

## RESEARCH ARTICLE

# Two sides of the same coin: The differentiating role of need satisfaction and frustration in passion for screen-based activities

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## Conflict of Interest Statement

The authors declare no conflict of interest.

## Transparency Statement

Supplementary material, including data files and coding protocols, has been made available on the Open Science Framework's website at <https://osf.io/RPYWH/>.

## Ethical Statement

All studies presented in the article were conducted in accordance with the Declaration of Helsinki and with the approval of the Research Ethics Committee of the Eötvös Loránd University. All participants gave their informed consent prior to their participations.

## Abstract

Rooted in Self-Determination Theory, the present research sought to investigate whether the “bright” and “dark” side of human functioning (need satisfaction and need frustration, respectively) would, as determinants, differentially predict harmonious passion (HP) and obsessive passion (OP) for screen-based activities such as Facebook use, TV series watching, online gaming, and smartphone gaming. For this purpose, four cross-sectional studies were carried out ( $N_{\text{total}} = 1,065$ ). Results showed that, across all activities, need satisfaction was negatively related to OP, but not HP. A similar pattern emerged with need frustration: It was positively related to OP, but not HP. Moreover, even after controlling for the self-reported amount of time spent on the activities, HP predicted adaptive, activity-specific outcomes, whereas OP predicted maladaptive ones. These findings suggest that general need satisfaction may be a protective factor against the compensatory function of OP, but need frustration may be a potential risk factor of OP and both should be taken into account in the case of passion for screen-based activities.

**Keywords:** basic psychological needs, Dualistic Model of Passion, Facebook use, online gaming, smartphone gaming, TV series watching

In today's ever-increasing digitalized and Internet-driven age, we are practically surrounded by screens that can come in different sizes and can have diverse functions. Through these devices, we can do basically everything, wherever and whenever we want to, for instance, use Facebook, watch TV series, or play games online or on smartphones. Although people spend more and more time in the online environment, only a small proportion of them display symptoms or behaviors that are akin to problematic behaviors or addictions (e.g., Bőthe et al., 2018; Griffiths, Király, Pontes, & Demetrovics, 2015; Ryan, Chester, Reece, & Xenos, 2014). At the same time, research often focuses on these problematic behaviors (even overpathologizes them, see Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015), and consequently ignores the majority of the users who do not have any issues with the online activities. Basing our study on the findings of Orosz, Vallerand, Bőthe, Tóth-Király, and Paskuj (2016), we posit that one's engagement and

involvement can vary as a function of passion for these activities; more specifically, its more adaptive (i.e., harmonious) and less adaptive (i.e., obsessive) forms. By more clearly delineating the adaptive and maladaptive forms of engagement through passion, it becomes clearer why online activities might cause problems for some, but not for others.

However, passion could also be influenced by other, more general ways of functioning that permeate all aspects of life, with need satisfaction being a candidate for such a role. While need satisfaction has been investigated in relation to passion (e.g., Curran, Appleton, Hill, & Hall, 2013; Lalande et al., 2017), the potential role of need frustration is yet to be tested. This examination is also crucial given that need frustration has been identified as an increasingly important and relevant predictor of suboptimal functioning, ill-being, psychopathologies, or even psychobiological functioning (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Vansteenkiste & Ryan, 2013).

The present research, by relying on the framework of Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000) and the Dualistic Model of Passion (DMP; Vallerand, 2015; Vallerand *et al.*, 2003), focused on the “bright” (i.e., need satisfaction) and “dark” (i.e., need frustration) sides of one’s functioning as potential determinants of harmonious passion (HP) and obsessive passion (OP) across popular screen-based activities. A total of four screen-based activities (i.e., TV series watching, online gaming, smartphone gaming, and Facebook use) were included that are relatively popular among the general population (see the individual studies below) in order to avoid capitalizing on chance and enhancing replicability (e.g., Bakker, van Dijk, & Wicherts, 2012).

### On the Dualistic Model of Passion

According to the DMP (Vallerand, 2015; Vallerand *et al.*, 2003), passion can be defined as a strong inclination toward a specific activity that the person loves and enjoys, values, incorporates into his/her identity, and spends a significant amount of time and energy with. Another important aspect of the DMP is that it proposes two qualitatively different forms of passions, differing from one another on the basis of the internalization process that occurs during activity engagement (Deci & Ryan, 1985; Vallerand, 1997, 2015). The first form is HP, which can manifest when autonomous internalization occurs; autonomous internalization entails that the activity is freely engaged and incorporated into one’s identity, without any contingencies. For instance, people might feel that they can engage in an activity out of their choice and interest, without depending on others’ approvals. In this case, engaging in this activity takes up a significant, but not overwhelming, amount of time in one’s life, and thus it is in balance with other aspects of one’s life, with one’s identity, and the individual remains in control of the activity. Overall, this harmonious form of engagement is thought to lead to potentially adaptive outcomes (Vallerand, 2015). The second form of passion is OP, which stems from a controlled internalization process; in this case, inter- or intra-personal contingencies are often attached to the activity itself. For instance, controlled internalization suggests that people engage in an activity to maintain the same level of self-esteem (Lafrenière, Bélanger, Sedikides, & Vallerand, 2011) or to receive social acceptance from others. As a result of these external or internal contingencies, one loses control over the activity and feels pressured to engage in it, often at the expense of other aspects of life, leading to predominantly maladaptive outcomes (Vallerand, 2015). Interested readers are referred to Appendix S1 in the online supplements for a comparison of passion and related constructs.

Although there has been a myriad of studies on passion in several domains of life (see Curran, Hill, Appleton, Vallerand, & Standage, 2015; Vallerand, 2015), far

less research has focused on the potential role of the DMP pertaining to online, screen-based activities, despite their popularity and prevalence. Moreover, there is still uncertainty about why some people have positive, adaptive experiences during engaging in these activities, while others either do not, or even have negative, maladaptive ones. Fortunately, some studies provide support for passion being a potential candidate that might separate the adaptive and maladaptive outcomes of activity engagement. Regarding *Internet use*, Naydanova and Beal (2016) investigated the effect of HP and OP for Internet use on positive outcomes of social (i.e., effectiveness in interacting with others) and cognitive competences (i.e., effectiveness in learning) as well as general self-worth (i.e., the belief about one’s capabilities and worthiness). The authors reported that HP was positively related to all outcomes, while OP was negatively related to these constructs, with most of these findings being identical in both US and Russian samples. Another study (Séguin-Lévesque, Laliberté, Pelletier, Vallerand, & Blanchard, 2003) showed that HP for Internet use was associated with greater self-determination in the couple and greater dyadic adjustment (i.e., adaptive correlates), and fewer interpersonal conflicts (i.e., maladaptive correlates). On the contrary, OP for Internet use was associated with lower levels of self-determination in the couple, lower levels of dyadic adjustment, and more conflicts, corroborating HP’s association with adaptive outcomes, and OP’s association with maladaptive ones.

So far, only one study addressed passion for Facebook use and series watching (Orosz, Vallerand, *et al.*, 2016). In the case of Facebook use, the associations between the passion and the activity-specific outcomes were less differentiated: HP was associated with self-expression on Facebook and, somewhat surprisingly, persistent use of Facebook, but HP was not related to Facebook overuse. On the other hand, OP was associated with all three outcomes. As for series watching, results were more clear-cut as HP was related to adaptive activity-specific outcomes (i.e., interacting with others about series or watching series to learn new languages), and OP was only related to problematic use (i.e., maladaptive outcome). In the case of online gaming, similar patterns can be observed as HP is often positively related to adaptive outcomes of positive affect and vitality (Lafrenière, Vallerand, Donahue, & Lavigne, 2009) as well as flow (Wang, Liu, Chye, & Chatzisarantis, 2011) during gaming and game enjoyment (Przybylski, Weinstein, Ryan, & Rigby, 2009), while OP is generally positively related to maladaptive outcomes of negative affect and problematic use (Przybylski *et al.*, 2009; Stoeber, Harvey, Ward, & Childs, 2011; Wang & Chu, 2007). As for smartphone gaming, this activity has not received any attention from the perspective of passion so far. In sum, the findings clearly support the importance of the DMP when assessing screen-based activities as the dualistic aspect of passion can separate the positive and negative outcomes of engaging in online behaviors.

### On the Theory of Basic Psychological Needs

In this research, we draw upon SDT (Deci & Ryan, 1985, 2000), a macro-theory of human motivation, personality, and development, to identify potential determinants of HP and OP. SDT rests on the assumption that people have an active tendency toward growth and development, leading to optimal functioning. However, there are inherent and essential specific nutrients in the form of three basic psychological needs that are required to reach this optimal functioning. The first, autonomy, involves the feelings of volition, choice, and psychological freedom in one's behavior. The second, competence, involves the feelings of being effective and capable in one's pursuits. The third, relatedness, involves the experience of closeness and reciprocal care with others. According to the SDT, the satisfaction of these innate needs is crucial for psychological and physical health (Vansteenkiste & Ryan, 2013).

Importantly, the distinction between need satisfaction (i.e., bright side of functioning) and need frustration (i.e., dark side of functioning) is of major significance as the absence of need satisfaction does not equal the presence of need frustration (Vansteenkiste & Ryan, 2013). More specifically, contrary to need satisfaction (i.e., when the three needs of individuals are met), need frustration refers to the actively frustrated needs which, in turn, contribute to ill-being, psychopathology, and maladaptive functioning (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Van den Broeck, Ferris, Chang, & Rosen, 2016; Vansteenkiste & Ryan, 2013). These findings suggest that while low need satisfaction hinders growth, need frustration could be especially harmful, thus deserving additional attention.

There are initial factor analytic studies arguing against this notion and suggesting that need satisfaction and need frustration are two endpoints of the same continuum (e.g., Tóth-Király, Morin, Bóthe, Orosz, and Rigó, 2018) rather than being two distinct dimensions. While factor analytic approaches are important, they still need to be complemented with examinations pertaining to convergent validity. More specifically, it should be investigated whether need satisfaction and frustration are indeed differentially related to a diverse range of correlates. Some studies showed that satisfaction and frustration are not diametrically opposed to one another when taking correlates into account (e.g., Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Chen et al., 2015; Costa, Ntoumanis, & Bartholomew, 2015; Krijgsman et al., 2017; Nishimura & Suzuki, 2016), which would support the hypothesis that these are distinct factors. Results of yet another group of studies provided support for the continuum hypothesis by demonstrating completely opposite patterns of associations between need satisfaction/frustration and

different correlates (e.g., Brenning, Soenens, Mabbe, & Vansteenkiste, 2019; Campbell et al., 2019; Costa, Gugliandolo, Barberis, & Larcán, 2016; Landry et al., 2016; Schultz, Ryan, Niemiec, Legate, & Williams, 2015). It appears that the field is far from unified. Thus, the present investigation contributes to this discussion by examining the relations between need satisfaction/frustration and HP/OP. If need satisfaction/frustration are related to HP/OP with the same magnitude, but opposite directions, then it would support the continuum hypothesis. On the other hand, if there are differences both in magnitude *and* in direction, then the distinctness of satisfaction and frustration would be supported.

### On Passion and Need Satisfaction

The associations between passion and need satisfaction have already been investigated. Some studies reported that need satisfaction is positively associated with HP and negatively with OP (e.g., Przybylski et al., 2009; Verner-Filion & Vallerand, 2018), while in some cases OP was also positively associated with need satisfaction (Forest, Mageau, Sarrazin, & Morin, 2011; Parastatidou, Doganis, Theodorakis, & Vlachopoulos, 2012). Other studies focused on how passion predicts need satisfaction by hypothesizing that engaging in an activity in a harmonious fashion entails higher need satisfaction as HP is characterized by elements (e.g., higher volition and flexibility) that are the foundations of need satisfaction. These studies concluded that whereas HP positively predicted need satisfaction, OP either did not or did negatively (Curran et al., 2013; Houliort et al., 2015; Verner-Filion, Vallerand, Amiot, & Mocanu, 2017).

While these studies provide important information about the relationship between need satisfaction and passion, one of their limitations is that they did not investigate whether need satisfaction can predict HP and OP. Indeed, Vallerand (2015; see also Vallerand et al., 2003) states that in order to achieve an optimal internalization process (i.e., autonomous), one needs to experience that their psychological needs of autonomy, competence, and relatedness are satisfied. On the other hand, when these needs are not satisfied or even frustrated, a less optimal internalization process (i.e., controlled) is thought to manifest. SDT also suggests that the internalization process becomes complete, instead of partial, in an environment where the basic psychological needs are supported, and individuals feel that they are autonomous, competent, and connected to others (Deci & Ryan, 2000). This, in turn, might lead people to become more autonomous in their regulation, and engage in an activity in a harmonious way.

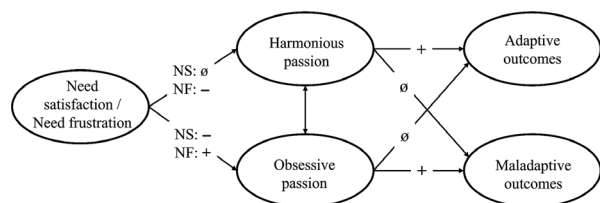
So far, the question whether HP and OP is differentially predicted by need satisfaction has only been examined in two studies. The first was Akehurst and Oliver (2014), who concluded that the three needs of autonomy, competence, and relatedness jointly, but not

independently, predicted both HP and OP. A second and a more thorough research project was conducted by Lalande *et al.* (2017) who investigated—with cross-sectional, mixed, and longitudinal studies—the role of need satisfaction as a determinant of HP and OP in relation to music, basketball, work and self-written activities. More interestingly, they considered two potential sources of need satisfaction, namely inside (i.e., when performing the activity) and outside (i.e., when not performing the activity) the activity. Their results revealed that low levels of need satisfaction outside the activity positively predicted OP (but not HP), whereas need satisfaction inside the activity was related to both forms of passion. They conclude that OP could represent a compensatory striving to respond to unsatisfied needs. These findings are in line with Vansteenkiste and Ryan (2013), who identify compensatory behaviors as a potential response to unsatisfied needs. Despite these studies, there remains a paucity of evidence on this issue as Lalande *et al.* did not take into account the dark side of human functioning, namely the frustration of psychological needs. In accordance with Vansteenkiste and Ryan (2013), who state that need frustration goes beyond the lack of satisfaction, it is reasonable to assume that chronically frustrated needs might be differentially related to passion.

### The Present Research

This research and the examination of the hypothesized model (see Fig. 1 for a schematic illustration) builds on previous ones in two significant ways. First, by examining whether the “bright” and “dark” side of one’s functioning (Vansteenkiste & Ryan, 2013), need satisfaction and need frustration respectively, would differentially predict the two forms of passion. On the basis of Lalande *et al.* (2017), we expected (Hypothesis 1) need satisfaction in life in general (henceforth referred to as general need satisfaction) to be negatively related to OP, while not related to HP. Although general need frustration (need frustration in life in general) has not been investigated in relation to passion, we posit that (Hypothesis 2) it would be positively related to OP, while negatively to HP.

Second, as we sought to comprehensively test these hypothesized relationship patterns, we conducted four



**Fig. 1:** Schematic illustration of the hypothesized model tested across the four studies. NS, need satisfaction; NF, need frustration; plus signs denote hypothesized positive associations, the “0” sign denotes that no associations were expected, while minus signs denote hypothesized negative associations

studies with four different popular screen-based leisure activities, namely TV series watching (Study 1), online gaming (Study 2), smartphone gaming (Study 3), and Facebook (Study 4), and investigated whether harmonious and OP would differentially predict adaptive and maladaptive outcomes. In line with the available literature, we expected (Hypothesis 3) HP to be related to adaptive outcomes, while OP to maladaptive ones across all four studies. Given the diverse range of activities in the present research, we opted to select outcomes that were specific to the particular activities as these types of outcomes were thought to be better at capturing the engagement with and the behavioral aspects of the activity itself. This decision was also underscored by the fact that passion is thought to be an activity-specific construct instead of being a more general, trait-like variable (Vallerand, 2015). It is important to keep in mind that different outcomes might be associated with the different activities given that these activities might be pursued in different settings: Series watching and gaming might be more likely to occur at home in front of a TV or computer screen, Facebook use might be more likely to occur in a workplace or school context, while smartphone gaming might be more likely to occur when one is waiting somewhere. In interpreting an outcome as being adaptive or maladaptive, we relied on previous studies that used these outcomes, as well as the qualitative examination of the items measuring said outcomes (see the subsequent studies).

This study contributes to the existing knowledge in four ways. First, by considering the Dualistic Model of Passion with its harmonious and obsessive facets, this investigation increases the knowledge about the motivation factors that could highlight why some users of screen-based activities reap benefits from them, whereas others do not. This could advance our understanding of the consequences of different screen-based activities. Second, we recognize that not all consequences of online behaviors are positive; therefore, by including specific adaptive and maladaptive outcomes as well, we are able to separate the consequences of these activities. Third, by independently considering need satisfaction and frustration, we investigated whether these two constructs similarly (indicative of an underlying need fulfillment continuum with satisfaction and frustration at the two extremes) or differentially (indicative of two distinct satisfaction and frustration factors) predict HP and OP. Fourth, we considered four popular online, screen-based activities which allowed us to assess the degree of similarities between them, potentially underscoring the replicability of our findings, particularly in light of the recent replication crisis plaguing different fields of psychology (e.g., Pashler & Wagenmakers, 2012).

### Study 1: Series Watching

Television watching is one of the most dominant leisure time activities in the world, taking up about 12–



16 hours a week in many countries (Fisher & Robinson, 2011). Within this activity, TV series watching became an even prevalent activity with the advancement of online streaming and (il)legal downloading. According to the data of the Pew Research Center, the percentage of adults watching series has doubled in recent years (Purcell, 2010). As one of the major companies, Netflix boasts around 100 million members in almost 200 countries with more than 125 million hours of TV shows being available readily (Netflix, 2017) and with 70% of its users binge-watching shows regularly (Smith, 2017). In sum, although series watching is becoming an increasingly important screen-based activity, it still has not received the attention of psychological research that it merits.

## Method

**Ethical considerations.** All four studies were conducted in accordance with the Declaration of Helsinki and with the approval of the Research Ethics Committee of the Eötvös Loránd University. The questionnaires were filled out online in all cases. Voluntary participants were first informed about the aim and the topic of the study. If they wished to participate, they had to check a box; otherwise, they were excluded. None of them received compensation or punishment for participation or non-participation, respectively. All participants in all studies were Hungarians and filled out the questionnaires in Hungarian. All data files are available at <https://osf.io/RPYWH/>.

**Participants.** Participants were 433 viewers (female = 345, 79.7%), aged between 18 and 71 ( $M_{\text{age}} = 27.95$ ,  $SD_{\text{age}} = 9.20$ ) recruited in online forums, groups, and mailing lists related to series watching. Regarding their level of education, 30 (6.9%) had a primary school degree, 258 (59.6%) had a high school degree, whereas 145 (33.5%) had a higher education degree. Regarding their residence, 168 (38.8%) lived in the capital, 64 (14.8%) in county towns, 128 (29.6%) in towns, and 73 (16.9%) in villages.

## Measures.

**Translation procedure.** All non-validated measures used in this and the subsequent studies were translated and back-translated based on the protocol outlined by Beaton, Bombardier, Guillemin, and Ferraz (2000).

**Passion Scale.** This scale (Marsh *et al.*, 2013; Tóth-Király, Bőthe, Rigó, & Orosz, 2017; Vallerand *et al.*, 2003) assesses the level of passion one has for a certain activity on the basis of two dimensions: HP (six items, e.g., “My activity is in harmony with the other activities in my life”;  $\alpha_{\text{series watching}} = .71$ ) and OP (six items, e.g., “I have almost an obsessive feeling for my activity”;  $\alpha_{\text{series watching}} = .85$ ). In the present case, items referred to series watching. Participants indicated their level of agreement on a 7-point scale (1 = *not agree at all*; 7 = *very strongly agree*).

**Basic Psychological Need Satisfaction and Frustration Scale.** This 24-item measure (Chen *et al.*, 2015; Tóth-Király, Morin, *et al.*, 2018) assesses general need satisfaction and frustration of the psychological needs of autonomy, competence and relatedness (eight items per need, four for satisfaction and frustration, respectively). Sample items are “I feel that my decisions reflect what I really want” for autonomy satisfaction; “I feel forced to do many things I wouldn’t choose to do” for autonomy frustration; “I feel confident that I can do things well” for competence satisfaction; “I feel disappointed with many of my performance” for competence frustration; “I feel close and connected with other people who are important to me” for relatedness satisfaction; and “I have the impression that people I spend time with dislike me” for relatedness frustration. Participants responded to the items on a 5-point scale (1 = *not at all true*; 5 = *very true for me*). In the present research, composite scores of need satisfaction and need frustration were used by averaging the sums of the three satisfaction and frustration factors.<sup>1</sup> Reliability indices were .84 for need satisfaction and .83 for need frustration.

**Series watching outcomes.** Three outcomes (Tóth-Király, Bőthe, Tóth-Fáber, Hága, & Orosz, 2017) were used for series watching: the adaptive (i) self-development, referring to learning languages through series watching (three items, e.g., “Series watching improved my language skills”;  $\alpha = .85$ ); the adaptive (ii) social interaction, referring to series watching as a topic of discussion in everyday conversations (three items, e.g., “Series are often discussed topics at my workplace/school”;  $\alpha = .69$ ); and the maladaptive (iii) overuse, referring to the excessive amount of series being watched even if the individual does not have time to do so (three items, e.g., “I watch series even when I already should sleep”;  $\alpha = .75$ ). Based on Tóth-Király, Bőthe, Tóth-Fáber, *et al.* (2017) as well as Orosz, Vallerand, *et al.* (2016), self-development and social interaction were interpreted as adaptive on the basis of their content (i.e., learning languages or having a conversation with others), whereas overuse was interpreted as maladaptive as it is closely related to behavioral addictions. Items were rated on a 7-point scale (1 = *not true to me at all*; 7 = *completely true to me*).

<sup>1</sup>Although some would argue for the use of the three psychological needs separately for their unique contributions, in the present study, we opted to use the general composite need satisfaction and need frustration factors for two reasons. First, all models were re-analyzed (unreported) including the three individual factors (i.e., without the general ones), but these analyses yielded inconsistent relationship patterns, similar to those of Lalande *et al.* (2017). Second, general dimensions have been used in multiple studies involving basic psychological needs (e.g., Campbell *et al.*, 2017; Costa *et al.*, 2016; Krijgsman *et al.*, 2017; Mabbe, Soenens, Vansteenkiste, & Van Leeuwen, 2016).

**Time spent with series watching.** Participants were asked to estimate the amount of time (expressed in minutes) they typically spend with series watching on an average weekday and on an average weekend. Based on Tóth-Király, Bóthe, Tóth-Fáber, *et al.* (2017), an upper threshold of 840 minutes (equals 14 hour) was used to minimize potential self-report biases, while greater values were recoded as missing. With this calculation, on an average weekday, participants reportedly watched series for 85.07 minutes ( $SD = 83.68$ ), while on an average weekend, they reportedly spent 146.58 minutes ( $SD = 137.22$ ) with this activity.

**Statistical analysis.** Data was first exported to SPSS 22 (IBM Corp., Armonk, NY, USA) for preliminary analyses (e.g., demographics of the participants, means, standard deviations, correlations, and estimation of internal consistency). The proposed models were tested in Mplus 7.3 (Muthén & Muthén, 1998–2015) using structural equation modeling with latent variables to reduce the biasing effects of measurement errors (Finkel, 1995) which, in turn, provides a more accurate estimation of the parameters relative to models including only measured variables (e.g., scale scores). In order to account for the potential non-normality of the data, the robust maximum likelihood estimator (MLR) was chosen. Additionally, on the basis of Schellenberg and Bailis (2016) as well as Schellenberg, Bailis, and Mosewich (2016), 95% bias-corrected bootstrapped confidence intervals (CIs) were also computed in Mplus with the maximum likelihood estimator as bootstrapping is not available with MLR.<sup>2</sup> By following the recommendations of Preacher and Hayes (2008), 5,000 bootstrap replication samples were requested. The use of bootstrapping methods is recommended with samples of small-to-moderate size (Shrout & Bolger, 2002). Mediation analyses are available in Tables S1–S4 of the Supporting Information which are also available at the OSF page.

In evaluating the model, several goodness-of-fit indices were examined with their respective good or acceptable cut-off values (Hu & Bentler, 1999; Marsh, Hau, & Grayson, 2005): the Comparative Fit Index (CFI;  $\geq .95$  good,  $\geq .90$  acceptable), the Tucker–Lewis index (TLI;  $\geq .95$  good,  $\geq .90$  acceptable), the root-mean-square error of approximation (RMSEA;  $\leq .06$  good,  $\leq .08$  acceptable) with its 90% CI, and the standardized root mean square residual (SRMR;  $\leq .05$  for good,  $\leq .10$  for acceptable).

In the case of the passion and need satisfaction/frustration items, a parceling approach was employed, given that these latent variables were assessed with many items which could bias the ratio of the sample size to the number of estimated parameters, and in turn lead to less reliable results. Parcels are aggregated

items that were used in the model as measured variables. This procedure is acceptable in the case of theoretically unidimensional scales (e.g., Bandalos & Finney, 2001; Little, Cunningham, Shahar, & Widaman, 2002). For the passion factors, the algorithm of Rogers and Schmitt (2004) was used in the parcel construction: Exploratory factor analyses were performed and the items were ordered in decreasing factor loadings, starting from the highest to the lowest. Parcels were balanced in a way that the item with the highest and the item with lowest loading were paired in the first parcel, the item with the second highest loading and the item with the second lowest loading in the second parcel, and so on. Parcels were calculated separately for HP and OP as the two factors are distinct without any higher-order factor being present. Finally, using a facet-representative approach (Little, Rhemtulla, Gibson, & Schoemann, 2013), need satisfaction and frustration were modeled with each subscale being averaged (given the presence of a higher-order factor), thus three indicators were created for need satisfaction and frustration as well. Due to the strong observed correlation between need satisfaction and frustration (e.g., Campbell *et al.*, 2019; Chen *et al.*, 2015; Tóth-Király, Morin, *et al.* 2018), these factors were included in separate models to avoid multicollinearity which could potentially result in biased estimates<sup>3</sup> However, this choice allowed us to explicitly test whether need satisfaction and frustration are differentially related to the correlates. The same analytic procedure was applied in every subsequent study.

## Results

Descriptive data and correlations are presented in Table 1. The model of need satisfaction as a predictor showed reasonably good fit to the data ( $\chi^2 = 151.712$ ,  $df = 92$ , CFI = .974, TLI = .966, RMSEA = .039 [90% CI 0.027–0.049], SRMR = .038). As expected, need satisfaction negatively predicted OP ( $\beta = -.22$  [95% CI  $-0.33, -0.10$ ],  $p < .001$ ;  $R^2 = .048$ ), while HP was not related to it ( $\beta = .04$  [95% CI  $-0.10, 0.17$ ],  $p = .591$ ;  $R^2 = .001$ ). Also, HP positively predicted the adaptive outcomes of social interaction ( $\beta = .49$  [95% CI 0.33, 0.63],  $p < .001$ ) and self-development ( $\beta = .49$  [95% CI 0.34, 0.63],  $p < .001$ ), but it was not related to overuse ( $\beta = -.04$  [95% CI  $-0.18, 0.09$ ],  $p = .524$ ). In the case of OP, a complementary pattern was identified as it positively predicted only the maladaptive outcome of overuse ( $\beta = .75$  [95% CI 0.64, 0.86],  $p < .001$ ), but neither social interaction ( $\beta = .09$  [95% CI  $-0.05, 0.23$ ],  $p = .218$ ) nor self-development

<sup>3</sup>Unreported auxiliary analyses were conducted by combining need satisfaction and need frustration into a single model in all studies. All these combined models resulted in (i) substantially decreased model fit; (ii) theoretically unreasonable regression coefficients; (iii) substantially inflated standard errors; and (iv) large correlations among the two factors. These results also reinforce the decision to include need satisfaction and need frustration in separate models.

<sup>2</sup>This method does not alter the parameter estimates, only the confidence intervals associated with them.

**Table 1.** Descriptive statistics and correlations for the models pertaining to series watching (Study 1)

Scales	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5	6
1. Need satisfaction	3.90	0.53	1–5	–					
2. Need frustration	2.30	0.60	1–5	–.70**	–				
3. Harmonious passion	4.26	1.01	1–7	.05	.03	–			
4. Obsessive passion	2.41	1.12	1–7	–.19**	.29**	.43**	–		
5. Social interaction	3.70	1.43	1–7	–.03	.09	.42**	.24**	–	
6. Self-development	4.34	1.71	1–7	.00	.02	.39**	.18**	.36**	–
7. Overuse	3.72	1.54	1–7	–.07	.18**	.26**	.62**	.20**	.23**

Note: *M*, mean; *SD*, standard deviation.

\*\* $p < .01$ .

( $\beta = -.06$  [95% CI  $-0.20, 0.07$ ],  $p = .346$ ). The proportion of explained variance was .531 for overuse, .294 for social interaction, and .214 for self-development. The fit of the second model with need frustration was satisfactory ( $\chi^2 = 155.315$ ,  $df = 92$ , CFI = .971, TLI = .963, RMSEA = .040 [90% CI 0.029–0.051], SRMR = .037). Need frustration was positively associated with OP ( $\beta = .38$  [95% CI 0.27, 0.48],  $p < .001$ ;  $R^2 = .144$ ), but not with HP ( $\beta = .08$  [95% CI  $-0.06, 0.21$ ],  $p = .253$ ;  $R^2 = .006$ ). The associations between passion and series watching outcomes were almost the same in the two models with highly similar explained variances (.536 for overuse, .296 for social interaction, and .214 for self-development). Finally, we also tested the two models while controlling for the time spent with series watching by regressing the outcomes on the two time-variables. Their inclusion did not substantially alter the results.<sup>4</sup> The results are discussed in the General Discussion.

## Study 2: Online Gaming

Online gaming is one of the most popular leisure time activities and with around 2.6 billion gamers all over the world, it has been billed as the most engaging forms of social media (Konrad, 2017). Games can be played on multiple devices such as PCs or gaming consoles like PlayStation (Lofgren, 2017) and there are multiple types one can choose from; as a result, gamers reportedly play around 6.5 hours online with others per week. In addition to its popularity, companies spend more and more money on game development and advertisement to reach even more potential gamers. These mark the importance of this research area. Although studies mostly focused on the potential problematic aspects of gaming, it is important to investigate its adaptive aspects as well.

<sup>4</sup>For the need satisfaction model, the coefficients for social interaction (both weekday and weekend time), self-development (both weekday and weekend time), and overuse (both weekday and weekend time) were non-significant ( $|\beta|s < .14$ ,  $ps > .134$ ). The same coefficients were also non-significant in the need frustration model ( $|\beta|s < .13$ ,  $ps > .139$ ).

## Method

**Participants.** Participants were 215 online gamers (female = 48, 22.3%), aged between 18 and 53 ( $M_{age} = 24.96$ ,  $SD_{age} = 6.11$ ) recruited in different online forums, groups, and mailing lists pertaining to online gaming. Regarding their level of education, 35 (16.3%) had a primary school degree, 135 (62.8%) had a high school degree, whereas 45 (20.9%) had a higher education degree. Regarding their residence, 66 (30.7%) lived in the capital, 39 (18.1%) in county towns, 68 (31.6%) in towns, and 42 (19.5%) in villages.

### Measures.

**Passion Scale.** In the present case, the Passion Scale (Tóth-Király, Bóthe, Rigó, et al., 2017; Tóth-Király, Bóthe, Tóth-Fáber, et al., 2017; Vallerand et al., 2003) reflected passion for online gaming. Again, reliability was adequate for harmonious ( $\alpha_{online\ gaming} = .74$ ) and for obsessive ( $\alpha_{online\ gaming} = .89$ ) passion as well.

**Basic Psychological Need Satisfaction and Frustration Scale.** Again, the same measure was used (Chen et al., 2015; Tóth-Király, Morin, et al. 2018). Reliability indices were .84 for need satisfaction and .86 for need frustration.

**Online gaming outcomes.** Three outcomes were considered: (i) skill development (four items, e.g., “I play online games, because it improves my skills”;  $\alpha = .93$ ) and (ii) recreation (three items, e.g., “I play online games, because it is entertaining”;  $\alpha = .73$ ) subscales from the Motives for Online Gaming Questionnaire (Demetrovics et al., 2011) as adaptive outcomes. Respondents indicated the frequency of motives on a 5-point Likert scale (ranging from 1 = *almost never/never* to 5 = *almost always/always*). Additionally, for measuring the potential (iii) problematic aspects of online gaming, the Ten-Item Internet Gaming Disorder Test (Király et al., 2017) was also administered (10 items, e.g., Have you ever in the past 12 month jeopardized your school or work performance because of gaming?;  $\alpha = .78$ ). Prior literature (Demetrovics et al., 2011; Király et al., 2017) and the examination of the content of the items guided the interpretation of the factors. Participants answered on 3-point scale (0 = *never*, 1 = *sometimes*, 2 = *often*).

**Table 2.** Descriptive statistics and correlations for the models pertaining to online gaming (Study 2)

Scales	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5	6
1. Need satisfaction	3.81	0.59	1–5	–					
2. Need frustration	2.41	0.71	1–5	–.62**	–				
3. Harmonious passion	4.40	1.17	1–7	.23**	.00	–			
4. Obsessive passion	2.21	1.28	1–7	–.19**	.33**	.42**	–		
5. Skill development	3.40	1.20	1–7	.18**	–.04	.54**	.13	–	
6. Recreation	4.67	0.52	1–7	.14*	–.08	.39**	.03	.31**	–
7. Problematic gaming	0.46	0.34	0–2	–.24**	.36**	.27**	.70**	.07	.03

Note: *M*, mean; *SD*, standard deviation.

\* $p < .05$ ; \*\* $p < .01$ .

**Time spent with online gaming.** Typical weekly gaming time was assessed with a 6-point ordinal scale (1 = none; 2 = less than 7 hours weekly; 3 = 7–14 hours weekly; 4 = 15–28 hours weekly; 5 = 29–42 hours weekly; and 6 = more than 42 hours weekly) as in the study of Király et al. (2017). In the current study, a large proportion of gamers reportedly spent 15–28 hours with gaming on a weekly basis (35.3% of the participants).

## Results

For descriptives and correlations, see Table 2. The model of need satisfaction and online gaming outcomes had acceptable model fit indices ( $\chi^2 = 182.910$ ,  $df = 107$ ,  $CFI = .952$ ,  $TLI = .940$ ,  $RMSEA = .057$  [90% CI 0.043–0.071],  $SRMR = .059$ ). While need satisfaction negatively predicted OP ( $\beta = -.26$  [95% CI  $-0.47, 0.00$ ],  $p < .05$ ;  $R^2 = .069$ ), it was positively associated with HP ( $\beta = .28$  [95% CI 0.03, 0.49],  $p < .05$ ;  $R^2 = .077$ ). Regarding the outcomes, similar to Study 1, HP positively predicted the adaptive outcomes of skill development ( $\beta = .75$  [95% CI 0.59, 0.91],  $p < .001$ ) and recreation ( $\beta = .73$  [95% CI 0.53, 0.92],  $p < .001$ ), but did not predict problematic use ( $\beta = -.12$  [95% CI  $-0.30, 0.06$ ],  $p = .178$ ). In contrast, the previous complementary pattern was further supported, as OP positively predicted problematic use ( $\beta = .90$  [95% CI 0.74, 1.01],  $p < .001$ ), while negatively skill development ( $\beta = -.29$  [95% CI  $-0.47, -0.13$ ],  $p = .001$ ) and recreation ( $\beta = -.35$  [95% CI  $-0.57, -0.11$ ],  $p < .001$ ). The overall proportion of explained variance was .414 for skill development, .381 for recreation, and .705 for problematic use. Regarding the model of need frustration, the model fit was adequate ( $\chi^2 = 147.934$ ,  $df = 107$ ,  $CFI = .975$ ,  $TLI = .968$ ,  $RMSEA = .042$  [90% CI 0.024–0.058],  $SRMR = .055$ ). The findings corroborate the previous study as need frustration only positively predicted OP ( $\beta = .42$  [95% CI 0.26, 0.57],  $p < .001$ ;  $R^2 = .173$ ), but not HP ( $\beta = -.00$  [95% CI  $-0.19, 0.18$ ],  $p = .978$ ;  $R^2 = .004$ ). Moreover, HP and OP predicted the different outcomes to a similar extent with similar proportion of variance being explained (skill development: .392; recreation: .377; problematic gaming: .718). Auxiliary analyses were also

performed by controlling the effect of gaming time on the outcomes. As with Study 1, the inclusion of this variable did not alter the results.<sup>5</sup>

## Study 3: Smartphone Gaming

People spend an average of 5.6 hour of their time using digital media (Konrad, 2017), while the time spent on mobile devices is constantly growing. Currently, there have been around 2.1 billion smartphone users around the world in 2016, and the numbers are still growing (Statista, 2017). Among them, 36% play games on their smartphones (Lofgren, 2017). These numbers indicate that smartphone gaming is getting more and more important in everyday life. Shafer (2013) pointed out that the most remarkable feature of mobile games is accessibility. He suggested that although other console games provide higher perceived interactivity and perceived reality, mobile games are still highly enjoyable. Playing on smartphones often includes a divided presence: We are simultaneously present inside the game we are playing and outside in the 'real' world (Hjorth & Richardson, 2009). Thus, we use these games during waiting, when bored, or as time-fillers. Moreover, there might be other important use cases, such as in education (Moore-Russo et al., 2015; Rodrigues & Carvalho, 2013) or health-care (Althoff, White, & Horvitz, 2016; Grimes, Kantroo, & Grinter, 2010). Even though an increasing number of users play on their smartphones, relatively little attention has been paid to psychological aspects of smartphone gaming.

## Method

**Participants.** Participants were 204 smartphone gamers (female = 131, 64.2%), aged between 18 and 61 ( $M_{age} = 25.34$ ,  $SD_{age} = 7.31$ ), recruited in specific online forums, groups, and mailing lists. Regarding their level of education, 17 (8.3%) had a primary school degree, 109 (53.4%) had a high school degree,

<sup>5</sup>For the need satisfaction model, the coefficients for skill development, recreation, and problematic use were non-significant ( $|\beta|s < .14$ ,  $ps > .163$ ). The same coefficients were also non-significant in the need frustration model ( $|\beta|s < .15$ ,  $ps > .132$ ).



while 78 (38.2%) had a higher education degree. Regarding their residence, 95 (46.6%) lived in the capital, 43 (21.1%) in county towns, 42 (20.6%) in towns, and 24 (11.8%) in villages.

### Measures.

**Passion Scale.** Again, the Passion Scale (Tóth-Király, Bóthe, Rigó, et al., 2017; Tóth-Király, Bóthe, Tóth-Fáber, et al., 2017; Vallerand et al., 2003) was administered. However, in the present study, as we found it highly problematic and ungrammatical to replace the phrase “my activity” with “smartphone gaming”, we elected to leave the original one. However, participants were instructed to think about smartphone gaming when answering. Reliability indices were .75 for HP and .85 for OP.

**Basic Psychological Need Satisfaction and Frustration Scale.** The present study also administered the BPNFS (Chen et al., 2015; Tóth-Király, Morin, et al., 2018) to measure general need satisfaction ( $\alpha_{\text{smartphone gaming}} = .91$ ) and frustration ( $\alpha_{\text{smartphone gaming}} = .87$ ).

**Smartphone gaming outcomes.** To measure potential adaptive and maladaptive motivational outcomes of smartphone gaming, three motivational factors were created for the purpose of the present study on the basis of a qualitative study (more information is available in Appendix S2 of the Supporting Information). First, the adaptive outcomes of (i) relaxation, referring to the recreational aspects of smartphone gaming (three items, e.g., “I play smartphone games, because I enjoy them”;  $\alpha = .84$ ), and (ii) skill development, referring to motives of playing in order to improve one’s logic or skills (three items, e.g., “I play smartphone games, because they improve my logic”;  $\alpha = .88$ ). Finally, as a maladaptive outcome, (iii) procrastination, referring to motives of playing instead of doing one’s job or obligations (three items, e.g., “I play smartphone games, because at least I don’t have to do my work meanwhile”;  $\alpha = .89$ ).

**Time spent with playing smartphone games.** The same method was used in the present study as in Study 1; thus, respondents reported the average time (expressed in minutes) they spent with playing smartphone games on an average weekday ( $M = 58.47$  minutes;  $SD = 71.80$ ) and on an average weekend ( $M = 89.86$  minutes;  $SD = 114.35$ ).

## Results

Descriptive statistics and correlations are presented in Table 3. Overall, the need satisfaction model had good model fit indices ( $\chi^2 = 162.976$ ,  $df = 92$ ,  $CFI = .955$ ,  $TLI = .942$ ,  $RMSEA = .061$  [90% CI 0.046–0.077],  $SRMR = .050$ ). OP was negatively predicted by need satisfaction ( $\beta = -.21$  [95% CI  $-0.37, -0.04$ ],  $p < .05$ ;  $R^2 = .044$ ), but not HP ( $\beta = .09$  [95% CI  $-0.09, 0.27$ ],  $p = .346$ ;  $R^2 = .007$ ). As for outcomes, the

complementary pattern of HP and OP was further replicated: The adaptive outcomes of skill development ( $\beta = .54$  [95% CI 0.30, 0.75],  $p < .001$ ) and relaxation ( $\beta = .81$  [95% CI 0.66, 0.96],  $p < .001$ ) were positively predicted by HP, but procrastination was not ( $\beta = -.12$  [95% CI  $-0.30, 0.07$ ],  $p = .217$ ). At the same time, OP positively predicted procrastination ( $\beta = .51$  [95% CI 0.31, 0.69],  $p < .001$ ), but not skill development ( $\beta = -.10$  [95% CI  $-0.30, 0.10$ ],  $p = .326$ ) or relaxation ( $\beta = -.10$  [95% CI  $-0.26, 0.04$ ],  $p = .176$ ). The predictors explained .207 of the variance of procrastination, .580 of relaxation, and .242 of skill development. Finally, the need frustration model also had good fit ( $\chi^2 = 158.005$ ,  $df = 92$ ,  $CFI = .957$ ,  $TLI = .943$ ,  $RMSEA = .059$  [90% CI 0.043–0.075],  $SRMR = .060$ ). Once again, need frustration only positively predicted OP ( $\beta = .28$  [95% CI 0.10, 0.45],  $p < .01$ ;  $R^2 = .078$ ), but not HP ( $\beta = .08$  [95% CI  $-0.10, 0.27$ ],  $p = .391$ ;  $R^2 = .007$ ). Also, the magnitude of the associations between the two forms of passion and the outcomes were similar. Finally, the proportion of explained variance was also similar for procrastination (.220), relaxation (.572), and skill development (.235) as well. Once again, the incorporation of weekday and weekend playing time did not substantially alter the results. However, it has to be noted that procrastination was positively predicted by weekend gaming time ( $\beta = -.18$ ,  $p = .040$ ) in both models, but the other outcomes were not.<sup>6</sup>

## Study 4: Facebook Use

Founded and launched in 2004, the social networking site of Facebook has become an almost essential part of our lives. As of March 31, 2017, the site had almost 2 billion active users on a monthly basis, 1.28 billion of which are daily active users (Facebook, 2017). Moreover, users reported that they would be willing to completely give up their Facebook accounts for the compensation of more than US\$5,000 (Orosz, Tóth-Király, & Bóthe, 2016). The site was able to achieve this status by constantly improving and incorporating new features, such as arranging events and meetings, playing games, or facilitating communication between friends. Moreover, the site could be used as a marketing tool or in the education to create and maintain classes and learning groups. This multifunctional usability leads to its integration into our lives, suggesting that Facebook use is an important screen-based activity that deserves attention.

<sup>6</sup>For the need satisfaction model, the coefficients for relaxation (both weekday and weekend time), skill development (both weekday and weekend time), and procrastination (both weekday and weekend time) were non-significant ( $|\beta|s < .08$ ,  $ps > .301$ ). The same coefficients were also non-significant in the need frustration model ( $|\beta|s < .08$ ,  $ps > .285$ ).

**Table 3.** Descriptive statistics and correlations for the models pertaining to smartphone gaming (Study 3)

Scales	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5	6
1. Need satisfaction	3.92	0.68	1–5	–					
2. Need frustration	2.18	0.68	1–5	–.52**	–				
3. Harmonious passion	3.45	1.21	1–7	.08	.09	–			
4. Obsessive passion	1.76	0.97	1–7	–.15*	.24**	.46**	–		
5. Skill development	2.40	1.12	1–5	.09	–.00	.46*	.20**	–	
6. Relaxation	3.32	1.16	1–5	.16*	.05	.64**	.34**	.49**	–
7. Procrastination	1.81	0.99	1–5	–.09	.32**	.16**	.40**	.10	.25**

Note: *M*, mean; *SD*, standard deviation.

\* $p < .05$ ; \*\* $p < .01$ .

## Method

**Participants.** Participants were 213 Facebook users (female = 154, 72.3%), aged between 20 and 29 years ( $M_{\text{age}} = 22.47$ ,  $SD_{\text{age}} = 1.88$ ) recruited in online forums, groups and mailing lists. Regarding their level of education, 193 (90.6%) had a high school degree, whereas 20 (9.4%) had a higher education degree. Regarding their residence, 87 (40.8%) lived in the capital, 29 (13.6%) in county towns, 70 (32.9%) in towns, and 27 (12.7%) in villages.

### Measures.

**The Passion Scale.** As with previous studies, the Passion Scale (Tóth-Király, Bóthe, Rigó, et al., 2017; Tóth-Király, Bóthe, Tóth-Fáber, et al., 2017; Vallerand et al., 2003) was used and adapted so that it referred to one's passion for Facebook use. Reliability indices were .66 for HP and .89 for OP.

**Basic Psychological Need Satisfaction and Frustration Scale.** The same scale (Chen et al., 2015; Tóth-Király, Morin, et al. 2018) was used as in Study 1: Cronbach alphas .88 for need satisfaction and .89 for need frustration.

**Facebook outcomes.** Based on previous studies (Orosz, Vallerand, et al., 2016) and systematic reviews (e.g., Sigerson & Cheng, 2018), the Multidimensional Facebook Intensity Scale (Orosz, Tóth-Király, & Bóthe, 2016) was used to measure outcomes pertaining to Facebook use. In the present study, the adaptive outcome of *self-expression* (three items, e.g., "It is important for me to update my Facebook profile regularly";  $\alpha = .83$ ), and the maladaptive outcomes of *persistence* (four items, e.g., "I often search for internet connection in order to visit Facebook";  $\alpha = .73$ ) and *overuse* (three items, e.g., "I spent time on Facebook at the expense of my obligations";  $\alpha = .75$ ), were used. Participants rated items on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*).

**Time spent with Facebook use.** Following Orosz, Vallerand, et al. (2016), two indices of self-reported Facebook use time were asked: passive use (i.e., when it is opened in a browser, but they do not actively interact with it) and active use (i.e., they actively

interact with it). On average, respondents spent 221.55 minutes/day ( $SD = 251.90$  minutes) on Facebook passively, while self-reported active Facebook use was 67.33 minutes/day ( $SD = 67.03$  minutes).

## Results

The findings of this study gave support for the findings seen in the previous studies (see Table 4 for descriptives and correlations). The model of need satisfaction as a predictor showed reasonably good fit to the data ( $\chi^2 = 184.510$ ,  $df = 107$ ,  $CFI = .941$ ,  $TLI = .925$ ,  $RMSEA = .058$  [90% CI 0.044–0.072],  $SRMR = .057$ ). Again, need satisfaction negatively predicted OP ( $\beta = -.19$  [95% CI  $-0.40$ ,  $-0.01$ ],  $p < .05$ ;  $R^2 = .038$ ), while it did not predict HP ( $\beta = -.05$  [95% CI  $-0.23$ ,  $0.14$ ],  $p = .608$ ;  $R^2 = .002$ ). In turn, HP positively predicted persistence ( $\beta = .49$  [95% CI  $0.21$ ,  $0.70$ ],  $p < .001$ ) and self-expression ( $\beta = .46$  [95% CI  $0.27$ ,  $0.64$ ],  $p < .001$ ), while it was not related to overuse ( $\beta = -.02$  [95% CI  $-0.23$ ,  $0.22$ ],  $p = .874$ ). On the other hand, OP positively predicted all Facebook use dimensions: persistence ( $\beta = .38$  [95% CI  $0.17$ ,  $0.56$ ],  $p < .001$ ), self-expression ( $\beta = .23$  [95% CI  $0.05$ ,  $0.42$ ],  $p < .05$ ), and overuse ( $\beta = .58$  [95% CI  $0.41$ ,  $0.72$ ],  $p < .001$ ). In this model, the proportion of explained variance for persistence, self-expression, and overuse was 0.561, 0.366, and 0.320, respectively. The model including need frustration also had acceptable fit ( $\chi^2 = 197.528$ ,  $df = 107$ ,  $CFI = .933$ ,  $TLI = .915$ ,  $RMSEA = .063$  [90% CI  $0.049$ – $0.077$ ],  $SRMR = .055$ ). In this case, need frustration positively predicted OP ( $\beta = .19$  [95% CI  $0.02$ ,  $0.36$ ],  $p < .05$ ;  $R^2 = .037$ ), but not HP ( $\beta = .15$  [95% CI  $-0.05$ ,  $0.33$ ],  $p = .112$ ;  $R^2 = .023$ ). In terms of passion and Facebook outcomes, the associations and the proportions of explained variance were highly similar to the previous model (persistence: .560; self-expression: .362; overuse: .322). Outcomes were not affected by self-reported Facebook use time in any of the models.<sup>7</sup>

<sup>7</sup>For the need satisfaction model, the coefficients for persistence (both active and passive use), self-expression (both active and passive use), and overuse (both active and passive use) were non-significant ( $|\beta|s < .24$ ,  $ps > .051$ ). The same coefficients were also non-significant in the need frustration model ( $|\beta|s < .24$ ,  $ps > .051$ ).

**Table 4.** Descriptive statistics and correlations for the models pertaining to Facebook use (Study 4)

Scales	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5	6
1. Need satisfaction	3.90	0.61	1–5	–					
2. Need frustration	2.41	0.74	1–5	–.72**	–				
3. Harmonious passion	3.64	0.94	1–7	–.05	.13	–			
4. Obsessive passion	1.72	0.92	1–7	–.18**	.17*	.41**	–		
5. Self-expression	1.92	0.84	1–5	.03	.03	.46**	.41**	–	
6. Persistence	2.43	0.90	1–5	–.03	.07	.51**	.51**	.41**	–
7. Overuse	2.79	1.07	1–5	.02	.05	.22**	.47**	.27**	.48**

Note: *M*, mean; *SD*, standard deviation.

\* $p < .05$ ; \*\* $p < .01$ .

## General Discussion

Grounded in SDT, the purpose of the present four studies was to investigate whether need satisfaction and frustration as the “bright” and “dark” sides of one’s functioning would be the determinants of HP and OP across four popular screen-based activities (i.e., Facebook use, TV series watching, online gaming, and smartphone gaming). Results across the four studies mostly supported our hypotheses in that need satisfaction was negatively associated with OP, but not with HP. Of additional importance, need frustration was positively associated with OP, and, somewhat contrary to our expectations, it was not related to HP. Finally, as expected, HP was positively related to a diverse range of adaptive, activity-specific outcomes, whereas OP was related to maladaptive ones, even after controlling for the amount of time one spent on an activity. These findings have important implications from the perspective of both the SDT and passion.

### Need Satisfaction and Need Frustration as Predictors of Passion

The first implication pertains to the SDT. In all four studies, general need satisfaction negatively predicted OP consistently, indicating that the more one’s general basic psychological needs are satisfied, the less obsessively passionate people might become for a certain screen-based activity. The results further support the findings of Lalande *et al.* (2017) and Akehurst and Oliver (2014). This relationship can be explained by the fact that when one’s general basic psychological needs are satisfied, then this individual might not feel pressure to engage in activities, and thus does not lose control over it. Moreover, in the state of need satisfaction, the individual’s regulation is generally more autonomous, which engenders less defensiveness and compensation (Vansteenkiste & Ryan, 2013). On the other hand, need satisfaction did not predict HP in most studies, which could be attributed to the fact that having our basic psychological needs satisfied does not necessarily lead to the adaptive form of activity engagement that facilitates self-growth and development (i.e., HP). The sole exception was online gaming which was the most active form of gaming in the present investigation relative to Facebook use, series

watching, and smartphone gaming. As online gaming is a more active form, it touches on a wider range of competencies which can develop or grow as a function of gaming.

A potential explanation for this lack of association between HP and need satisfaction might be rooted in the hierarchical model of Vallerand (1997). This model identifies three hierarchical levels of generality, namely global level, contextual level, and situational level. Passion is thought to be a contextual variable and, accordingly, most previous studies (e.g., Curran *et al.*, 2013; Parastatidou *et al.*, 2012) measured need satisfaction on the same contextual level, essentially assessing respondents’ experiences during activity engagement (or inside the activity as put by Lalande *et al.*, 2017). These results showed that when people experience a sense of autonomy, competence, and relatedness inside the activity, they are more likely to become harmoniously passionate compared to becoming obsessively passionate. However, only the investigation of Lalande *et al.* (2017) examined general need satisfaction (i.e., outside the activity) and reported that need satisfaction outside the activity is related to OP, but not HP. This result closely aligns with the ones of the present research and suggests that people with satisfied needs might not be involved in an online activity for compensatory reasons. These mostly non-significant results between need satisfaction and HP also suggest that other background variables such as autonomy-supportive environment (Mageau *et al.*, 2009), autonomous personality orientation (Vallerand *et al.*, 2006), or other self-regulatory processes might have more relevance in the development and maintenance of HP. In sum, need satisfaction could be seen as a protective or resilience factor against OP.

Another important implication refers to the fact that need frustration (i.e., the personal experience of actively thwarted needs) positively predicted OP (but not HP) across all four studies. When people experience the state of need frustration, there might be multiple mechanisms that they can use to cope with this deficit. A possible way would be the pursuit of rigid behavioral patterns in which a sense of structure and security is experienced, which, in turn, could counterbalance the frustration. They might see their passionate activity as a route to need satisfaction, because in

the state of need frustration, people become more sensitive to the environmental cues that could potentially satisfy this deficit (Vansteenkiste, Niemiec, & Soenens, 2010). It might be possible that engaging in an activity in an obsessive manner could temporarily restore the needs of the individual, which, however, rarely leads to adaptive outcomes of the activity. A recent study conducted by Mills, Milyavskaya, Heath, and Derevensky (2018) also supported the relevance of need frustration in relation to online gaming. Thus, the experience of general need frustration could be seen as a potential risk factor of OP.

A secondary goal of the present investigation was to examine whether need satisfaction and frustration were apparent by their associations with passion. Having opposing relations with passion would suggest that satisfaction and frustration are two extremes of the same need fulfillment continuum; on the other hand, having different relations with passion would suggest that the two are distinct dimensions. Our results mostly align with the former proposition, given that need satisfaction negatively, and need frustration positively, predicted OP across all studies. The fact that need satisfaction and need frustration mirror one another gives support for the need fulfillment representation of Tóth-Király, Morin, *et al.* 2018, see also Tóth-Király, Bóthe, Orosz, & Rigó, 2018a), suggesting that need satisfaction and frustration are better represented as a single need fulfillment continuum rather than being two distinct and separate constructs. These results are also consistent with the daily diary study of Bidee, Vantilborgh, Pepermans, Griep, and Hofmans (2016), who reported that the temporal dynamics of need satisfaction and frustration mirror one another, giving further support for the continuum representation.

### Correlates of Passion for Screen-Based Activities

Over the last decade, much has been revealed about the intra- and interpersonal outcomes of HP and OP (Curran *et al.*, 2015; Vallerand, 2015). HP is generally considered to be the adaptive form of passion which, in turn, leads to predominantly adaptive outcomes. On the other hand, OP is viewed as a maladaptive form, leading to maladaptive outcomes in the majority of the cases. However, far too little attention has been paid to passion for screen-based activities in the age where people are surrounded by technology fundamentally everywhere. The fact that multiple different online activities are easily accessible on both bigger (*i.e.*, laptops or PCs) and smaller (*i.e.*, smartphones or tablets) screens could increase the possibilities that people engage in these particular activities, even multiple ones. Therefore, it is important to investigate how passion for these screen-based activities and their respective outcomes are associated.

The present findings provide support for the differential role of HP and OP with regard to the specific

outcomes of screen-based activities. The results are consistent with the findings of Orosz, Vallerand, *et al.* (2016) as HP was related to adaptive outcomes, whereas OP was related to maladaptive ones in the case of TV series watching, online gaming, and smartphone gaming. Interestingly, in the case of Facebook use, OP was related to adaptive and maladaptive forms of outcomes as well, indicating that obsessively passionate Facebook users also reap benefits associated with this social media site. This discrepancy could be attributed to the nature of Facebook use: For example, self-expression could manifest in a similar way for two different users; however, the underlying motivation behind self-expression could substantially differ (*i.e.*, sharing relevant life events or ideas with others *vs.* enhancing lower self-esteem through self-expression). Presumably, HP would be associated with the former motivation, whereas OP would be associated with the latter one. Also, relative to the other screen-based activities included in the present research, Facebook is a more complex service with its multitude of features, potentially involving different psychological mechanisms at the same time. It is possible that Facebook use is not simply maladaptive or adaptive (black or white), but rather a mixture of the two (grey) and not all Facebook-related outcomes are necessarily positive or negative. Therefore, it would be important to divide Facebook use into more specific elements in order to see the nuanced differences of activity engagement. Nevertheless, as apparent by the results, it matters whether we have HP or OP for screen-based activities.

### Limitations and Future Studies

This research has several strengths such as the inclusion of different activities and samples, the separate consideration of need satisfaction and need frustration, and the application of sophisticated methodologies that made it possible to minimize biases from a statistical point of view. However, there are also several limitations that need to be acknowledged. First, all studies employed a cross-sectional design that does not allow for causal inferences. An important next step in this research would be the application of experimental designs to examine the causal role of need satisfaction and frustration in HP and OP, as well as the role of HP and OP in the specific outcomes. Additionally, longitudinal studies would also be essential in more precisely identifying the directionality between need fulfillment and passion. While a recent longitudinal study has been conducted that focused on the temporal changes of passion and the effect of need fulfillment on these changes (Tóth-Király, Bóthe, Jánvári, *et al.*, 2018), it did not assess whether the associations between passion and need fulfillment are uni- or bidirectional. For this reason, future longitudinal studies could employ cross-lagged autoregressive analyses for testing this hypothesis.



Alternative person-centered approaches have also been proposed (Schellenberg et al., 2019; Tóth-Király, Bóthe, Orosz, & Rigó, 2018b) that might lead to more nuanced conclusions regarding the nature of passion or need fulfillment.

Second, the studies were questionnaire-based, which could lead to distorted results due to potential biases (e.g., social desirability) that cannot be controlled from a methodological point of view with the explicit incorporating of measurement errors. More objective and, at the same time, privacy-respecting measures would be useful and could reinforce the current findings, such as actual time spent with the activities, activity log data, or time spent with the individual functions. The results pertaining to Facebook use did not appear to be clear-cut, which might also be attributed to the fact that some Facebook-related factors might not be easily categorized as adaptive or maladaptive. Future studies should include other Facebook use measures that can more precisely grasp these adaptive/maladaptive aspects. Third, the results should be replicated in more diverse, comprehensive, or even representative samples in order to have conclusions that are more generalizable to users with more diverse socioeconomic backgrounds. Apart from micro-level characteristics (such as basic psychological needs), meso- (e.g., norms) or macro-level (e.g., average income) characteristics might also influence one's quantity and quality of engagement (Tóth-Király, Bóthe, and Orosz, 2018). It would be interesting to assess the potential effects of need-supporting and need-thwarting social environments (Rocchi, Pelletier, Cheung, Baxter, & Beaudry, 2017) and to investigate whether these environments would predict the basic psychological needs and the two forms of passion at the same time, given that the social environment has been highlighted as being important in relation to passion (Vallerand, 2015). Finally, the amount of free time one has in life might also play a relevant role in the engagement with these online activities. Despite these limitations, the findings of the current research enhance our understanding of the role that general need satisfaction and need frustration have as determinants of HP and OP.

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### Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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## **Supplementary Materials for:**

Two sides of the same coin: The differentiating role of need satisfaction and frustration in passion for screen-based activities

### **Table of Contents:**

<b>Appendix 1:</b> Conceptual similarities and differences between passion and other constructs ...	1
<b>Appendix 2:</b> Item construction for the outcomes pertaining to smartphone gaming (Study 3)	2
<b>Table S1.</b> Mediation analyses including total, direct, and indirect effects for the models pertaining to series watching (Study 1).....	3
<b>Table S2.</b> Mediation analyses including total, direct, and indirect effects for the models pertaining to online gaming (Study 2).....	4
<b>Table S3.</b> Mediation analyses including total, direct, and indirect effects for the models pertaining to smartphone gaming (Study 3).....	5
<b>Table S4.</b> Mediation analyses including total, direct, and indirect effects for the models pertaining to Facebook use (Study 4).....	6
<b>References in the Supplementary Document</b> .....	7

### **Appendix 1: Conceptual similarities and differences between passion and other constructs**

While passion has a number of conceptual similarities with related constructs, it is also distinct from them in significant ways (Curran, Hill, Appleton, Vallerand, & Standage, 2015; Vallerand, 2015). For instance, both passion and *intrinsic motivation* includes loving a certain activity and performing it for itself (Deci, 1971). However, in the case of passion, this engagement is a constant part of one's identity, while in the case of intrinsic motivation, this activity is not internalized into the identity. One might even demonstrate intrinsic motivation for a certain activity without actually loving and valuing it.

As for *extrinsic motivation*, it generally does not refer to performing an activity for love or enjoyment, but rather for an external reason that is outside of and separate from the activity. With passion, the goal is to perform the activity for itself; with extrinsic motivation, the goal is to achieve something that is separate from the activity itself. These theoretical distinctions are also empirically underpinned by the moderate associations between passion with intrinsic and extrinsic motivation (Curran et al., 2015; Houliort, Philippe, Vallerand, & Ménard, 2013; Vallerand et al., 2003).

One might also notice similarities between *hedonic-eudaimonic motivations* and passion with the distinctions being highly similar to that of intrinsic-extrinsic motivation: hedonic motivations refer to an end goal (e.g., pleasure, amusement) that might be separate from the activity. While eudaimonic motives entail striving to do good and meaningful things, one does not need to love this particular activity to achieve these goals (Huta, 2016; Oliver & Raney, 2011).

Passion also bears similarities to *problematic and potentially addictive behaviors* such as online gaming. Specifically, while both passion and problematic use involve a persistent behavior toward a specific activity, problematic use excludes the components of liking/loving and valuing that is central to passion. However, based on previous studies (Orosz, Tóth-Király, & Bőthe, 2016; Wang & Yang, 2007), having obsessive passion for an activity might put the individual at a greater risk in developing problematic use. Finally, none of the above theories address the dualistic aspect of activity engagement; that is, how loving an activity and engaging in it can lead to positive *or* negative outcomes. Overall, while passion bears similarities to related constructs, it is nevertheless different and unique in important ways, making it particularly relevant for the present investigation.

## **Appendix 2: Item construction for the outcomes pertaining to smartphone gaming (Study 3)**

As we were not aware of any instruments about smartphone gaming that are not problematic and do not overpathologize this behavior (Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015), a preliminary qualitative study was conducted prior to the main investigation to construct an instrument with items that (1) were concise and easy to understand, (2) clearly belonged to a given dimension, but not to other ones, (3) were not double-barreled, and (4) were not suggestive. The process of the qualitative study followed previous reported protocols of scale and item construction (Demetrovics et al., 2011; Orosz, Benyó, et al., 2018; Orosz, Tóth-Király, & Bőthe, 2016; Orosz, Tóth-Király, et al., 2018; Tóth-Király, Bőthe, Tóth-Fáber, Hága, & Orosz, 2017; Zsila et al., 2018). In the first step, a qualitative exploration was performed on a sample of 96 individuals (61.5% female,  $M_{\text{age}} = 26.52$ ,  $SD_{\text{age}} = 7.79$ ) who were playing with smartphone games on a regular basis. Via an online questionnaire, respondents were presented with the following open-ended sentence: “*I play with smartphone games because...*”, and they were invited to complete the sentence. A total of 235 responses were provided with 80% being retained. The remaining 20% of the responses were removed because they did not belong to the topic of smartphone gaming. In the next step, three expert raters (all three were psychologists and had experience in motivational research as well as qualitative methodologies) independently categorized the items into categories (i.e., factors) based on their content. Three factors were chosen to be included in the main study, given that items belonging to these factors were mentioned most frequently. The first factor was named *relaxation*, referring to the recreational aspects of smartphone gaming and playing for enjoyment and for resting. The second factor was named *self-development* and described those experiences when respondents played smartphone games in order to improve or develop their skills or their logic. The third factor was named *procrastination* and referred to motives of playing instead of doing one’s job or obligations.

**Table S1.** Mediation analyses including total, direct, and indirect effects for the models pertaining to series watching (Study 1)

	Total effect		Direct effect		Indirect effect		
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	
Sat → Soc	-.00	[-.08, .08]	—	—	Sat → HP → Soc	.02	[-.05, .08]
					Sat → OP → Soc	-.02	[-.06, .01]
Sat → Sdev	.03	[-.04, .10]	—	—	Sat → HP → Sdev	.02	[-.05, .08]
					Sat → OP → Sdev	.01	[-.01, .05]
Sat → Over	-.17**	[-.25, -.08]	—	—	Sat → HP → Over	-.00	[-.02, .01]
					Sat → OP → Over	-.17**	[-.25, -.08]
Fru → Soc	.07	[-.01, .17]	—	—	Fru → HP → Soc	.04	[-.03, .12]
					Fru → OP → Soc	.03	[-.02, .10]
Fru → Sdev	.02	[-.06, .09]	—	—	Fru → HP → Sdev	.04	[-.03, .11]
					Fru → OP → Sdev	-.02	[-.08, .03]
Fru → Over	.28**	[.20, .36]	—	—	Fru → HP → Over	-.00	[-.03, .01]
					Fru → OP → Over	.29**	[.20, .37]

*Note.* Bootstrapped confidence intervals were estimated with maximum likelihood estimation.;  $\beta$  = standardized regression weights; 95% CI = bias-corrected bootstrapped confidence intervals; Sat = need satisfaction; Fru = need frustration; Soc = Social interaction; Sdev = Self-development; Over = Overuse; HP = harmonious passion; OP = obsessive passion.; \* $p < .05$ ; \*\* $p < .01$ .



**Table S2.** Mediation analyses including total, direct, and indirect effects for the models pertaining to online gaming (Study 2)

	Total effect		Direct effect		Indirect effect		
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	
Sat → Skill	.28**	[.11, .45]	—	—	Sat → HP → Skill	.21*	[.02, .38]
					Sat → OP → Skill	.07	[.01, .19]
Sat → Recr	.29**	[.15, .47]	—	—	Sat → HP → Recr	.20*	[.03, .39]
					Sat → OP → Recr	.09	[.02, .21]
Sat → Prob	-.27*	[-.47, -.04]	—	—	Sat → HP → Prob	-.03	[-.12, .01]
					Sat → OP → Prob	-.24*	[-.44, -.01]
Fru → Skill	-.12	[-.25, .02]	—	—	Fru → HP → Skill	-.00	[-.14, .13]
					Fru → OP → Skill	-.12**	[-.22, -.05]
Fru → Recr	-.15	[-.30, .01]	—	—	Fru → HP → Recr	-.00	[-.13, .14]
					Fru → OP → Recr	-.15**	[-.27, -.05]
Fru → Prob	.38**	[.23, .52]	—	—	Fru → HP → Prob	.00	[-.03, .04]
					Fru → OP → Prob	.38**	[.23, .54]

*Note.* Bootstrapped confidence intervals were estimated with maximum likelihood estimation.;  $\beta$  = standardized regression weights; 95% CI = bias-corrected bootstrapped confidence intervals; Sat = need satisfaction; Fru = need frustration; Skill = skill development motivation; Recr = recreation motivation; Prob = problematic use; HP = harmonious passion; OP = obsessive passion.; \* $p < .05$ ; \*\* $p < .01$ .

**Table S3.** Mediation analyses including total, direct, and indirect effects for the models pertaining to smartphone gaming (Study 3)

	Total effect		Direct effect		Indirect effect	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Sat → Skill	.07	[-.03, .18]	—	—	Sat → HP → Skill	.05 [-.04, .16]
					Sat → OP → Skill	.02 [-.01, .09]
Sat → Relax	.09	[-.05, .24]	—	—	Sat → HP → Relax	.07 [-.07, .23]
					Sat → OP → Relax	.02 [-.01, .08]
Sat → Proc	-.12**	[-.22, -.04]	—	—	Sat → HP → Proc	-.01 [-.06, .01]
					Sat → OP → Proc	-.11* [-.21, -.03]
Fru → Skill	.02	[-.09, .13]	—	—	Fru → HP → Skill	.04 [-.05, .15]
					Fru → OP → Skill	-.02 [-.09, .03]
Fru → Relax	.04	[-.11, .19]	—	—	Fru → HP → Relax	.07 [-.08, .22]
					Fru → OP → Relax	-.03 [-.09, .01]
Fru → Proc	.14*	[.05, .26]	—	—	Fru → HP → Proc	-.01 [-.07, .01]
					Fru → OP → Proc	.15* [.05, .29]

*Note.* Bootstrapped confidence intervals were estimated with maximum likelihood estimation.;  $\beta$  = standardized regression weights; 95% CI = bias-corrected bootstrapped confidence intervals; Sat = need satisfaction; Fru = need frustration; Skill = skill development motivation; Relax = relaxation motivation; Proc = procrastination motivation; HP = harmonious passion; OP = obsessive passion.; \* $p < .05$ ; \*\* $p < .01$ .

**Table S4.** Mediation analyses including total, direct, and indirect effects for the models pertaining to Facebook use (Study 4)

	Total effect		Direct effect		Indirect effect		
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	
Sat → Pers	-.10	[-.24, .04]	—	—	Sat → HP → Pers	-.02	[-.13, .06]
					Sat → OP → Pers	-.07	[-.16, -.01]
Sat → Self	-.07	[-.18, .05]	—	—	Sat → HP → Self	-.02	[-.10, .06]
					Sat → OP → Self	-.05	[-.13, -.00]
Sat → Over	-.11	[-.23, -.01]	—	—	Sat → HP → Over	.00	[-.02, .04]
					Sat → OP → Over	-.11	[-.24, -.01]
Fru → Pers	.15*	[.02, .27]	—	—	Fru → HP → Pers	.07	[-.01, .20]
					Fru → OP → Pers	.07*	[.01, .16]
Fru → Self	.12*	[.00, .23]	—	—	Fru → HP → Self	.07	[-.01, .16]
					Fru → OP → Self	.05	[.00, .13]
Fru → Over	.11*	[.01, .20]	—	—	Fru → HP → Over	-.00	[-.06, .03]
					Fru → OP → Over	.11*	[.02, .21]

*Note.* Bootstrapped confidence intervals were estimated with maximum likelihood estimation.;  $\beta$  = standardized regression weights; 95% CI = bias-corrected bootstrapped confidence intervals; Sat = need satisfaction; Fru = need frustration; Pers = Persistence; Self = Self-expression; Over = Overuse; HP = harmonious passion; OP = obsessive passion.; \* $p < .05$ ; \*\* $p < .01$ .

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