Technological addiction in adolescents: the interplay between parenting and psychological basic needs.

Gugliandolo M. C., Costa, S., Kuss, D. J., Cuzzocrea, F., & Verrastro, V. (2019). Technological addiction in adolescents: The interplay between parenting and psychological basic needs. *International Journal of Mental Health and Addiction.* https://doi.org/10.1007/s11469-019-00156-4

Abstract

Although technological addictions, similar to other behavioural addictions, share psychosocial risk factors with substance-related addictions, the studies on the interplay between contextual and personal variables in the prediction of technological addictions are still limited. For this reason, in accordance with Self-Determination Theory (SDT), the aim of this study was to examine the integrated role of parental psychological control and parental autonomy with need satisfaction and need frustration in the understanding of technological addictions (internet addiction, gaming addiction, smartphone addiction, and social network addiction) in adolescents. Using a sample of 482 adolescents (200 males) with an age range between 14 and 17, path analyses showed that both parental psychological control and need frustration predicted all the technological addictions examined. Furthermore, indirect effects from psychological control to all technological addictions through need frustration were also found. The findings are discussed in line with the SDT.

Keywords: psychological control; autonomy support; need frustration; need satisfaction; technological addictions.

Introduction

New technologies are changing several aspects of everyday life, and the speed with which they are implemented and integrated make technology-related impacts an area of particular scientific interest. Numerous studies have shown that new technologies can have very important therapeutic, rehabilitation, educational, and recreational implications (Costa, Cuzzocrea, & Nuzzaci, 2014; Griffiths, Kuss, & Ortiz de Gortari, 2017; Krutka, Nowell, & Whitlock, 2017; Yaden, Eichstaedt, & Medaglia, 2018), but other research has indicated that excessive use of technological devices can be risky, especially for some age groups, such as adolescents (Eleuteri, Saladino, & Verrastro, 2017; Kuss, & Griffiths, 2012). In fact, younger generations are increasingly using mobile phones, social media, gaming, and the Internet (Allen, Ryan, Gray, Mclnerney, & Waters, 2014; Griffiths, 2010), and without adequate regulation skills (Roberts, & Pirog, 2013), the availability and portability of new devices can make an over-use more likely, possibly with the end result of developing a form of technological addiction (Echeburua & de Corral, 2010; Griffiths, 1995; Kuss, & Billieux, 2017).

Technological addictions are defined as "non-chemical (behavioural) addictions which involve human-machine interaction" (Griffiths, 1995, p. 15). They are a subset of behavioural addictions that are characterized by the six core dimensions of the components model of addiction (Griffiths, 1996; 2005): salience, tolerance, conflict, mood modification, withdrawal, and relapse. Furthermore, the direct and continuous connection to the Internet and the ease with which it is possible to use various devices (such as mobile phones) tends to encourage frequent checking of updates and notifications that could maintain and develop the addictive tendencies of the behaviours (Kanjo, Kuss & Ang, 2017; Roberts, & Pirog, 2013). According to the components model of behavioural addictions (Griffiths, 1996; 2005; Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014; Kuss, Shorter, van Rooij, van de

Mheen, & Griffiths, 2014), technological addictions, similar to other behavioural addictions, share psychosocial risk factors with substance-related addictions, suggesting that the interplay between contextual and personal variables can have a relevant role in the development and maintenance of behavioural addictions (Kuss, & Billieux, 2017; Shaffer, et al., 2004).

Among the contextual factors, several studies have shown how parental practices can play a very important role in the development of problematic behaviours in adolescents, and especially addictions (Dentale, et al., 2015; Li, Lei, & Tian, 2018; Pinquart, 2017). Specifically, parental psychological control is a form of parental practices that recent studies have shown to be extremely dangerous for the psychosocial functioning of adolescents (Soenens, & Vansteenkiste, 2010). Parental psychological control is an intrusive form of parental behaviours to manipulate the adolescent's feelings, thinking, and behaviours, which is strongly related to ill-being, psychopathology and maladjustment in adolescents (Filippello, Harrington, Costa, Buzzai, & Sorrenti, 2018; Gugliandolo, Costa, Cuzzocrea, & Larcan, 2015; Soenens, & Vansteenkiste, 2010). In contrast, the opposite pole of parental psychological control is parental autonomy support (Soenens, & Vansteenkiste, 2010; Liga, et al., 2018), which is characterized by an empathic, and supportive tendency of parents to encourage desires and feelings of adolescents, facilitating the promotion of well-being, and positive adjustment (Brenning, Soenens, Van Petegem, & Vansteenkiste, 2015; Costa, Barberis, Gugliandolo, Larcan, & Cuzzocrea, 2018; Soenens, & Vansteenkiste, 2010). Parental psychological control and parental autonomy support have been integrated into the Self-Determination Theory (SDT) framework and contextualized as thwarting and supportive social environment (Ryan, & Deci, 2017; Vansteenkiste, & Ryan, 2013). SDT is a macro-theory of human behaviour and motivation that describes how social context can support or thwart psychological basic needs of autonomy, competence and relatedness (Ryan, & Deci,

2017). The need of autonomy refers to the experience of volition and to be free to make their own decisions. The need of competence instead refers to the experience of being confident in one's abilities and of feeling able to face challenges. Finally, the need for relatedness refers to the experience of feeling appreciated and being able to take care of others.

Psychological basic needs are central in SDT and the satisfaction of these three needs is essential for personal growth, well-being and self-realization (Chen, et al., 2015; Ryan, & Deci, 2017; Vansteenkiste, & Ryan, 2013). On the contrary, when these three needs are not met, ill-being and maladjustment are the outcomes (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Costa, Ntoumanis, & Bartholomew, 2015; Vansteenkiste, & Ryan, 2013). The feeling of need satisfaction is experienced when social-contextual factors (e.g., parenting) support autonomy, competence and relatedness, while the need frustration feeling is experienced when social-contextual factors (e.g., parenting) thwart autonomy, competence and relatedness (Ryan, & Deci, 2017; van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2017; Vansteenkiste, & Ryan, 2013). Several studies in the SDT framework have in fact showed that parental psychological control is a form of a need-thwarting social context, while parental autonomy support is a form of need-supportive social context (Costa, Soenens, Gugliandolo, Cuzzocrea, & Larcan, 2015; Costa, Gugliandolo, Barberis, Cuzzocrea, & Liga, 2018; Mabbe, Soenens, Vansteenkiste, van der Kaap-Deeder, & Mouratidis, 2018). Furthermore, several studies have also shown that psychological basic needs mediate the relations of parental psychological control and parental autonomy support with adolescent functioning (Ahmad, Vansteenkiste, & Soenens, 2013; Costa, Sireno, Larcan, & Cuzzocrea, 2018). Specifically, need satisfaction is a crucial mechanism in the relationship between parental autonomy support and optimal functioning, while need frustration mediates the relationship between parental psychological control and maladjustment (Costa, Cuzzocrea, Gugliandolo, & Larcan, 2016).

Although several studies have shown that the interplay between parental psychological control, autonomy support and psychological basic needs have a relevant role in the development of adolescents, this process has not yet been explored in the field of behavioural addictions, and specifically related to technological addictions. Some studies have shown that parental psychological control can promote behavioural addictions, such as exercise addiction (Costa, Hausenblas, Oliva, Cuzzocrea, & Larcan, 2015; Costa, Hausenblas, Oliva, Cuzzocrea, & Larcan, 2016), and problematic internet use (Li, Li, & Newman, 2013). Other studies have also found that the frustration of psychological basic needs can promote some behavioural addictions, such as exercise addiction (Costa, Coppolino, & Oliva, 2016), and problematic gaming (Wu, Lei, & Ku, 2013). Although the mediational model of need satisfaction and need frustration in the relationship between parenting and optimal and non-optimal functioning has been studied widely, it was not tested in the domain of technological addictions. This is surprising because the addictive use of technology can be a symptomatic response to the distress perceived by the frustration of psychological needs caused by the intrusive behaviours of parents (i.e., psychological control). On the contrary, autonomy-supportive parents can promote the experience of need satisfaction, which in turn can support healthy technology use and reduce the risk of developing a technological addiction. Previous studies (Kuss, & Griffiths, 2011; Kuss, & Griffiths, 2012; Kuss, Griffiths, Karila, & Billieux, 2014) showed that social networking and gaming are specific behaviours that can become problematic for adolescents, leading to symptoms associated with addiction. Furthermore, the availability and mobility of smartphones and the internet increase the risk for adolescents to engage in excessive behaviours that can develop into addictions (Kuss et al., 2013; Kuss, et al., 2018). For these reasons, internet, gaming, smartphone, and social networking addictions were examined in this study as technological addictions.

Therefore, the aim of this study was to examine the interplay between parental psychological control, parental autonomy support, need satisfaction, and need frustration on technological addiction in adolescents. Specifically, the first aim of the study was to confirm the relationship between parental psychological control, parental autonomy support, need satisfaction, and need frustration. The second aim was to examine the relationship between need satisfaction, need frustration and technological addictions (internet, gaming, smartphone, and social networking addictions). The third aim was to examine the mediating role of psychological basic needs in the relationship between parental psychological control, parental autonomy support and technological addictions (internet, gaming, smartphone, and social networking addiction).

Method

Participants and procedures

A total of 482 adolescents (200 males, 42%) between 14 and 17 years old took part in the study. All of them have Italian as the first language and attend high school in Italy. After obtaining the school's authorization, the researchers provided participant information and informed consent to be signed by parents. Only students who have received informed consent from their parents have been included in the research. Privacy and anonymity of participants were guaranteed and the research was conducted in line with the Helsinki Declaration.

Measures

Parental Psychological control was measured with the Psychological Control Scale (PCS; Barber, 1996). The PCS is a widely used instrument composed of 16 items, eight each for fathers and mothers (e.g., “My mother/father is always trying to change how I feel or think about things”) using a 3-point Likert scale ranging from 1 (not like her/him) to 3 (a lot like her/him). The reliability and validity of the PCS – YSR have been demonstrated in some

cross-cultural research (Barber et al., 2005), showing good psychometric properties. Previous studies (Costa et al., 2014; Gugliandolo et al., 2015) have widely used the Italian translation of this questionnaire, and in this study, the alpha value was .76 (Table 1).

Parental Autonomy Support was measured by the autonomy support subscale of the Perceptions of Parenting Scale (POPS; Robbins, 1994). It is a six-item scale (e.g., "My mother/father listens to my opinion or perspective when I've got a problem") using a five-point Likert scale ranging from 1 (not at all true) to 5 (very true). Previous studies (Costa et al., 2016; Gugliandolo, Mavroveli, Costa, et al., 2019; Vansteenkiste et al., 2005) in different countries, including Italy, have used this scale successfully, showing good psychometric properties. In this study, the internal consistency was satisfactory (α =.84; see Table 1).

Need Satisfaction and Need Frustration were measured by the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen, et al., 2015). The BPNSFS uses 24 items (e.g., "I feel a sense of choice and freedom in the things I undertake") that assesses both the satisfaction and frustration of basic psychological needs in general life using a five-point Likert scale from 1 (completely disagree) to 5 (completely agree). This measure has been widely used and validated in an Italian sample (Costa, et al., 2018; Liga, et al., 2018) and in this research, the levels of reliability were satisfactory for both the need satisfaction (α =.86) and the need frustration scale (α =.85; Table 1).

Gaming Addiction was measured by the Game Addiction Scale (GAS, Lemmens, Valkenburg, & Peter, 2009). GAS consists of 21 items (e.g., "Did you play games to forget about real life?") on a 5-point Likert scale from 1 (never) to 5 (very often) to measure gaming addiction using the component model of addiction as the framework (Griffiths, 2005). Recently, this scale has been validated in Italy on a sample of adolescents (Costa, Barberis, et

al. 2019), and showed good psychometric properties in several studies (King, et al., 2013). In this study, the alpha value was .95 (Table 1).

Smartphone addiction was measured by the Mobile Phone Addiction Index (MPAI; Leung, 2008). MPAI is composed of 17 items (e.g., "You think it is hard to shut down your Smartphone.") on a 5-point Likert-type scale ranging from 1 (never) to 5 (always). Previous studies have shown good psychometric characteristics for this scale in different countries (Leung, 2007; Leung, 2008; Mazaheri & Karbasi, 2014). In this research, the alpha value for this scale was .93 (Table 1).

Social Networking Addiction was measured by the adapted version for the social network of the Bergen Facebook Addiction Scale (BSNAS; Andreassen et al., 2012). It is an 18-item questionnaire (e.g., "How often during the last year have you felt an urge to use Social Network more and more?") scored on a 5-point Likert scale ranging from 1 (Very rarely) to 5 (Very often). Previous studies have shown good levels of reliability and validity in several countries, including Itay (Andreassen, Griffiths, Gjertsen, et al., 2013; Andreassen, et al., 2012; Monacis, De Palo, Griffiths, & Sinatra, 2017). In this study, the internal consistency was satisfactory (α =.94; see Table 1).

Internet addiction was measured with the Internet Addiction Test (IAT; Young, 1998). IAT is a 20-item (e.g., "How often do you try to cut down the amount of time you spend online and fail?") questionnaire scored on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very frequently). Previous research has widely used the IAT in various countries, including Italy, showing good psychometric characteristics (Barke, Nyenhuis & Kröner-Herwig, 2012; Ferraro, Caci, D'amico & Blasi, 2006; Jelenchick, Becker & Moreno, 2012; Poli, & Agrimi, 2012; Young, 1998). In this study, the internal consistency was satisfactory (α =.92; see Table 1).

Results

Preliminary Analyses

Descriptive statistics and correlation analyses are reported in Table 1. Correlational analyses showed that parental psychological control, need frustration, gaming addiction, smartphone addiction, social network addiction, and internet addiction were all positively correlated with each other, while parental autonomy support was positively related only to need satisfaction, and negatively related to need frustration. Finally, need satisfaction was also negatively related to need frustration and to gaming addiction. Correlational analyses showed also large correlations between the criteria variables of social network addiction and internet addiction, and between internet addiction and smartphone addiction. Multicollinearity usually poses a problem for SEM when the correlations among predictors are large (Grewal, Cote, & Baumgartner, 2004). There is also a specific case of lateral collinearity that refers to high correlations among predictors and criteria (Kock, & Lynn, 2012), but usually, there is no mention of collinearity problems for the correlations among criteria variables (as is the case in the present study). However, the results regarding the large correlation between the criteria variables of social network addiction and internet addiction, and between internet addiction and smartphone addiction in the present study need to be taken with caution and need further study.

Path Analyses

A model with parental psychological control and parental autonomy support as predictors, need satisfaction and need frustration as mediators, and gaming addiction, smartphone addiction, social network addiction, and internet addiction as final criteria was tested using SEM with observed variables (path analysis). Furthermore, the paths from

gender (coded: 1 = male, 2 = female) and age to all the study's variables were added to control for these background variables, gender and age were not allowed to correlate. Finally, the bootstrapping approach with 5000 resamplings was used to test the percentile bootstrap confidence intervals of total, direct and indirect effects.

The final model fits the data well, $\chi 2(1) = 1.94$, $p = .16$, CFI=.99, RMSEA (90% CI) =.04 (.00; .14), SRMR = .01, and showed several significant direct effects (Table 2): specifically that need frustration was predicted by parental psychological control, while need satisfaction was predicted by parental autonomy support. Furthermore, gaming addiction was predicted by parental psychological control, and need frustration, gender, and age. Smartphone addiction was predicted by parental psychological control, need frustration, gender, and age. Social network addiction was predicted by parental psychological control, need frustration, and gender. Internet addiction was predicted by parental psychological control and need frustration.

All the other direct paths were not significant; regarding the indirect paths (Table 3) instead, the effects from psychological control through need frustration were significant for gaming addiction, smartphone addiction, social network addiction, and internet addiction. Finally, the total effects from parental psychological control were all significant (Table 3) to gaming addiction, smartphone addiction, social network addiction, and internet addiction.

Discussion

An integrative model of parenting dimensions and basic psychological needs in relation to technological addictions was used in this study, using the SDT (Ryan, & Deci, 2017) as a theoretical framework. Results showed that parental psychological control and need frustration positively predict technological addictions in adolescents. Furthermore, the

results showed that for all the technological addictions, there were the same significant paths. Specifically, a direct path from parental psychological control is visible for all the technological addictions (i.e., internet, gaming, smartphone, and social networking), but also an indirect effect through the effect of need frustration. A detailed discussion of these findings is reported below.

The first aim of this study was to confirm previous studies on the relations between parental psychological control and need frustration and between parental autonomy support and need satisfaction. Results clearly confirm the dual-process pathway described by SDT (Jang, Kim, & Reeve, 2016; Ryan, & Deci, 2017), with parental autonomy support indicating good adolescent functioning through the promotion of need satisfaction, while parental psychological control enhances negative adolescent functioning, creating a state of need frustration (Costa, Cuzzocrea, et al., 2016; Vansteenkiste, & Ryan, 2013). Furthermore, these results confirm the contextualization of the SDT of parental psychological control as a form of need-thwarting social environment, and parental autonomy support as a form of a need-support social environment (Vansteenkiste, & Ryan, 2013).

The second aim of this study was to verify the relationship between technological addictions, need satisfaction and need frustration. The results of this study showed that the relationship between the basic psychological needs and technological addictions are consistent among all the technological addictions examined. While need frustration positively predicted all the four assessed technological addictions taken into consideration in this study (internet addiction, gaming addiction, smartphone addiction, and social network addiction), need satisfaction did not predict any of them. In addition, this result is in line with the dual process of SDT (Ryan, & Deci, 2017), which affirm that need frustration is strongly related to negative outcomes. Furthermore, a chronical condition of need frustration could also generate rigid behaviour patterns, perception of loss of control and the promotion of compensatory

behaviours (Vansteenkiste, & Ryan, 2013). In line with this reasoning, technological addictions could represent compensatory behaviours implemented by adolescents to escape from the distress caused by need frustration, which is in line with research suggesting Internet addiction is a consequence of dysfunctional coping (Kuss et al., 2017). The lack of a negative correlation between need satisfaction and technological addictions could also be explained by the fact that need satisfaction and need frustration tend to have an asymmetrical relation (Vansteenkiste, & Ryan, 2013). In fact, low levels of need satisfaction do not necessarily imply an active frustration of basic needs, whereas need frustration generally implies low levels of need satisfaction (Vansteenkiste, & Ryan, 2013). For this reason, both adolescents with low need satisfaction and those with high need satisfaction who do not have need frustration could have moderate-high use of technology, but without developing an addiction. Instead, the experience of need frustration can create the condition that a moderate-high use of technology can become dysregulated, pathological and lead to technological addictions.

Finally, the third aim of this study was to verify the mediating role of psychological basic needs between parental practices and technological addictions (internet, gaming, smartphone, and social networking addiction). Results showed that need frustration mediates the relationship between psychological control and internet addiction, gaming addiction, smartphone addiction, and social network addiction. This is in line with previous studies (Li, et al., 2018), which have shown that both personal and parental variables have a relevant role in the development of technological addictions. Furthermore, it extended need frustration is a crucial mechanism to explain the relations between parental psychological control and maladjustment (Costa, Soenens, at al., 2015; Soenens, & Vansteenkiste, 2010) also in the behavioural addiction context, providing interesting suggestions regarding the motivations for adolescents to use the internet, gaming, smartphones, and social networks as compensatory

tools to escape from the state of need frustration caused by psychologically controlling behaviours of parents, and this may lead to the development of technological addictions.

Although this study provides relevant information for clinical and theoretical practices, several limitations should be taken into account. First, only self-report data of adolescents were used in this study. Future studies should combine and compare both adolescents and parental perceptions to improve the accuracy of the predictions (Gugliandolo, Costa, Cuzzocrea, Larcan, & Petrides, 2015). Another limitation consists of the adaptation of some measures used in this study that were not cross-validated in the Italian context. Future studies should try to provide stronger evidence of the measurements in several cultural contexts for all the questionnaires. Furthermore, this study was cross-sectional, and for this reason, it is not possible to infer causal relationships between the study's variables. Future studies should confirm these findings implementing experimental and longitudinal designs. Finally, in this study, only two parental practises (i.e., psychological control and autonomy support) were examined, however, future studies could integrate other forms of parental practices.

These results provide a deeper understanding of some risk factors for the development of technological addictions, highlighting that technological addictions share common aspects (Kuss, & Billieux, 2017) and that they can be categorized as "non-chemical (behavioural) addictions which involve human-machine interaction" (Griffiths, 1995, p. 15). From a practical point of view, it also seems crucial for parents to reduce the use of psychological control to avoid that need frustration may result in an addictive use of the internet, gaming, smartphones, and social networks. Furthermore, it seems necessary from a primary prevention perspective to promote parent training interventions in order to invite parents to adopt a less psychological controlling style towards their children, reducing the risk to frustrate the children's basic psychological needs; at the same time, adolescents should be supported with adequate psycho-educational pathways. In fact, recently, the international

scientific community has called for prevention approaches against unhealthy technology use (King, et al., 2017; Kuss, 2018; Throuvala, Griffiths, Rennoldson, & Kuss, 2018), and the present study confirms that upcoming prevention projects can benefit from the integration of family and individual variables using SDT as theoretical framework. Summing, in light of the results of the present study, interventions should examine the interplay between contextual and individual factors to deal efficiently with technological addiction in adolescence.

Conflict of interests

All authors declare that they have no conflict of interest.

Informed consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all parents of participants of the study.

References

Ahmad, I., Vansteenkiste, M., & Soenens, B. (2013). The relations of Arab Jordanian adolescents' perceived maternal parenting to teacher-rated adjustment and problems: The intervening role of perceived need satisfaction. *Developmental Psychology*, *49*(1), 177–183.

Allen, K. A., Ryan, T., Gray, D. L., McInerney, D. M., & Waters, L. (2014). Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *The Educational and Developmental Psychologist*, *31*(1), 18-31.

Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook Addiction Scale. *Psychological Reports*, *110*(2), 501-517.

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thøgersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport and Exercise Psychology*, *33*(1), 75-102.

Brenning, K., Soenens, B., Van Petegem, S., & Vansteenkiste, M. (2015). Perceived maternal autonomy support and early adolescent emotion regulation: A longitudinal study. *Social Development*, *24*(3), 561-578.

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., ... & Ryan, R. M. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, *39*(2), 216-236.

Costa, S., Barberis, N., Gugliandolo, M. C., Larcan, R., & Cuzzocrea, F. (2018). The intergenerational transmission of trait emotional intelligence: The mediating role of parental autonomy support and psychological control. *Journal of Adolescence*, *68*, 105-116.

Costa, S., Barberis, N., Gugliandolo, M. C., Liga, F., Cuzzocrea, F., & Verrastro, V. (2019). Examination of the psychometric characteristics of the Italian version of the Game Addiction Scale for Adolescents. *Psychological reports*. DOI: 10.1177/0033294119838758

Costa, S., Coppolino, P., & Oliva, P. (2016). Exercise dependence and maladaptive perfectionism: The mediating role of basic psychological needs. *International Journal of Mental Health and Addiction*, *14*(3), 241-256.

Costa, S., Cuzzocrea, F., Gugliandolo, M. C., & Larcan, R. (2016). Associations between parental psychological control and autonomy support, and psychological outcomes in adolescents: The mediating role of need satisfaction and need frustration. *Child Indicators Research*, *9*(4), 1059-1076.

Costa, S., Cuzzocrea, F., & Nuzzaci, A. (2014). Use of the Internet in Educative Informal Contexts. Implication for Formal Education. *Comunicar*, *22*(43), 163-171.

Costa, S., Gugliandolo, M. C., Barberis, N., Cuzzocrea, F., & Liga, F. (2019). Antecedents and consequences of parental psychological control and autonomy support: The role of psychological basic needs. *Journal of Social and Personal Relationships*, *36(4)*, 1168-1189. doi: 10.1177/0265407518756778.

Costa, S., Hausenblas, H. A., Oliva, P., Cuzzocrea, F., & Larcan, R. (2015). Perceived parental psychological control and exercise dependence symptoms in competitive athletes. *International Journal of Mental Health and Addiction*, *13*(1), 59-72.

Costa, S., Hausenblas, H. A., Oliva, P., Cuzzocrea, F., & Larcan, R. (2016). Maladaptive perfectionism as mediator among psychological control, eating disorders, and exercise dependence symptoms in habitual exerciser. *Journal of Behavioral Addictions*, *5*(1), 77-89.

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Costa, S., Ingoglia, S., Inguglia, C., Liga, F., Lo Coco, A., & Larcan, R. (2018). Psychometric evaluation of the basic psychological need satisfaction and frustration scale (BPNSFS) in Italy. *Measurement and Evaluation in Counseling and Development*, *51*(3), 193-206.

Costa, S., Ntoumanis, N., & Bartholomew, K. J. (2015). Predicting the brighter and darker sides of interpersonal relationships: Does psychological need thwarting matter?. *Motivation and Emotion*, *39*(1), 11-24.

Costa, S., Sireno, S., Larcan, R., & Cuzzocrea, F. (2018). The six dimensions of parenting and adolescent psychological adjustment: The mediating role of psychological needs. *Scandinavian Journal of Psychology*. doi: 10.1111/sjop.12507

Costa, S., Soenens, B., Gugliandolo, M. C., Cuzzocrea, F., & Larcan, R. (2015). The mediating role of experiences of need satisfaction in associations between parental psychological control and internalizing problems: A study among Italian college students. *Journal of Child and Family Studies*, *24*(4), 1106-1116.

Dentale, F., Verrastro, V., Petruccelli, I., Diotaiuti, P., Petruccelli, F., Cappelli, L., & San Martini, P. (2015). Relationship between Parental Narcissism and Children's Mental Vulnerability: Mediation Role of Rearing Style. *International Journal of Psychology and Psychological Therapy*, *15*(3), 337-347.

Echeburua, E., & de Corral, P. (2010). Addiction to new technologies and to online social networking in young people: A new challenge. *Adicciones*, *22*(2), 91–95.

Eleuteri, S., Saladino, V., & Verrastro, V. (2017). Identity, relationships, sexuality, and risky behaviors of adolescents in the context of social media. *Sexual and Relationship Therapy*, *32*(3-4), 354-365.

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Filippello, P., Harrington, N., Costa, S., Buzzai, C., & Sorrenti, L. (2018). Perceived parental psychological control and school learned helplessness: The role of frustration intolerance as a mediator factor. *School Psychology International*. doi: 10.1177/0143034318775140.

Grewal, R., Cote, J. A., & Baumgartner, H. (2004). Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing science*, *23*(4), 519-529.

Griffiths, M. (1995). Technological addictions. *Clinical psychology forum*, *1*, 14-19.

Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*(4), 191-197.

Griffiths, M. (2010). Internet abuse and internet addiction in the workplace. *Journal of Workplace Learning*, *22*(7), 463-472.

Griffiths, M. D. (1996). Nicotine, tobacco and addiction. *Nature*, *384*, 18-18.

Griffiths, M. D., Kuss, D. J., & Ortiz de Gortari, A. (2017). Videogames as therapy: An updated selective review of the medical and psychological literature. *International Journal of Privacy and Helath Information Management*, *5*(2), 71-96.

Gugliandolo, M. C., Costa, S., Cuzzocrea, F., & Larcan, R. (2015). Trait emotional intelligence as mediator between psychological control and behaviour problems. *Journal of Child and Family Studies*, *24*(8), 2290-2300.

Gugliandolo, M. C., Costa, S., Cuzzocrea, F., Larcan, R., & Petrides, K. V. (2015). Trait emotional intelligence and behavioral problems among adolescents: A cross-informant design. *Personality and Individual Differences*, *74*, 16-21.

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Gugliandolo, M. C., Mavroveli, S., Costa, S., Cuzzocrea, F., & Larcan, R. (2019). The relative contribution of parenting practices in predicting trait emotional intelligence in an Italian adolescent sample. *British Journal of Developmental Psychology*, 37, 585–599.

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction*, *43*, 27-38.

Kanjo, E., Kuss, D. J., & Ang, C. S. (2017). NotiMind: Responses to smartphone notifications as affective sensors. *IEEE Access, 5*, 22023-22035.

King, D. L., Haagsma, M. C., Delfabbro, P. H., Gradisar, M., & Griffiths, M. D. (2013). Toward a consensus definition of pathological video-gaming: A systematic review of psychometric assessment tools. *Clinical psychology review*, *33*(3), 331-342.

King, D. L., Delfabbro, P. H., Doh, Y. Y., Wu, A. M., Kuss, D. J., Pallesen, S., ... & Sakuma, H. (2018). Policy and prevention approaches for disordered and hazardous gaming and Internet use: An international perspective. *Prevention Science*, *19*(2), 233-249.

Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, *13*(7), 1-40.

Kuss, D. J. (2018). Policy, prevention and regulation for Internet Gaming Disorder: A commentary on Király et al. (2017). *Journal of Behavioral Addictions*, *7*(3), 553-555. DOI: 10.1556/2006.7.2018.79.

Kuss, D. J., & Billieux, J. (2017). Technological addictions: Conceptualisation, measurement, etiology and treatment. *Addictive Behaviors*, *64*, 231-233.

Kuss, D. J., Dunn, T. J., Wölfling, K., Müller, K. W., Hędzelek, M., & Marcinkowski, J. (2017). Excessive Internet use and psychopathology: The role of coping. *Clinical Neuropsychiatry*, *14*(1), 73-81.

Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction—a review of the psychological literature. *International journal of environmental research and public health*, *8*(9), 3528-3552.

Kuss, D. J., D Griffiths, M., Karila, L., & Billieux, J. (2014). Internet addiction: a systematic review of epidemiological research for the last decade. *Current pharmaceutical design*, *20*(25), 4026-4052.

Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, *1*(1), 3–22.

Kuss, D. J., Kanjo, E., Crook-Rumsey, M., Kibowski, F., Wang, G. Y., & Sumich, A. (2018). Problematic mobile phone use and addiction across generations: The roles of psychopathological symptoms and smartphone use. *Journal of Technology in Behavioral Science*,*1*, -9.

Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. M. (2014). Assessing internet addiction using the parsimonious internet addiction components model—a preliminary study. *International Journal of Mental Health and Addiction*, *12*(3), 351-366.

Kuss, D. J., Shorter, G. W., van Rooij, A. J., van de Mheen, D., & Griffiths, M. D. (2014). The Internet addiction components model and personality: Establishing construct validity via a nomological network. *Computers in Human Behavior*, *39*, 312-321.

Kuss, D. J., Van Rooij, A. J., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior*, *29*(5), 1987-1996.

Krutka, D. G., Nowell, S., & Whitlock, A. M. (2017). Towards a social media pedagogy: Successes and shortcomings in educative uses of Twitter with teacher candidates. *Journal of Technology and Teacher Education*, *25*(2), 215-240.

Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology*, *12*(1), 77-95.

Leung, L. (2008). Linking psychological attributes to addiction and improper use of the mobile phone among adolescents in Hong Kong. *Journal of Children and Media*, *2*(2), 93-113.

Li, S., Lei, H., & Tian, L. (2018). A meta-analysis of the relationship between parenting style and Internet addiction among mainland Chinese teenagers. *Social Behavior and Personality: An International Journal*, *46*(9), 1475-1487.

Li, X., Li, D., & Newman, J. (2013). Parental behavioral and psychological control and problematic Internet use among Chinese adolescents: The mediating role of self-control. *Cyberpsychology, Behavior, and Social Networking*, *16*(6), 442-447.

Liga, F., Ingoglia, S., Cuzzocrea, F., Inguglia, C., Costa, S., Lo Coco, A., & Larcan, R. (2018). The Basic Psychological Need Satisfaction and Frustration Scale: Construct and Predictive Validity in the Italian Context. *Journal of Personality Assessment*. doi: 10.1080/00223891.2018.1504053

Liga, F., Lo Coco, A., Musso, P., Inguglia, C., Costa, S., Lo Cricchio, M. G., & Ingoglia, S. (2018). Parental psychological control, autonomy support and Italian emerging adult's

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psychosocial well-being: a cluster analytic approach. *European Journal of Developmental Psychology*. doi: 10.1080/17405629.2018.1532887.

Mabbe, E., Soenens, B., Vansteenkiste, M., van der Kaap-Deeder, J., & Mouratidis, A. (2018). Day-to-day variation in autonomy-supportive and psychologically controlling parenting: The role of parents' daily experiences of need satisfaction and need frustration. *Parenting*, *18*(2), 86-109.

Monacis, L., De Palo, V., Griffiths, M. D., & Sinatra, M. (2017). Social networking addiction, attachment style, and validation of the Italian version of the Bergen Social Media Addiction Scale. *Journal of Behavioral Addictions*, *6*(2), 178-186.

Pinquart, M. (2017). Associations of parenting dimensions and styles with externalizing problems of children and adolescents: An updated meta-analysis. *Developmental Psychology*, *53*(5), 873.

Roberts, J. A., & Pirog III, S. F. (2012). A preliminary investigation of materialism and impulsiveness as predictors of technological addictions among young adults. *Journal of Behavioral Addictions*, *2*(1), 56-62.

Ryan, R. M., & Deci, E. L. (2017*). Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Press

Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*, *12*(6), 367-374.

Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, *30*(1), 74-99.

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Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2019). School-based prevention for adolescent Internet addiction: Prevention is the key. A systematic literature review. *Current neuropharmacology*, *17*(6), 507-525.

van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., & Mabbe, E. (2017). Children's daily well-being: The role of mothers', teachers', and siblings' autonomy support and psychological control. *Developmental Psychology*, *53*(2), 237.

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, *23*(3), 263-280.

Wu, A. M., Lei, L. L., & Ku, L. (2013). Psychological needs, purpose in life, and problem video game playing among Chinese young adults. *International Journal of Psychology*, *48*(4), 583-590.

Yaden, D. B., Eichstaedt, J. C., & Medaglia, J. D. (2018). The future of technology in positive psychology: methodological advances in the science of well-being. *Frontiers in Psychology*, *9*, 1-11.

Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology & Behavior*, *1*(3), 237-244.