

Summary

Determination of Behavioural Addictions and Addiction Pattern Risk Models within the Framework of Sociodemographic Characteristics

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While the debate on the nature of behavioral addictions continues, the heterogeneity in behavioral addiction syndromes complicates the categorization of these behaviors (Nestler, 2005). Existing data support that behavioral addictions and substance addictions share many common clinical features (Grant et al., 2010; Potenza et al., 2009).

For the first time in DSM-5 (APB, 2013), gambling disorder was classified as a non-substance-related addiction, while internet gaming disorder was included in the section recommending conditions for further research. In the 11th Revision of the International Classification of Diseases (ICD-11; WHO, 2020), there are two behavioral addictions (gambling disorder and gaming disorder) classified as “disorders resulting from addictive behaviors”. It is still controversial to consider the excessive display of behaviors other than gambling and gaming as a disorder.

Due to the phenomenological commonalities of behavioral addictions, it has been suggested that behavioral and substance-related addictions may co-occur. Several studies have shown that behavioural addictions and substance addictions can coexist (e.g. Ayala-Rojas et al., 2022; Black et al., 2015; Di Nicola et al., 2015; Ko et al., 2008; Petry et al., 2005).

Another critical point is how this addiction pattern, which may include more than one addiction, occurs and which sociodemographic factors play a role in this process. Therefore, various studies examining many sociodemographic variables that may be predictors of gambling (Moreira et al., 2023; Volberg et al., 2010; Williams et al., 2012), gaming (Kim et al., 2008; Kim et al., 2016; Rho et al., 2018; Wittek et al., 2016), shopping (Duong & Liaw, 2022; Ünübol et al., 2022) and exercise (Costa et al., 2013; Di Lodovico et al., 2018), behav-

iours, which are the addictions addressed in this study, have been included in the literature.

Present Study

Within the scope of this study, it was also aimed to examine whether behavioral addiction types accompany each other, in other words, whether they present themselves as a single addiction pattern. For practical reasons, a limited number of behavioral addictions (gambling, shopping, internet gaming and exercise) were included in the study. In the event that behavioural addictions are found to be comorbid with each other, it will support the view that other behaviours (shopping and exercise addiction) that are not included in diagnostic classification systems can also be accepted as addictions.

Behavioral addictions were examined in terms of many sociodemographic characteristics, and although consistent results were found for gender and age in general, different results were obtained for other variables. Another aim of the study was to determine which of the common sociodemographic characteristics underlying behavioral addictions and addiction patterns are risk factors for addiction profiles. In addition to sociodemographic variables such as sex, age, education level, employment status, marital status, living alone, and perceived financial income that may be related to addiction, psychiatric diagnosis and psychiatric treatment, smoking and alcohol use, and lifetime experience with any substance were also considered as risk factors.

Methods

Participants

A total of 1114 people over the age of 18 living in Turkey participated in the study, 513 female (46.1%) and

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587 male (53.6%). Four participants (0.4%) defined their gender in the other category. The ages of the participants ranged between 18-72 ($\bar{X} = 35.52$, $SD = 11.70$). Most of the participants were from Izmir province (28.5%).

Data Collection Tools

The Participant Information Form was used to obtain information about the sociodemographic characteristics of the participants and their psychiatric diagnosis, psychiatric medication use, whether they were actively attending individual or group psychotherapy, smoking/alcohol use, and whether they had ever tried any substance in their lives.

Gambling disorder was assessed with The South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), internet gaming disorder with The Internet Gaming Disorder Scale - Short Form (IGDS9-SF; Pontes and Griffiths, 2015), shopping addiction with The Compulsive Buying Scale (CBS; Faber & O'Guinn 1992; Valence et al., 1988) and exercise addiction with The 21-item Exercise Dependence Scale (EDS-21; Hausenblas & Symons Downs, 2002).

Procedure

Permission was obtained from Dokuz Eylül University Faculty of Literature Ethics Committee for the research. Potential participants were invited to make various announcements about the research on different social networking platforms. Responses were accepted from the online data collection platform named "qualtrics.com".

Statistical Analyses

Cluster analyses, descriptive analyses of differences between groups and regression analyses were conducted using the Statistical Package for Social Sciences version 26 (SPSS 26).

First, to identify addiction-prone groups specific to each addiction type (gambling, gaming, shopping and exercise, respectively), cluster analysis was conducted separately with the measurement instruments assessing the respective behavioral addiction. In addition, all items from the behavioral addiction scales were included in the two-step cluster analysis to understand whether the addiction types co-occur and how many different patterns would occur.

In the specific addiction groups and general addiction groups determined by cluster analysis, the change in the characteristics that may be related to behavioral addictions (sociodemographic variables, psychiatric diagnosis variables, smoking-alcohol use and substance experimentation) in the groups was examined by Pearson chi-square analyses. Then, likelihood tests were

conducted to see whether the variables that differed in the groups according to the chi-square analyses formed a model together. With the variables found to be significant in the models that emerged as a result of the likelihood tests, binary/binominal logistic regression analyses were conducted on specific addiction groups and multiple (multinomial) logistic regression analyses were conducted on general addiction groups to understand which variables could be risk factors in assigning participants to groups.

Findings

Clusters and Descriptive Characteristics

Before the two-stage cluster analyses, the items of all scales were divided into binary categories representing the presence or absence of addiction symptoms according to the nature of the relevant scale.

As a result of the analysis conducted with the SOGS items, 246 (22.1%) participants who said "yes" to the items related to gambling, 236 (21.2%) participants who tended to say "yes" more to the scale items as a result of the two-step cluster analysis conducted on IGDS9-SF, 234 (21%) participants who mostly said "yes" to the items in CBS, and 251 (22.5%) participants who gave higher scores to the items related to exercise behavior in EBÖ-21 were obtained. These groups were named as "specific addiction clusters".

Two-step cluster analysis was conducted with a total of 61 items from all measurement tools in order to understand in which classes all participants were placed at the item level and whether there was a pattern of concurrency between behavioral addiction types. Three clusters emerged as a result of the analysis. The clusters, which were considered "general addiction clusters", were named as those who were prone to non-exercise (NE) addictions ($n = 412$; gambling, gaming and shopping), those who were prone to exercise addiction (EA, $n = 230$) and those who were not prone to addiction (NA; $n = 472$).

Group Comparisons and Determination of Risk Factors According to Demographic Characteristics in Specific Addiction Groups

Sociodemographic and comorbidity-related variables were compared between the groups with and without each type of addiction using Pearson Chi-square analysis. According to the results, being male, not being in a relationship, living alone, smoking, alcohol use and experiencing substance were more common in the gambling group. In the gambling group, the observed values were higher than the expected values in males, in the younger age, not in a relationship, not working, smoking

and experiencing substance. When it was examined how the variables differed in the shopping addiction cluster, being female and young, not being in a relationship, living alone, higher education level, not working, psychiatric diagnosis and active medication were higher than the expected values in the shopping addiction group. When the results of exercise addiction were analyzed, only gender and relationship status differed significantly, while age showed slightly significance ($.05 \leq p < .10$). Being male, young and not having a relationship, the values observed are higher than the expected values in the exercise group.

Binary/binominal logistic regression (BLR) analysis was conducted to assess the effect of variables that differed significantly in specific clusters on assignment to the addiction group.

The likelihood ratio test results showed that these models were significant. The models established with significant variables were examined with the Hosmer-Lemeshow goodness-of-fit test, and it was observed that the model fit the data well for all addiction types. This fit was slightly significant for exercise addiction.

The variables explaining the model in the gambling cluster are being male, not being in a relationship, smoking, drinking alcohol and experiencing substances ($\chi^2 = 4.88$, $df = 8$, $p = .77$, Nagelkerke $R^2 = .19$). In the gaming cluster, in addition to being male, young and not working, substance experimentation explains the model ($\chi^2 = 7.024$, $df = 8$, $p = .53$, Nagelkerke $R^2 = .10$). In the shopping cluster, only being female, young, not working and psychiatric medication are significant in explaining the model ($\chi^2 = 4.436$, $df = 7$, $p = .73$, Nagelkerke $R^2 = .09$). For the exercise cluster, being male and not being in a relationship were significant, but the power to explain the model was quite low ($\chi^2 = 12.690$, $df = 6$, $p = .05$, Nagelkerke $R^2 = .03$). As a result, it is seen that the model explained most by sociodemographic variables is in the gambling cluster. The Wald statistic conducted to understand the importance of the variables in the model showed that gender was the most important explanatory.

Group Comparisons and Determination of Risk Factors According to Demographic Characteristics in General Addiction Groups

3x2 Pearson Chi-square analyses were conducted to determine whether the general addiction groups (3: those who are prone to non-exercise addictions, those who are prone to exercise, and those who are not prone to any type of addiction) differ in terms of sociodemographic variables, each of which are two categories. The findings showed that gender, age, relationship and employment status were effective in the assignment of participants to addiction groups and the formation of ad-

diction groups ($p < .05$), while education level and living alone did not differ in the formation of groups ($p > .05$).

Being female was observed more than the expected value in the cluster where gambling, gaming and shopping behaviors were observed together, and being male was observed more than the expected value in exercise addiction. Being in the 18-35 age group and not being in a relationship were observed more than the expected value in both NE and EA groups. In terms of employment status, being unemployed was observed more than the expected value in the NE and EA groups. Smoking was higher than the expected value in the NE group and lower than the expected value in the EA and NA groups. Patterns of alcohol use and substance experimentation were similar to smoking. No significant difference was found between the groups according to the variables of psychiatric diagnosis, medication use and receiving psychotherapy.

Likelihood ratio test and multiple (multinomial) logistic regression (MLR) analyses were conducted in order to determine the degree to which the factors of smoking, alcohol use and substance abuse, which cause significant differences between the groups, as well as the basic demographic variables found to be significantly different in the general addiction groups, explain the non-exercise addictions and exercise addiction groups together. The likelihood ratio test showed that all variables together formed a significant model (LR $\chi^2 = 107.674$, $df = 14$, $p < .001$). Therefore, all variables were included in the MLR analysis to test the extent to which they explained the dependency groups. The goodness-of-fit test indicates that the model fits the real data well ($\chi^2 = 191.025$, $df = 206$, $p > .05$). Wald statistic values were examined to understand the importance of each independent variable in the model. While the correct prediction rate of the whole model was found to be 50%, the rate of variables explaining the model was 11% (Nagelkerke $R^2 = .11$).

Variables that were effective in the non-exercise addictions group were evaluated according to odds ratios. Odds ratios express the ratio of the probability of being in one category of the variable compared to the other category. Accordingly, being young is more likely to be in the age group of 36 and over (1.36 times more), alcohol users are more likely to be in the non-exercise addictions group than non-alcohol users (1.61 times more) and substance experimenters are more likely to be in the non-exercise addictions group than non-exercise addicts (1.50 times more). Since the odds ratio of those who are working is below 1, it is understood that the probability of not working increases the probability of being in the non-exercise addiction group (1.77 times more). Gender, relationship status and smoking were not

significant in the model.

When the variables determining being in the exercise addiction group were examined, it was found that all variables except alcohol use and substance experimentation were effective in being in the exercise addiction group. Unlike the non-exercise addiction group, the effect of gender (being male was 1.85 times higher) and not smoking (1.44 times higher) was observed.

In conclusion, being young, not working, drinking alcohol and experimenting with substances are possible risk factors for the non-exercise addiction group, whereas being male, being young, not being in a romantic relationship, not working and not smoking seem to be possible determining factors for being in the exercise addiction group.

Discussion

Co-occurrence of Behavioral Addictions

The two-step cluster analysis indicates that excessive gambling, gaming and shopping behaviors are observed to co-occur. This mixed cluster indicates that an addiction pattern can be mentioned with the combination of behavioral addictions. Previous studies have shown that these addictions can accompany each other (Ayala-Rojas et al., 2022; Black et al., 2015; Burleigh et al., 2019; Di Nicola et al., 2015; King et al., 2014; Puiras et al., 2022).

Two-step cluster analysis for general addiction groups showed the existence of a cluster in which participants tended to say yes to more exercise addiction items. There is evidence in the literature that exercise addiction is accompanied by other behavioral addictions (Grall-Bronnec et al., 2016; Håkansson et al., 2018; Lejoyeux et al., 2012). The reason for the differentiation of exercise addiction from other addictions in this study may be due to the possibility that it may actually be more representative of a different classification, such as illness anxiety or eating disorders, rather than an addiction perspective.

Sociodemographic Variables in Behavioral Addictions

When gender differences were examined in specific addiction groups, being female was associated with shopping addiction, while being male was associated with other addictions. When examined in general addiction groups, it was observed that gender made a significant difference between the non-exercise addictions group, the exercise addiction group and the group that was not addicted to any of the addictions. The results regarding gender differences found in this study are supported by the literature. Various studies have shown that

gambling (Carneiro et al., 2020; Moreira et al., 2023; Slutske et al., 2015; Volberg et al., 2018; Williams et al., 2012), gaming (Kim et al., 2016; Kiraly et al., 2014; Mihara & Higuchi, 2017) and exercise addiction (Costa et al., 2013; Dumitru et al., 2018; Zmijewski & Howard, 2003) are risk factors for men and are more common than women. Excessive shopping behaviour has been reported to be more common in women in many studies (Dittmar, 2005; Harvanko et al., 2013; Karakuş et al., 2011; Maraz et al., 2016; Otero-López & Villardefrancos, 2014; Puiras et al., 2022; Raab et al., 2012).

When addiction types were analyzed according to age groups, it was found that gambling was not affected by age in specific addiction groups, being young was significant for gaming and shopping, and being in the young group was borderline significant for exercise. While age did not differ in the groups with addictions (non-exercise and exercise), these two clusters differed from the non-addicted group and more addictive behaviors were observed between the ages of 18-35. These findings regarding age are generally in line with the literature (Allegre et al., 2007; Bruno et al., 2014; Costa et al., 2013; Derevensky et al., 2003; Irmak & Erdoğan, 2015; Raab et al., 2012; Schlosser et al., 1994; Slutske, 2006; Wittek et al., 2015).

Risk Factor Models in Non-Exercise Addictions

For the gambling group, *being male, not being in a relationship, smoking, alcohol and substance experimentation* variables together constitute a cluster of risk factors. It has been reported in the literature that not being in a relationship or being single may be a predictor of gambling (Allami et al., 2021; Syvertsen et al., 2023). There is also supportive evidence for smoking, alcohol use and substance experimentation as other risk factors for gambling (Hammond et al., 2020; Himelhoch et al., 2016; Kessler et al., 2008; Martínez-Loredo et al., 2019; McCready et al., 2008).

For the gaming group, *being an unemployed young male and experimenting with substances* appear to be co-existing risk factors. The findings regarding gender and age are consistent with the literature, as mentioned in the previous section. It has been reported that individuals with gaming addiction also develop substance addiction in adulthood (Burleigh et al., 2019).

Being an unemployed young woman and taking psychiatric medication were found to be the most prominent variables for being in the shopping addiction group. As mentioned in the previous sections, being young is a risk factor for all addictions and being female is a predictor for shopping addiction. Studies have shown that not working may be a risk factor for shopping addiction (Pavarin & Biolcati, 2015). The reason why the use of

psychiatric medication was found to be associated with shopping behavior may be due to the fact that some antidepressant derivatives trigger hypomania or mania in individuals and they turn to shopping behavior.

Risk Factor Models in Exercise Addiction

For exercise addiction, both a specific exercise cluster and a general exercise cluster that differed from the other three addictions were obtained as a result of the cluster analysis. The distinct nature of exercise addiction compared to other addictions may have caused the variables predicting other addictions such as smoking, alcohol and substance use to be ineffective in determining risk factors. According to the literature, the nature of exercise addiction is different from other addictions. It has been stated that it is a rare form of addiction compared to substance use and requires more physical effort and willpower (Berczik et al., 2012). Exercise is also used in the treatment of nicotine, alcohol and other substance addictions (Ünlü et al., 2023). The reason why smoking, alcohol use and substance experimentation variables were not found significant in the exercise groups in this study may be that exercise functions as a behavioural replacement therapy similar to other addiction treatments. Thus, exercise may have prevented the emergence of substance-related addictions in the addiction cluster.

In this study, the absence of a romantic relationship was found to be a risk factor in both exercise addiction groups. However, studies suggest that being single is not a variable that makes a difference for exercise (Allegre et al., 2007; Lejoyeux et al., 2012). Studies on the relationship between being unemployed and exercise addiction are limited. A study conducted in Spain reported that being unemployed was associated with exercise addiction (Berengüi et al., 2021). However, the findings in this study did not support the literature.

In conclusion, in line with the above findings, it can be argued that behavioral addictions accompany each other and that some sociodemographic variables, smoking, alcohol use and experiencing substance are determinants of this addiction pattern. Exercise addiction, on the other hand, does not accompany other behavioral addictions and differs from other addictions in terms of the explanatory power of sociodemographic and substance-related variables. Therefore, in future studies, it is recommended to consider the possibility of classifying excessive exercise behavior in a spectrum other than addiction.