

Unique Associations of Different Addictions with the Big-5 Personality Dimensions

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Abstract

Background: Addiction is an increasingly prevalent issue and one with dark consequences for both physical and mental health. As the number of addictions increases with new technological innovations and changing social environments make certain addictions more dangerous, it is important to investigate ways to influence the development and growth of such addictions. Personality has been shown to interact with addiction in a bidirectional fashion, however while there is a wealth of data connecting personality and addiction, these studies are vitally limited in a number of ways this study aims to rectify.

Methods: This study examined the unique associations of ten different types of addictions (alcohol, smoking, drug, sex, social media, shopping, exercise, gambling, internet gaming, and internet use addictions) with the Big-5 personality dimensions of extraversion (E), emotional stability (ES), agreeableness (A), conscientiousness (C), and openness to experience (O), controlling for gender and age effects. Participants ($N = 968$; males = 64.3%) were adults from the general Australian community, with age ranging from 18 to 64 years (mean = 29.54 years; $SD = 9.36$ years).

Results: The findings, based on multiple regression analyses, showed that the different types of addictions were associated with different groups of the personality dimensions. Most of the addictions were however associated with low E, A and C, and many were additionally associated with low A. The theoretical, clinical and research implications of the findings are discussed.

Conclusions: In summary, the findings of the study showed that different addictions can be grouped together into general patterns of association different groups of the personality dimensions. There are several of these such patterns showing that different personality profiles are associated with different kinds of addictions.

Background

An addiction is an ongoing failure to resist an impulse or urge to engage in a certain response, despite experiencing repeated harm by such engagement (American Society of Addiction Medicine, 2019 [1]; Grant et al., 2010[2]). Addictions can involve engagement with substances, such as alcohol, or with behaviors, such as gambling (Kim & Hodgins, 2018 [3]). Personality refers to characteristic ways of thinking, feeling and acting across time and place. Researchers have argued that establishing links between psychological disorders and personality dimensions are important as they can enhance our understanding of diatheses, cause, progression, prognosis, and the treatment of psychological disorders (Costa & Widiger, 1994 [4]; Markon et al., 2005 [5]; Watson et al., 1994 [6]). In recent years, the findings from numerous studies have shown that the different types of addictions are associated with different types or groups of personality dimensions (Grant et al., 2010 [2]). However, we will argue in this introduction that existing findings in this area have serious omissions and limitations. Given this, the aim of the current study was to examine the associations of ten different types of common addictions (alcohol, smoking, drug, sex, social media, shopping, exercise, gambling, internet gaming, and internet use addictions) with the personality dimensions in the Five-Factor Model (FFM; McCrae & Costa, 1985 [7]; McCrae & Costa, 1999 [8]), controlling for the omissions and limitations in existing studies.

The Big-5 Model of Personality

The Five-Factor Model is at times referred to as the Big-5 personality model (Big-5; Goldberg, 1992 [9]). In this model, the major dimensions are extraversion (E; individual differences in reactivity to positive environmental stimuli); neuroticism (N; individual differences in reactivity to negative environmental stimuli) or its opposite pole called emotional stability (ES); agreeableness (A; reflecting how a person is generally with others and interacts with others); conscientiousness (C; reflecting how organized, responsible and task-focused an individual is in pursuing goals); and openness to experience (O; relates to being 'open-minded') (McCrae & Costa, 1999 [8]). The Big-5 personality dimensions have been widely used in addiction research.

Major Findings of the Associations of Different Types of Addictions with Big-5 Personality Dimensions

Because 10 different addiction types are examined in the study, and as there have been many studies in this area, a complete and comprehensive review of the associations for these different addition types with the Big-5 personality dimensions is beyond the scope of this paper. Consequently, to place our study in context, we will summarize the major findings in this area using the findings from meta-analysis, where available. When such findings are not available, the findings from systematic reviews, when available, will be summarized. Where deemed necessary, the findings from both meta-analysis and systematic reviews will be supplemented with more recent findings not included in the original reviews. For addictions without meta-analysis or systematic reviews, we will attempt to synthesize and summarize recent individual studies.

For alcohol addiction, the meta-analysis by Malouff et al. (2007 [10]) that included 20 studies concluded that alcohol addiction is associated negatively with ES, C, and A. A subsequent meta-analysis by Kotov et al. (2010 [11]), based on 11 (for C and A) to 26 (for ES) studies concluded that it was associated with only ES and C. A recent study not included in these meta-analyses reported negative associations with ES, C, and A (Dash et al., 2019 [12]). In relation to drug addiction, the meta-analysis by Kotov et al. (2010 [11]; 12 studies for E and ES, and 4 studies for C, A, and O) concluded that it was associated negatively with E, ES, C, and A. A study by Zilberman et al. (2018 [13]) that was not included in the Kotov et al. (2010 [11]) study reported that drug addiction was associated with A, C, and ES. In relation to smoking addiction, Smith (1970 [14]) concluded a positive association between smoking and E, and a subsequent review by Gilbert (1995 [15]) concluded that there was an association with high psychoticism (psychoticism is a personality construct associated negatively with C and A) and low ES. In a review of 25 studies that only focused on the E and ES personality dimensions, Malouff et al. (2007 [10]) reported that smokers had higher E and lower ES scores than non-smokers. More recently Hakulinen et al. (2015 [16]), covered nine studies finding that current smoking was associated positively with E, and negatively with ES and C. Additionally a study by Dash et al. (2019 [12]), which was not included in these reviews, concluded that

smoking addiction was associated negatively with A, ES, and C. For internet addiction, a meta-analysis involving 12 studies, by Kayış et al. (2016 [17]) reported that it had negative associations with all Big-5 personality dimensions. As for gambling, the meta-analysis by MacLaren et al. (2011 [18]), involving 44 studies, found that it was associated negatively with ES, C, and A. This study did not examine the relationship with O. For internet gaming, a systematic review that included a wider range of personality dimensions than the Big-5 dimensions concluded that for internet gaming there was a negative association or no relationship with E, ES, and O; and mixed results with C and A (Şalvarlı & Griffiths, 2019 [19]). Another systematic review by Gervasi et al. (2017 [20]) covering 27 studies concluded that internet gaming is associated negatively with ES, A and C. In relation to exercise addiction, studies have shown that exercise is associated positively with E and negatively with A (Costa & Oliva, 2012 [21]; Hausenblas & Giacobbi, 2004 [22]; Mathers & Walker, 1999 [23]). Though findings for ES shown some inconsistency, with some studies reporting a negative association (Courneya & Hellsten, 1998 [24]; Yeung & Hemsley, 1997 [25]), and others reporting positive associations (Costa & Oliva, 2012 [21]; Hausenblas & Giacobbi, 2004 [22]). However, in a systematic review that included 5 studies, Bircher et al. (2017 [26]) concluded that there was no clear association between exercise addiction with any Big-5 personality dimensions. As for any associations involving sex, social media use, and shopping addictions with the Big-5 dimensions, we did not find reviews to cover. For sex addiction, at least two studies have reported negative associations with C and ES (Amamou et al., 2020 [27]; Zilberman et al., 2018 [13]). Additionally, Amamou et al. (2020 [27]) also reported a negative association with E, and Zilberman et al. (2018 [13]) reported a negative association with A. In relation to shopping addiction, findings have generally reported a positive association with E (Andreassen et al., 2013 [28]; Uzarska et al., 2021 [29]; Verplanken & Herabadi, 2001 [30]), and a negative association with ES (Andreassen et al., 2013 [28]; Mowen & Spears, 1999 [31]), C (e.g., Andreassen et al., 2013 [28]; Mowen & Spears, 1999 [31]; Verplanken & Herabadi, 2001 [30]; Wang & Yang, 2008 [32]), A (e.g., Andreassen et al., 2013 [28]; Uzarska et al., 2021 [29]) and O (Andreassen et al., 2013 [28]). In relation to (general) social network use addiction, the findings have generally been inconsistent. Studies have reported positive associations with E and negative associations with ES (Peris et al., 2020 [33]; Wang et al., 2015 [34]). Sumaryanti et al. (2020 [35]) found a positive association with A and E, and a negative association with ES, C, and O. Kavčič et al. (2019 [36]) reported negative associations with ES. Wilson, Fornasier and White (2010 [37]) have reported a positive association with E, and a negative association with C. Negative associations with C has also been reported by others (e.g., Andreassen et al., 2012 [38]).

In summary, the findings suggest that alcohol addiction is likely to be associated with low ES and C, and possibly low A. For drug addiction, it is highly probable that it is associated with low A, C, and ES, and possibly low E. Although there is notable inconsistency in the findings, it can be speculated that smoking addiction will be associated with low A, C, and ES. All Big-5 personality dimensions may be associated negatively with internet addiction; and gambling addiction is likely to be associated with low ES, C, and A. Furthermore, internet gaming has been associated with low ES, A, and C. Whilst sex addiction has been associated with low C and ES, and possibly low A and E. Shopping addiction can be expected to be associated with low C, A, ES, and O, and high E. Despite these inconsistencies, the findings for social media use addiction appear to indicate associations with high E and low ES and C. Although it is difficult to speculate clearly the associations between exercise addiction and the Big-5 dimensions, exercise addiction is most likely to be associated positively with E and negatively with A. Overall therefore, past findings across most of the different types of addictions appear to indicate fairly consistent associations with low ES, C, and to a lesser extent A (especially for biological addictions), with less consistent associations with high E and low O.

Limitations of Existing Findings on the Associations of Different Types of Addictions with Big-5 Personality Dimensions

Despite the existence of a large number of studies that have examined the associations of different types of addictions with the Big-5 personality dimensions, it is argued here that existing findings from these studies are limited. Firstly, to date, most of the studies in this area have examined only one or at most a small handful of addictions in the same study. Although the study by Villeda et al. (2011 [39]) examined five types of addictions, they were all behavioral addictions (pathological gambling, compulsive buying, internet addiction, workaholism, and exercise addiction). Likewise, although Andreassen et al. (2013 [28]) examined seven different addictions, they were also all behavioral addictions (Facebook addiction, video game addiction, internet addiction, exercise addiction, mobile phone addiction, compulsive buying, and study addiction). Additionally, both Andreassen et al. (2013 [28]) and Villeda et al. (2011 [39]) did not include many behavioral addictions that are of current interest, such as gaming, sex, and social media. Given these limitations and omissions, it can be argued that further research is needed, examining concurrently, for the same group of participants, the associations of the Big-5 personality dimensions with a wider range of both biological and behavioral addictions (especially those of the current interest). Such studies will reveal shared and unique associations across different addictions and will not be confounded by differences in the sample and study characteristics (Andreassen et al., 2013 [28]). As noted by others, although these cross-study comparisons of personality correlates of the different addictions are informative, the most incisive approach is to make these comparisons within the same study (Krueger et al., 1996 [40]).

Second, the vast majority of the past studies in this area, including the meta-analysis, systematic reviews, and individual studies cited above have examined bivariate correlations between the different pairs of addictions and the Big-5 personality dimensions. Given this, and as there are many shared variances across the Big-5 personality dimensions (Costa and McCrae, 1992 [41]), the findings from the correlation analyses, therefore, do not indicate the unique associations between the personality and addiction variables. There is however some limited data on unique associations. Although our review of past studies suggested that shopping addiction can be expected to be associated with low C, A, ES, and O, and high E, and that exercise addiction will be associated positively with E and negatively with A, and internet addictions will be associated negatively with all five personality dimensions, Andreassen et al. (2013 [28]) have reported that shopping, exercise, and internet addictions were all uniquely associated negatively with ES, A, and C, and positively with E. While our review suggested that gambling addiction is likely to be associated with low ES, C, and A, Andreassen et al. (2013 [28]) have reported that it is uniquely associated with low C. While our review suggested that gambling will be associated with low ES, C and A, Miller et al. (2013 [42]) found that only low ES and O predicted gambling problems uniquely. As will be noticed, when examined for unique associations, the findings are different than when examined for bivariate associations. As unique associations provide a more accurate understanding of the personality-addiction links, we need such data. Statistically, they can be obtained by using multiple regression analysis in which each of the addiction types is regressed on the Big-5 personality dimensions simultaneously.

Third, two important considerations when examining the associations for the different addictions with personality dimensions are gender and age. This is because both age and gender are known to influence different addiction types (e.g., Andreassen et al., 2013 [28]; Becker et al., 2017 [43]; Cotto et al., 2010 [44]; Thege et al., 2015 [45]). This means that existing correlation and unique association data on how the different addiction types are associated with personality dimensions that have not controlled for gender and age effects (which has more often been the case) are confounded and misleading. The importance of controlling for age and gender effects is emphasized in the study by Jaradat et al. (2017 [46]). They found that while high E and O, and low ES predicted social media addiction in a multiple regression analysis model, only low C predicted social media addiction when gender was included in the regression model, and none of the personality dimensions predicted social media addiction when age was included in the regression model. The unique associations, controlling for age and gender, can be obtained using multiple regressions, in which each of the addiction types is regressed on the Big-5 personality dimensions, and also age and gender simultaneously.

Aims of the Current Study

Given the omissions and limitations in the existing literature, the current study used multiple regression analysis to examine the associations of 10 different types of addictions with the Big-5 personality dimensions (E, ES, A, C, and O) in the same study. The addictions examined were alcohol, smoking, drug, sex, social media, shopping, exercise, gambling, internet gaming, and internet use. Age and gender were controlled in the multiple regression analyses. As there has been limited data on the unique associations between the different types of addictions with the Big-5 personality dimensions, controlling for age and gender effects, we made no clear predictions. However, based on the literature reviewed for bivariate correlations, it is speculated that many (but not all) of the following associations would hold. Alcohol, drug, and smoking addictions will be associated negatively with A, C, and ES; internet gaming and internet addictions could be associated negatively with all five personality dimensions; pathological gambling will be associated negatively with ES, C, and A; sex addiction will be associated negatively with C and ES; social media use addiction will be associated positively with E, and negatively with ES; shopping addiction will be associated positively with E and negatively with the remaining four personality dimensions. Exercise addiction is most likely to be associated positively with E and negatively with A.

Method

Participants

There were 968 adult participants from the general Australian community. Their age ranged from 18 to 64 years (mean = 29.54 years; $SD = 9.36$ years). There were 622 males (64.3%; mean age = 29.46 years, $SD = 8.93$ years), 315 females (32.5%; mean age = 30.02 years, $SD = 10.39$ years), and the others specified other sexual identities, for example trans/non-binary gender. No significant age difference was found across males and females, $t(935) = 0.846$, $p = .398$. Slightly more than half the participants reported being employed (55.0%) and most of them reported having completed at least secondary education (98.2%).

Measures

Demographic

Demographic information on age, gender, employment, and education levels were obtained as part of the questionnaires completed.

Addiction Measures

Scores for the different types of addictions were obtained using well-developed, theoretical-based and psychometrically sound addiction specific questionnaires, as described below.

Alcohol addiction. The 10-item Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992 [47]) was used to measure alcohol addiction. Each item is rated on a 5-point scale, with higher scores indicating more severity. An example of an item is "During the past year, how often have you felt guilt or remorse after drinking?". The internal consistency reliability coefficient (Cronbach α value) for the current study was .89.

Drug Addiction. This addiction was measured using the 10-item Drug Abuse Screening Test (DAST-10; Skinner, 1982 [48]). Each item is rated using a yes/no response format, with higher scores indicating more severity. An example of an item is "Are you unable to stop abusing drugs when you want to?". The Cronbach α value for this measure in this study was .78.

Smoking Addiction. Smoking addiction was measured using the 5-item Cigarette Dependence Scale – 5 (CDS-5; Etter et al., 2003 [49]). Each item is rated on a 5-point scale, with higher scores indicating more severity. An example of an item is "After a few hours without smoking, I feel an irresistible urge to smoke". The Cronbach α value for this measure in this study was .68.

Internet Gaming Addiction. Internet gaming addiction was measured using the 9-item Internet Gaming Disorder Scale – Short-Form (IGDS9-SF; Pontes & Griffiths, 2015 [50]). Each item is rated on a 5-point scale over the past 12 months, with higher scores indicating more severity. An example of an item is "Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?". The Cronbach α value for this measure in this study was .89.

Internet Addiction. This addiction was measured using the 9-item Internet Disorder Scale–Short Form (IDS9-SF; Pontes & Griffiths, 2016 [51]). Each item is rated on a 5-point scale over the past 12 months, with higher scores indicating more severity. An example of an item is “Do you feel preoccupied with your online behaviour?”. The Cronbach α value for this measure in this study was .90.

Gambling Addiction. Gambling addiction was measured using the 11-item Online Gambling Disorder Questionnaire (OGD-Q; González-Cabrera et al., 2020 [52]). Each item is rated on a 5-point scale for the symptoms over the past 12 months, with higher scores indicating more severity. An example of an item is “Have you tried to control, reduce or stop gambling and have not been able to do so?”. The Cronbach α value for this measure in this study was .94.

Social Media Use Addiction. This addiction was measured using the 6-item Bergen Social Media Use Addiction Scale (BSMAS; Andreassen et al., 2012 [38]). Each item is rated on a 5-point scale over the past 12 months, with higher scores indicating more severity. An example of an item is “Felt an urge to use social media more and more”. The Cronbach α value for this measure in this study was .88.

Shopping Addiction. Shopping addiction was measured using the 7-item Bergen Shopping Addiction Scale (BSAS; Andreassen et al., 2015 [53]). Each item is rated on a 5-point scale over the past 12 months, with higher scores indicating more severity. An example of an item is “I shop/buy things in order to change my mood”. The Cronbach α value for this measure in this study was .88.

Sex Addiction. The 6-item Bergen–Yale Sex Addiction Scale (BYSAS; Andreassen et al., 2018 [54]) was used for measuring sex addiction. Each item is rated on a 5-point scale for the symptoms experienced during the past 12 months, with higher scores indicating more severity. An example of an item is “Felt an urge to masturbate/have sex more and more”. The Cronbach α value for this measure in this study was .84.

Exercise Addiction. This addiction was measured using 6-item Revised Exercise Addiction Inventory (EAI-R; Szabo et al., 2019 [55]). Each item is rated on a 6-point scale, with higher scores indicating more severity. An example of an item is “Exercise is the most important thing in my life”. The Cronbach α value for this measure in this study was .84.

Big-5 Personality Dimensions

The Big-5 personality dimensions (E, ES, A, C, and O) were measured using the self-report Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007 [56]). In this measure, there are two items measuring each dimension. All ten items in the questionnaire are rated in terms of how well the statements describe the respondent on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate higher levels of the dimension. The BFI-10 has shown good reliability and validity (Rammstedt & John, 2007 [56]). Given that there are only two items per dimension, the internal consistency Cronbach α values for them are not reported here (e.g., Soto & John, 2017 [57]).

Procedure

The Human Ethics Research Committee of Victoria University (Australia) approved the study. It was advertised widely, and the survey was conducted online. Interested participants were invited to register for the study via a Qualtrics link available on social media (i.e. Facebook; Instagram; Twitter), the Victoria University websites and digital forums (i.e., reddit.com). The link took them to the Plain Language Information Statement (PLIS), and individuals who were interested were directed to click a button to agree to informed consent. This was followed by the questions seeking sociodemographic information, and the study questionnaires.

Statistical Procedure

All statistical analyses were conducted using SPSS version 22. For the multiple regression analyses, each of the addiction types was regressed on the Big-5 personality dimensions simultaneously, with age and gender as covariates. For those interested, we will also report bivariate correlations for each of the addictions with each of the personality dimensions. However, given that our focus is on the unique associations, we will not discuss the bivariate correlation findings.

Results

Missing Values and Descriptives

As mentioned earlier, there were 968 participants in the study. The number and the percentages of missing values across the 16 variables in the study are shown in Table 1. As the percentages of missing values for the variables ranged between 0 and 1.7%, they can be considered negligible. Little’s MCAR chi-square value ($df = 361$) for missing values was 346.865, and as this was not significant ($p = .694$), the missing values can be considered missing completely at random. Incomplete variables were imputed under EM. Table 1 includes the mean and standard deviation (SD) scores following the imputation.

Table 1

Mean and Standard Deviation Scores for the Study Variables

	N	Mean	Std. Deviation	Missing (Count/ Percent)
Age	968	29.54	9.355	0/0
Extraversion	965	5.94	3.135	3/.3
Agreeableness	966	9.65	2.548	2/.2
Conscientiousness	963	9.35	2.895	5/.5
Emotional Stability	962	8.42	3.151	6/.6
Openness to Experiences	967	9.86	2.535	1/.1
Gaming Total	957	18.15	7.114	11/1.1
Alcohol Total	963	4.47	6.004	5/.5
Smoking Total	968	9.23	3.975	0/0
Drugs Total	967	1.69	1.670	1/.1
Sex Total	962	6.66	5.090	6/.6
Social Media Total	962	11.71	5.548	6/.6
Shopping Total	958	13.55	5.813	10/1.0
Exercise Total	957	14.37	6.500	11/1.1
Gambling Total	952	13.59	5.856	16/1.7
Internet Total	958	19.96	7.956	10/1.0

Mean and SD are values after imputation of missing values.

Frequencies of men and women were 622 (64.3%) and 315 (32.5%), and the remaining (3.2 %) were others (e.g., trans/non-binary gender).

Correlations

Table 2 shows the intercorrelations of all the study variables. As shown, alcohol and smoking addictions were associated positively with age, whereas all the behavioral addictions (except exercise) were associated negatively with age. Drug and exercise were not associated with age. Gender (with male coded as 1, and female coded as 0) was associated positively with alcohol, gaming, and sex addictions, and social media use and shopping addictions were associated negatively with gender. All the other addictions (smoking, drug, gambling, internet and exercise addictions) were not associated with gender. In relation to the different personality dimensions, age was associated positively with all dimensions, and gender was associated negatively with E and A, and positively with ES. In relation to the interrelations between the addictions, all the addictions, except smoking and exercise, were associated positively with each other. Smoking addiction was associated positively with alcohol, smoking, drug, gambling, sex, and shopping addictions. Exercise was associated positively with gaming, gambling, social media use, sex, and shopping addictions. Table 2 also shows that with the exception of ES with O, all other personality dimensions were associated positively with each other. Table 2 includes the correlations of the five personality dimensions with the different types of addictions. As mentioned earlier, as our focus is on their unique associations, we will not discuss these correlations.

Table 2

Inter-Correlations Between All Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Age (1)	1															
Gender (2)	-.044	1														
Alcohol (3)	.107**	.065*	1													
Smoking (4)	.164**	-.011	.200**	1												
Drugs (5)	-.049	.009	.387**	.272**	1											
Gaming (6)	-.254**	.071*	.075*	.049	.109**	1										
Gambling (7)	-.091**	.040	.202**	.087**	.158**	.380**	1									
Internet (8)	-.226**	-.001	.109**	.044	.181**	.687**	.325**	1								
SocialMedia (9)	-.164**	-.093**	.154**	.007	.112**	.358**	.281**	.524**	1							
Sex (10)	-.113**	.182**	.166**	.071*	.121**	.372**	.286**	.354**	.309**	1						
Shopping (11)	-.137**	-.148**	.114**	.089**	.130**	.326**	.360**	.386**	.437**	.248**	1					
Exercise (12)	-.042	.022	.004	-.027	-.035	.075*	.198**	.058	.146**	.124**	.124**	1				
Extraversion (13)	.136**	-.079*	.176**	.015	.045	-.169**	.012	-.151**	.065*	.012	.035	.109**	1			
Agreeableness (14)	.113**	-.137**	-.131**	.017	-.104**	-.238**	-.136**	-.262**	-.102**	-.206**	-.084**	.001	.065*	1		
Conscientiousness (15)	.158**	-.047	-.191**	-.062	-.239**	-.268**	-.093**	-.327**	-.196**	-.162**	-.130**	.173**	.085**	.001	1	
Emotional Stability (16)	.188**	.110**	-.104**	-.048	-.168**	-.221**	-.006	-.345**	-.275**	-.101**	-.252**	.122**	.148**	.001	.001	1
Openness Experiences	.073*	-.030	.055	.055	.056	-.170**	-.139**	-.126**	-.020	-.036	-.040	.047	.295**	.001	.001	1

For gender, male = 1, female = 0.

* $p < .05$, ** $p < .01$.

Multiple Regression Analyses

Table 3 shows the standardized regression coefficients from the multiple regression analyses. As shown, age was associated negatively with gaming, sex, social media use, shopping, exercise, gambling, and internet addictions. It was associated positively with alcohol and smoking addictions. Gender (with male coded as 1, and female coded as 0) was associated positively with alcohol and sex addictions, and negatively with social media use and shopping addictions. Internet gaming addiction was associated negatively with all the personality dimensions. Alcohol addiction was associated negatively with A, C, and ES, and positively with E. Smoking addiction was associated negatively with C, and drug addiction was associated negatively with C and ES, and positively with O; and sex addiction was associated negatively with A and C. Social media was associated positively with E, and negatively with C and ES. Shopping addiction was associated positively with E, and negatively with ES. Exercise was associated positively with E and ES. Gambling addiction was associated negatively with A, C, and O, and positively with E. Internet addiction was associated negatively with E, A, C, and ES.

Table 3

Standardized Regression Coefficients from the Multiple Regression Analyses Testing the Predictions of the Different Addictions by the Personality Dimensions, with age and Gender as Covariates

	Gaming	Alcohol	Smoking	Drugs	Sex	Social Media	Shopping	Exercise	Gambling	Internet
Age	-.177***	.137***	.182***	.182	-.073*	-.123***	-.103**	-.089**	-.077*	-.129***
Gender	.035	.072*	.003	.003	.162***	-.076*	-.131***	.021	.014	-.023
Extraversion	-.081*	.188***	-.011	-.011	.062	.126***	.088**	.098**	.068*	-.066*
Agreeableness	-.144***	-.104**	.016	.016	-.150***	-.038	-.038	-.039	-.105**	-.161***
Conscientiousness	-.165***	-.179***	-.076*	-.076***	-.103**	-.098**	-.036	.160***	-.074*	-.191***
Emotional Stability	-.082*	-.075*	-.057	-.057*	-.042	-.215***	-.208**	.068	.053	-.198***
Openness Experiences	-.090**	.029	.052	.052*	-.008	-.025	-.044	.014	-.131***	-.045

For gender, male = 1, female = 0.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Overall, therefore, eight of the ten addictions (gaming, alcohol, smoking, drug, sex, social media use, gambling, and internet) were associated with low C. Six of the ten addictions (gaming, alcohol, drug, social media use, shopping, and internet) were associated with low ES. Five of the ten addictions (gaming, alcohol, sex, gambling, and internet) were associated with low A. Also, five of the ten addictions (alcohol, social media use, shopping, exercise, and gambling) were associated with high E. In all, three addictions (gaming, alcohol, and internet) were associated with low C, ES, and A; and five additions were associated with low A and C (gaming, alcohol, drug, social media use, and internet).

Discussion

Major Findings

The aim of the study was to examine the unique associations of the Big-5 personality dimensions of E, ES, A, C, and O with alcohol, smoking, drug, sex, social media, shopping, exercise, gambling, internet gaming, and internet use addictions, controlling for age and gender effects. Based on the conclusions derived from our review that in turn were primarily based on correlations between the different types of addictions and personality, we expected that alcohol addiction will be associated with low A, C, and ES. However, the findings indicated that while alcohol addiction was associated uniquely with low A, C, and ES, it was also associated uniquely with high E. Our review suggested that drug addiction will be associated with low A, C, and ES. The findings indicated that drug addiction was associated uniquely with low C and ES, and high O. While we expected smoking to be associated with low A, C, and ES, our findings indicated a unique association with low C. Although we predicted that internet addiction will be associated negatively will all five personality dimensions, our findings indicated negative associations with E, A, C, and ES, but not O. We expected gambling addiction to be associated negatively with low ES, C, and A. Our findings showed that it was associated with low A and O, and high E. We expected sex addiction will be associated with low C and ES. Our findings showed that it was associated with low C and A. While social media use addiction was expected to be associated with high E, and low with ES, our findings showed that it was associated uniquely with high E, and low ES. Shopping addiction was expected to be associated with high E and low ES, C, A and O. Our findings indicated that it was associated with high E and low ES only. Exercise addiction was expected to be associated high with E and low A. The findings showed that it was associated with high E and ES. Consistent with our expectations, internet gaming was associated negatively with all five personality dimensions. Thus, our findings were only partially as expected. As the current study examined unique associations and controlled for age and gender effects, it can be argued our findings are more credible than existing findings.

Theoretical Implications

As will be evident, our findings indicated that the different addictions were associated differently with the five personality dimensions, i.e., the different addictions had different personality profiles. This indicates that the different types of addictions are by and largely independent of each other. This has important theoretical implications. To date, researchers have noted the high degree of similarities across the different types of addictions, including biological and behavioral addictions, thereby raising the possibility that the different types of addictions lack independence. According to Griffiths (2005 [58]), the different addictions share the same basic components of: (i) salience, mood modification, tolerance, withdrawal, conflict, and relapse. Salience refers to the addiction in question dominating the individual's thinking, feelings, and behavior. Mood modification refers to euphoria and/or other mood modifying experiences resulting from performing the addictive behavior. Tolerance refers to the need for an increasing amount of the addictive behavior to produce the former effects. Withdrawal is experiencing unpleasant feelings when the addictive behavior is stopped or reduced. Conflict refers to the addictive behavior causing conflict with other people or within the individual, and relapse is the return to earlier patterns of the addictive behavior after abstinence or control. Our findings indicated that even if these components are the same across different types of addictions, it does not necessarily follow that the different types of addictions lack independence.

Notwithstanding that the different addictions demonstrated different personality profiles, there was some convergence across most of the addictions in terms of their associations with the personality dimensions. Our findings showed that eight of the ten addictions (gaming, alcohol, smoking, drug, sex, social media use, gambling, and internet) were associated with low C. According to Roberts et al. (2009 [59]), C is "the propensity to follow socially prescribed norms for impulse control, to be goal-directed, to plan, and to be able to delay gratification" (p. 369). Thus, high C is related to a better ability to control, regulate, and direct impulses, which as had been noted is grossly lacking in individuals with addictions. Six of the ten addictions (gaming, alcohol, drug, social media use,

shopping, and internet) were associated with low ES, and five of the ten addictions (gaming, alcohol, sex, gambling, and internet) were associated with low A. Also, five of the ten addictions (alcohol, social media use, shopping, exercise, and gambling) were associated with high E. In all, three addictions (gaming, alcohol, and internet) were associated with low C, ES and A; and five addictions were associated with low A and C (gaming, alcohol, drug, social media use, and internet). These associations are consistent with existing data (see introduction), and conclusions made by other researchers (Dash et al., 2019 [12]; Zilberman et al., 2018 [13]). For instance, Zilberman et al. (2018 [13]) has highlighted that generally both biological and behavioral addictions are associated consistently with low C and ES, with biological addictions also being associated consistently with low A, and the associations for E and O vary across behavioral addictions. Descriptively, it can be speculated that generally those with addictions lack control, reliability, and conscience (characterized by low C). Also, they have high anxiety, nervousness, and touchiness (characterized by low ES). In addition to these characteristics, those who have biological addictions will also demonstrate hostility, stubbornness, and insensitivity (characterized by low A).

Although our findings indicated different personality profiles for the different addictions examined, the findings also demonstrated that some of the addictions showed more similarities with each other in their personality profiles than with other addictions. In particular, internet addiction and internet gaming addiction (the so-called information technology addictions) had highly similar personality profiles as they were both associated with low E, A, C, and ES. Also, alcohol and drug addictions (the so-called substance use addictions) had highly similar personality profiles as they were both associated with low C and ES. Additionally, these addictions were not as closely associated with the other addictions that we examined. One important distinction between the information technology addictions and the other addictions is that it is characterized by pathological engagement in technology-related activities that are interactive (Sigerson et al., 2017 [60]). Unlike the other addictions, substance use addictions are characterized by the consumption of exogenous psychoactive substances (American Psychiatric Association [APA], 2013 [61]). Our findings are consistent with that reported by Sigerson et al. (2017 [60]). They tested the relationships of information technology addictions with other behavioral addictions, as well as substance addictions. Related to our interpretations of our findings, their findings showed that there was a common factor underlying various types of information technology addiction. Also, information technology addiction is more similar to other behavioral addictions than substance related addictions. Additionally, problematic gambling was more strongly correlated with information technology addiction than alcohol use disorder was. The researchers interpreted their findings in terms of a spectrum approach, which conceptualizes information technology addiction as a cluster of disorders comprising not only shared risk factors and symptoms but also distinct characteristics.

Clinical Implications

There are clinical implications for our findings. Firstly, as we identified specific profiles for the different addictions, the findings highlight that obtaining information of the Big-5 personality permission can be useful for the identification and diagnosis of the different types of addiction. Secondly, our findings can be used for early identification of individuals at risk for the different addictions, and with that to develop and implement programs for effective prevention and intervention of addiction. As an example, Roberts et al. (2017 [62]) have described a sociogenomic trait intervention model for changing conscientiousness. In sum, our findings highlight that personality research has promise from a translational, clinical perspective (Costa & McCrae, 1992 [41]). Third, unlike all the other addictions, exercise showed associations with high E and ES. The study by Andreassen et al. (2013 [28]) that (like our study) examined unique associations, controlling for age and gender effects, found that exercise addiction was associated with low ES and A, and high E and C. Taken together these findings could be interpreted to mean that exercise addiction is not dysfunctional. Thus, it is important that clinicians view their client's excessive exercise (when present) with caution and determine carefully when planning interventions if it is facilitating or hampering their client's well-being. Fourth, our findings have implications for understanding comorbidity involving addictions. The findings showed that all the addictions, except smoking and exercise, were associated positively with each other. Smoking addiction was associated positively with alcohol, drug, gaming, gambling, internet, social media use, and sex addictions. Exercise was associated positively with gaming, gambling, social media use, sex, and shopping addictions. These positive associations indicate a high probability of comorbidity of the different addictions with each other. Additionally, as most of the different addictions showed consistent associations with low ES, C, and A, and as these have been linked to a range of externalizing and internalizing psychopathologies (Gomez & Corr, 2014 [63]; Kotov et al., 2010 [11]; Malouff et al., 2007 [10]), it is conceivable that the different addictions will also be associated with externalizing and internalizing disorders.

Research Implications

The findings in our study have implications for research in this area. Our findings showed that with the exception of ES with O, all other personality dimensions were associated positively with each other. Additionally, age was associated negatively with gaming, sex, social media use, shopping, exercise, gambling, and internet addictions. It was associated positively with alcohol and smoking addictions. Gender (with male coded as 1, and female coded as 0) was associated positively with alcohol and sex addictions, and negatively with social media use and shopping addictions. Internet gaming addiction was associated negatively with all the personality dimensions. These findings highlight the need for research that aims at examining the associations of addictions with the Big-5 personality dimensions to examine unique associations (such as by applying multiple regression analysis) rather than bivariate correlations, controlling for age and gender effects, as done in the current study.

Limitations & Further Research

A major strength of the study was that it examined unique associations in the same groups of individuals, controlling for gender and age effects, for a much wider range of addictions than done in previous studies. However, there were a number of limitations in the study that require consideration when interpreting the findings and the conclusions made. First, as the findings are based on a single study, there is a need for cross-validation of the findings before they can be generalized. Second, as the employed dataset was collected from participants not selected randomly, using self-rating scales, the findings may have been

confounded and influenced by common method variance. Third, as we examined a community sample, the findings may not be relevant to those with clinical diagnoses. Fourth, as we used cross-sectional data, our findings cannot be interpreted in causal terms. Fifth, since cultural differences were not controlled in the current study, and as this can potentially influence ratings of the addiction and personality questionnaires, it is conceivable that our findings are confounded. Sixth, as we used the BFI-10 (Rammstedt & John, 2007 [56]), which has only two items measuring each personality dimension, it may not have been broad enough to measure the heterogeneous nature of the dimensions studied, and therefore how it influenced our findings. Future research in this area may wish to redress these limitations by pursuing similar studies employing larger samples of randomly selected individuals and/or focusing on clinical populations, pursuing longitudinal research in this field or by replicating the present results across populations of different cultural backgrounds. Notwithstanding these limitations, the findings in the current studies do provide a strong basis for more studies in this area, controlling for the limitations raised here.

Conclusions

Our study has provided new and novel findings on the associations of the Big-5 personality dimensions with different types of addictions. In summary, the findings in the study showed that the different types of addictions were associated with different groups of the personality dimensions. Despite this, most of the addictions were associated with low EA and C, and many were additionally associated with low A. Also, there was a reasonable degree of convergence between the information technology addictions (i.e., internet addiction and internet gaming addiction), and between substance use addictions (i.e., alcohol and drug addictions).

Abbreviations

A = Agreeableness

C = Conscientiousness

E = Extraversion

ES = Emotional Stability

N = Neuroticism

O = Openness to Experience

FFM = Five-Factor Model

Big-5 = Big-5 personality model

AUDIT = Alcohol Use Disorders Identification Test

DAST = Drug Abuse Screening Test

CDS-5 = 5-item Cigarette Dependence Scale

IGDSF-9 = 9 item Internet Gaming Disorder Scale - Short-Form

IIDS9-SF = 9-item Internet Disorder Scale–Short Form

OGD-Q = Online Gambling Disorder Questionnaire

BSMAS = Bergen Social Media Use Addiction Scale

BSAS = Bergen Shopping Addiction Scale

BYSAS = Bergen–Yale Sex Addiction Scale

EAI-R = Revised Exercise Addiction Inventory

BFI-10 = Big Five Inventory-10

PLIS = Plain Language Information Statement

SPSS = Statistical Package for the Social Sciences

MCAR = missing completely at random

EM = Expectation Maximisation imputation

APA = American Psychiatric Association

Declarations

Ethics approval and consent to participate

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. This article does not contain any studies with animals performed by any of the authors nor any studies making use of human tissue.

Thus, the present study was approved by the Human Ethics Research Committee of Victoria University (Australia).

Consent for publication

Not Applicable.

Availability of data and materials

Data is deposited as a supplementary file with the current document.

Competing interests

The authors of the present study declare they have no competing interests.

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Authors contributions

RG: Contributed to the literature review, framework formulation, the structure and sequence of theoretical arguments and conducted the statistical analysis.

DTP: Reviewed and improved upon the final form of the manuscript. Compiled the manuscript and associated documents into submittable forms and corresponded with the publishing journal.

TB: Contributed to the references section and proper use of citation in the document. Reviewed and improved the final form of the manuscript.

VS: Reviewed and improved the final form of the manuscript.

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