or work results are suffering from the amount of time I spend watching TV series	0.74		
Item 12 - I sometimes fail to accomplish my daily tasks so I can spend more time watching TV series	0.79		
Item 23 - My family express their disapproval on my spending what they claim is too much time watching TV series	0.81		
Engagement		0.79	0.85
Item 27 - My family and friends consider me a gold mine of information on TV series	0.69		
Item 30 - I often check TV series applications (i.e., IMDb, TVShow Time, TV Series, etc.)	0.58		
Item 26 - I'm always looking for new TV series to watch	0.63		
Item 39 - I tend to keep watching a TV series until I really get hooked	0.40		
Item 18 - Watching TV series is one of my favourite hobbies	0.80		
Item 1 - I spend a lot of time watching TV series	0.67		
Item 9 - I spend a lot of time talking to people on the Internet about TV series	0.55		
Item 35 - In my opinion, TV series are a part of my life and they contribute to my welfare	0.77		
Dependency		0.77	0.85
Item 16 - I get tense, irritated or agitated when I can't watch my favourite TV series	0.80		
Item 31 - I am usually in a bad mood, sad, depressed or annoyed when I can't watch any TV series, and I feel better when I am able to watch them again	0.79		
Item 25 - I am often worried there might be a technical problem (i.e., an Internet interruption) that prevents me from watching TV series	0.64		
Item 10 - I get annoyed or angry when I'm interrupted while watching my favourite TV series	0.64		
Item 6 - I am so immersed in my TV series that I get isolated, and I'll even sometimes decline an invitation to go out.	0.75		
Desire/Savoring		0.75	0.84
Item 2 - I look forward to the moment I'll be able to see a new episode of my favourite TV series	0.66		
Item 21 - I get really excited when a new episode is released	0.76		
Item 4 - I keep track of the release date of new episodes so I can remain up-to-date and finish the series (season)	0.66		
Item 7 - I am generally quite excited about watching an episode of my favourite TV series	0.66		
Item 5 - I sometimes feel empty or nostalgic when my favourite TV series comes to an end	0.69		
Item 3 - I sometimes get so absorbed in the series that I lose track of time	0.66		
Positive Emotions		0.62	0.75
Item 33 - Watching TV series episodes triggers positive emotions (enthusiasm, interest, excitement, inspiration, etc.)	0.63		
Item 8 - I tend to watch TV series when I am in a happy mood or feeling positive emotions (when I'm feeling joyful, euphoric, etc.)	0.32		
Item 28 - I generally feel intense pleasure upon watching an episode of my favourite TV series	0.79		
Item 38 - Watching TV series is a cause for joy and enthusiasm in my life	0.82		
Item 24 - I tend to watch TV series when I am feeling low or when I am feeling negative emotions (when I'm feeling angry, sad, etc.)	0.43		
Binge-watching		0.79	0.84
Item 22 - When an episode comes to an end, and because I want to know what happens next, I often feel an irresistible tension that makes me push through the next episode	0.68		
Item 19 - I usually spend more time watching TV series than planned	0.61		
Item 34 - I often need to watch the next episode to feel positive emotions again and to relieve frustration caused by the interruption in the storyline	0.68		
Item 17 - I don't sleep as much as I should because of how much time I spend watching TV series	0.58		
Item 14 - I always need to watch more episodes to feel satisfied	0.74		
Item 20 - I cannot help feeling like watching TV series all the time	0.78		
Pleasure Preservation		0.63	0.78
Item 13 - I get really irritated if I get the next few episodes spoiled by anyone	0.75		
Item 37 - I worry about getting spoiled	0.93		
Item 40 - I tend to use a number of strategies to keep the joy I feel at watching something as intact as possible (for example, I tend to wait until the whole series is out to start watching so I can binge, I tend to plan when and how I'll watch the TV series, I tend to try not to get spoiled, or I tend to wait until later to start watching if necessary, etc.)	0.48		

All standardized factor loadings are significant at $p < .01$.

negative affect, problematic use of the Internet and substance use.

CFA analyses resulted in a four-factor model of the WTSMQ with good psychometric properties and fit. The four motivational factors deducible from these analyses (i.e., enrichment, social, emotional enhancement and coping-escapism) arguably cover the range of key motivational aspects involved in binge-watching as they perfectly replicate the gratifications typology of television viewing established by Sussman and Moran (2013) in their selective review of the concept of “television addiction”. Based on Media Systems Dependency and Uses and Gratification theories, the authors state that television viewing motivations fall under three headings: (a) learning (e.g., understanding and reinforcing one's values or orienting oneself to one's world), (b) connection (using television to facilitate relationships or as a substitute for them) and (c) affect regulation (via diversion or entertainment). CFA

Table 5
Spearman correlations between all WTSMQ (N = 6556) and BWESQ (N = 5272) subscales.

	WTSMQ-Social	WTSMQ-Emotional enhancement	WTSMQ-Enrichment	WTSMQ-Coping/Escapism
BWESQ-Engagement	0.29	0.39	0.32	0.30
BWESQ-Positive emotions	0.19	0.42	0.25	0.42
BWESQ-Pleasure preservation	0.21	0.26	0.15	0.19
BWESQ-Desire/Savoring	0.21	0.48	0.19	0.36
BWESQ-Binge-watching	0.22	0.36	0.12	0.41
BWESQ-Dependency	0.30	0.31	0.13	0.41
BWESQ-Loss of control	0.22	0.20	0.10	0.43

All correlation coefficients significant at $p < .001$.

Table 6
Spearman correlations between all WTSMQ (N = 6556) subscales and age, gender (N = 6556), PANAS (N = 3987), CIUS (N = 3891), AUDIT (N = 3826) and FTND (N = 1120).

	WTSMQ-Social	WTSMQ-Emotional enhancement	WTSMQ-Enrichment	WTSMQ-Coping/Escapism
Age	−0.15*	−0.12*	−0.20*	−0.19*
Gender	−0.06*	0.07*	−0.04*	0.12*
Positive affect	−0.03	0.04*	0.12*	−0.13*
Negative affect	0.12*	0.20*	0.04*	0.38*
CIUS	0.22*	0.23*	0.11*	0.39*
AUDIT	0.01	−0.03	0.01	−0.00
FTND	−0.02	0.03	−0.07*	0.06

*$p < .05$, corrected for multiple correlations using the false discovery procedure (Benjamini-Hochberg procedure).

analyses also emphasized that a seven-factor model of the BWESQ has good psychometric properties and fits the data well. Overall, by being repeatedly put into perspective with TV series watching motivations, the construct validity of the BWESQ as discriminating two dimensions (high but healthy involvement and problematic binge-watching) was supported by differential patterns of correlations with common features found in diverse hobbies and leisure activities on one side, and risk factors similar to those typically found in addictive behaviors on the other.

A first range of BWESQ factors (i.e., engagement, positive emotions, desire/savoring, pleasure preservation) seem to cluster around common connections as evidenced by the links being stronger between those dimensions and the emotional enhancement motive assessed by the WTSMQ. It comes as no surprise that engagement and emotionally-laden factors are siding together in light of the core principles of screenwriting, which state that it is only through emotional impact that great storytelling engage viewers (Field, 2005; Iglesias, 2005; Lavandier, 2011; McKee, 2010; Russin & Missouri, 2012). In addition, emotional involvement has been conceptualized as the key mechanism underlying engagement with media content, by covering the various forms of emotional bonding with a character, story, or narrative (Konijn & Hoorn, 2005; Wirth, 2006). More particularly, involvement in TV series (e.g., soap operas) has been framed as the emotional response of the viewers to the events occurring in the show (i.e., storyline; Greenberg, 1982). Undoubtedly, as any hobby or leisure activity, TV series watching primarily satisfies the need for entertainment, thus leading to the enhancement of feelings of well-being and positive affect. According to the mood management theory (Zillmann, 1988, 2000), people in everyday life are indeed selecting certain media to enhance or maintain positive affect, and, driven by these hedonistic goals, they will even intuitively deploy some extra optimization strategies whereby individuals rearrange their environment in a way that maximizes positive emotional experience (Reinecke, 2016). More generally speaking, such enhancement motives are all part of other leisure activities such as sports (Jansanem & Berna, 2017), extreme sports (Brymer & Mackenzie, 2017; Kerr, 1991; Lipscombe, 1999), video gaming (Ryan, Rigby, & Przybylski, 2006), or dancing (Maraz, Király, Urbán, Griffiths, & Demetrovics, 2015). For example, individuals who are seeking arousal may use television as a way to obtain that stimulation (Bryant & Zillmann, 1984), as much as sports enthusiasts may seek arousal through spectatorship (Kahle & Riley, 2004) or gamers through video gaming (Sherry et al., 2006). As such, elevated involvement in TV series watching is utterly suggestive of the positive expectancies (e.g., experiencing pleasure) typically attributed to other leisure activities one may be passionate about. Another main finding of the correlational results is the noticeable link found between the engagement factor and

Table 7
Spearman correlations between all BWESQ (N = 5272) subscales and age, gender (N = 5272), PANAS (N = 3987), CIUS (N = 3891), AUDIT (N = 3826) and FTND (N = 1120).

	BWESQ-Engagement	BWESQ-Positive emotions	BWESQ-Pleasure preservation	BWESQ-Desire/Savoring	BWESQ-Binge-watching	BWESQ-Dependency	BWESQ-Loss of control
Age	−0.12*	−0.19*	−0.10*	−0.18*	−0.17*	−0.13*	−0.23*
Gender	0.00	0.08*	−0.06*	0.05*	0.03*	0.01	0.07*
Positive affect	−0.05*	0.01	−0.03*	−0.01	−0.07*	−0.12*	−0.14*
Negative affect	0.11*	0.18*	0.13*	0.21*	0.28*	0.31*	0.26*
CIUS	0.24*	0.31*	0.24*	0.32*	0.48*	0.46*	0.51*
AUDIT	−0.02	0.01	0.07*	0.01	0.09*	0.00	0.11*
FTND	0.02	0.01	0.05	0.08*	0.08*	0.11*	0.03

*$p < .05$, corrected for multiple correlations using the false discovery procedure (Benjamini-Hochberg procedure).

the enrichment motive for TV series watching. This result is consistent with those of a recent study, which aimed at elucidating variables that drive sustained engagement with TV series watching (Adachi, Ryan, Frye, McClurg, & Rigby, 2017). Overall, the authors noted that the eudemonic themes (i.e., related to a sense of fulfillment that arises from achieving one's full potential) afforded by the shows was a particularly robust and consistent predictor of sustained engagement in TV series. It is well established that entertainment media may contain rich eudemonic themes (Bailey & Ivory, 2016; Oliver & Raney, 2011; Rigby & Ryan, 2017; Wirth, Hofer, & Schramm, 2012) and that TV series can be intellectually stimulating by conveying meaningful and virtuous messages (Mikos, 2016; Perks, 2015). Such consideration completely matches with the shared conception that there are intellectual benefits or learning aspects that can be derived from leisure activities as a whole, which may further motivate subsequent involvement (Beggs & Elkins, 2010). Consistent with this, high involvement in TV series watching is likely to occur when one feels preoccupied with TV series as a means of personal enrichment. In light of the above, the four BWESQ factors (i.e., engagement, positive emotions, desire/savoring, pleasure preservation) appear to precisely measure the extent of interest in or wish for binge-watching TV series one may experience regardless of any problematic account.

The remaining factors of the BWESQ (i.e., binge-watching, dependency, loss of control), show the opposite pattern in view of their common correlates. The correlational results convergently emphasize these three factors as being specifically related to the coping-escapism motive as assessed with the WTSMQ, as well as to negative affect and problematic Internet use. In the past, frequent recourse to TV watching has already been credited as a way of coping with stress (Anderson, Collins, Schmitt, & Jacobvitz, 1996) or distracting oneself from unpleasant thoughts (McIlwraith, 1998). More recently, escaping from reality, which is generally credited as a reason behind binge-behaviors (Greene & Maggs, 2017; Heatherton & Baumeister, 1991), has noticeably been acknowledged as a motivation to spend more time with binge-watching among undergraduates (Panda & Pandey, 2017). However, dysfunctional coping (e.g., problem alleviating expectations, emotional coping, or stress reduction) has also been extensively described in relation to various excessive or problematic versions of recreational behaviors such as online video gaming (Kuss, 2013; Yee, 2006, 2007), gambling (Binde, 2013; Canale, Vieno, Griffiths, Rubaltelli, & Santinello, 2015; Devos et al., 2017; Wu, Tao, Tong, & Cheung, 2012), cybersex (Cooper, Griffin-Shelley, Delmonico, & Mathy, 2001; Laier & Brand, 2014; Wéry & Billieux, 2016), social networking (Hormes, Kearns, & Timko, 2014), alcohol consumption (Holahan, Moos, Holahan, Cronkite, & Randall, 2001; Kuntsche & Kuntsche, 2009; Kuntsche, Knibbe, Gmel, & Engels, 2006; Terlecki & Buckner, 2015), smoking (Shapiro, Jamner, Davydov, & James, 2002), excessive eating (Markey & Vander Wal, 2007; Munsch, Meyer, Quartier, & Wilhelm, 2012; Polivy & Herman, 1993) and, just as importantly, Internet use (Kardefelt-Winther, 2014; Tang et al., 2014; Whang, Lee, & Chang, 2003). Therefore, one may speculate that problematic binge-watching stems from avoidance expectancies or dysfunctional coping with adverse emotional states, for example. Such assumptions are supported by the moderate relationship that was identified in our sample between dependency and negative affect. As emotion regulation is an important process across multiple psychopathological conditions including addictions (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & Jazaieri, 2014; Thorberg & Lyvers, 2006), it is likely that the urge for mood regulation might be considered an important factor within the development of problematic binge-watching, which is why binge-watching has recently been proposed as an emotion regulation strategy (Flayelle et al., 2018). Another finding of these results is the moderate relationship between dependency and social motivations. First studies have shown that social interaction is a significant driver for TV series watching (Flayelle et al., 2017; Panda & Pandey, 2017; Pittman & Sheehan, 2015) and that binge-watching seems to be associated with loneliness (Sung et al., 2015). It is also now established that factors such as the fear of missing out (i.e., FOMO, apprehension associated with the fear that other people are having a pleasurable experience that one is not a part of) have a boosting motivational effect on the pace of media consumption (Conlin, Billings, & Averset, 2016). More generally speaking, socialization motives (e.g., facilitate social ties) have been found to play an active role in the literature on excessive behaviors (Cooper, 1994; Kuntsche & Kuntsche, 2009; Kuntsche et al., 2006; McGrath, Stewart, Klein, & Barrett, 2010) and a perceived lack of social support, feelings of isolation, and loneliness have notably been considered factors of vulnerability for developing excessive use of Internet (Caplan, 2007; Morahan-Martin & Schumacher, 2003; Odacı & Kalkan, 2010; Pontes, Griffiths, & Patrão, 2014). Backed by such understanding, problematic binge-watching might be expected particularly among persons using TV series viewing to compensate for a paucity of social interactions. In view of the foregoing, the three considered BWESQ factors (i.e., binge-watching, dependency, loss of control) therefore seem specifically suited to assess problematic involvement in binge-watching. Finally, of particular interest was the fact that no genuine relationships were observed between both WTSMQ and BWESQ scales and substance abuse, thus substantially discrediting the pertinence of investigating binge-watching through the lens of addiction models and reinforcing the paramount necessity to rather focus on a “behavioral analysis” of excessive behaviors characterized by addiction-like symptoms (James & Tunney, 2016), such as binge-watching.

Taken together, the results of this study point to the relevance of both WTSMQ and BWESQ scales for further exploration of binge-watching behaviors, by giving special emphasis to the discriminatory potential of the BWESQ scale in distinguishing problematic from avid binge-watching. Still, the question remains as to how researchers actually define it and, eventually, how much is too much when engaging in binge-watching? Some authors have tentatively tackled the definition issue of binge-watching and problematic binge-watching by proposing the move from two to three episodes as the cut-off point to start considering binge-level watching (Walton-Pattison, Dombrowski, & Presseau, 2018), and a minimum threshold of five consecutive episodes for determining unhealthy binge-watching (De Feijter et al., 2016). However, such indicators reveal little or nothing about binge-watching and problematic binge-watching as they completely ignore pivotal information such as the underlying motivations or the associated functional outcomes. Anyway, trying to establish a consistent normative threshold for binge-watching (e.g., by determining quantifiable markers such as quantity of episodes seen or hours spent viewing) that we might identify as problematic may be not only difficult but also valueless given the typical episodic nature of elevated binge-watching (Flayelle et al., 2017), and also particularly because an equivalent amount of viewing time may cause problems for some people but not others, depending on competing life demands. Moreover, it is also possible that, for some individuals, seemingly excessive binge-watching may rather involve positive repercussions such as fostering relationships with close relatives (Flayelle et al., 2017; Gomillion, Gabriel, Kawakami, & Young, 2017). Therefore, in concordance with latest conceptualizations about behavioral addictions claiming that the functionally impairing nature of the engagement is the critical dimension in considering problematic involvement in a given behavior (Billieux, van Rooij et al., 2017; Kardefelt-Winther et al., 2017), we argue that the focus should be on the tangible negative impact of the behavior when defining problematic binge-watching. In this regard, it is worth noting that the “addictive” aspect of television has previously been expressed as a function of interference with completion of life tasks rather than number of hours of viewing *per se* (Horvath, 2004). In line with this, we propose that problematic binge-watching should produce long-term significant harm by compromising multiple areas of one's life (e.g., family, health, work) and psychological functioning before being identified as such. Longitudinal studies aimed at exploring the specific course of binge-watching, and elucidating its different mediators and moderators, are

needed in this respect. In such a research context, it will be essential to distinguish cases where excessive binge-watching might be the consequence of other genuine mental disorders (e.g., depression, social anxiety), from cases where it only constitutes a temporary way of dealing with difficult circumstances for example. Taking into account the motivations for binge-watching will be fundamental there. Yet again, it must be noted that binge-watching for such motives is not inherently problematic and can be beneficial in many cases (e.g., binge-watching as a stress-reliever when faced with stressful life events, binge-watching for staying on top of a popular series in order to bond with others). It is worth recalling that individuals who engage in leisure activities generally do so for similar reasons (Beggs & Elkins, 2010; Chen & Pang, 2012; Kerr & Mackenzie, 2012). However, the fact that binge-watching has the power to satiate these needs may predispose this activity to be a source of problematic use for vulnerable individuals.

The present study clearly has some limitations. First, data were collected by using self-reported scales that are subjected to standard limitations (e.g., memory recall and lack of introspection biases, social desirability). Second, some correlations found in this study were of modest size, suggesting that additional factors are more likely to be associated with problematic and non-problematic binge-watching behaviors. Other unconsidered factors associated with binge-watching behaviors (e.g., personality traits or emotion regulation strategies) may also be targeted in future research in order to gain a more comprehensive analysis of the concurrent validity and to identify potential subtypes of binge-watchers. Third, alpha values for WSTMQ/BWESQ subscales were somewhat slightly below the recommended threshold value equal to 0.7 (Nunnally & Bernstein, 1994). Fourth, the subsamples were mainly composed of students (percentage range: 52.6–66.9), which impacts upon the generalizability of the results. Finally, the scales developed in the current study were validated in a French-speaking population and further cross-cultural studies should test their psychometric structure in different cultures and languages.

On the whole, these results emphasize that the WTSMQ and BWESQ have good psychometric properties and constitute promising tools for use within the emerging binge-watching research area. Indeed, both scales present sufficient wealth and accuracy to explore such a new behavioral phenomenon, which is completely emblematic of changes that we are observing in our connected everyday environment and on-demand culture. An additional and far from least important benefit of these measures is that the BWESQ scale may be discriminatory for elevated (but healthy) involvement in TV series watching and problematic binge-watching, and that each of the motivations assessed with the WTSMQ provides insight as to the potential etiologies of these two dimensions. Therefore, these measurement instruments may enable scholars to significantly move forward problem binge-watching research without overpathologizing such a popular and common leisure activity.

Declarations of interest

None.

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