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INTERMITTENT EXCESSIVE BEHAVIORS: DIFFERENCES IN ALCOHOL CONSUMPTION AND BINGE EATING BETWEEN YOUNG ADULTS OF RURAL AND URBAN AREAS

COMPORTAMIENTOS EXCESIVOS E INTERMITENTES: DIFERENCIAS EN EL CONSUMO DE ALCOHOL E INGESTA EN FORMA DE ATRACÓN ENTRE ADULTOS JÓVENES DE ÁREAS RURALES Y URBANAS

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Abstract

Introduction: Drug abuse and binge eating have been characterized as part of the so-called intermittent excessive behaviors, which share common neurobiological pathways. University students come from very different areas to access higher education, for example, rural environments, where some habits, education, and recreational options differ from those of people who grew up in the city. Contextual cues are crucial in the development of drug addiction, but little is known about the role that the living area where individuals grew up has on the development of intermittent excessive behaviors, such as binge eating and binge drinking. Objective: The main aim of this study was to explore the prevalence and comorbidity of alcohol consumption and binge eating behaviors in young adults (18-30 years), considering the living area where they grew up. Method: For this purpose, the AUDIT and the Binge Eating Scale were employed in a sample of 2461 undergraduates. Results: The results showed a significant proportion presenting a risky alcohol consumption pattern and a reduced proportion of people presenting binge eating behaviors. Interestingly, in both cases, there was a significant difference between groups, where rural students were more vulnerable to risky alcohol consumption and to developing maladaptive eating patterns.

Resumen

Introducción: La adicción a drogas y los atracones de comida se han caracterizado recientemente como parte de los llamados comportamientos excesivos e intermitentes, ya que comparten vías neurobiológicas comunes. Una tercera parte de los estudiantes universitarios proviene de entornos rurales, donde algunos hábitos, educación y opciones recreativas difieren de las de las personas que han crecido en la ciudad. El contexto es un factor crucial en el desarrollo de la adicción a las drogas, sin embargo, la relación del abuso de alcohol junto con atracones de comida y la influencia del entorno de origen en estos comportamientos ha sido poco estudiada. Objetivo: El objetivo principal de este estudio fue explorar la prevalencia y comorbilidad de las conductas de consumo de alcohol y atracones en adultos jóvenes (18-30 años), teniendo en cuenta el lugar de residencia donde crecieron. Método: Para ello se emplearon el AUDIT y la escala de trastorno por atracón (Binge Eating Scale) en una muestra de 2461 estudiantes universitarios. Resultados: Los resultados mostraron que una proporción significativa presentaba un patrón de consumo de alcohol de riesgo y una proporción reducida presentaba conductas de atracón. Se hallaron diferencias significativas, donde los estudiantes rurales fueron más vulnerables al consumo de riesgo de alcohol y al desarrollo de patrones alimentarios desadaptativos.

Keywords

alcohol, binge eating, university, rural, nutrition, students.

Palabras clave

alcohol, trastorno por atracón, universidad, rural, nutrición, estudiantes

Abbreviations:

AUDIT	Alcohol Use Disorders Identification Test
BD	Binge Drinking
BES	Binge Eating Scale
IEBS	Intermittent Excessive Behaviors

1. Introduction

Drug abuse and binge eating have been characterized as part of the so-called intermittent excessive behaviors (IEBs) (Corwin, 2006) and they share an important and common neurobiological pathway: the brain's reward system (Schulte et al., 2016). Both behaviors are characterized by a loss of control, an escalation in consumption and compulsive consumption, and a negative emotional state when reinforcement is not available (Swanson et al., 2011). Moreover, the value of this reinforcement (drug or palatable food) increases compared with the value of the remaining reinforcers, which are devaluated (Barson et al., 2009; Volkow et al., 2013). In addition, drug addiction is characterized by multiple relapses, which also occur in eating disorders (Gold, 2011).

On the one hand, alcohol is the most widely consumed substance worldwide and, during adolescence and youth, the consumption follows an intensive or binge pattern (binge drinking, BD) (The European Monitoring Centre for Drugs and Drug Addiction, [EMCDDA], 2020). Binge drinking consists of the intake of large amounts of alcohol (≥60 grams in men and ≥40 grams in women) in a short period of time (usually between 2-4 hours) (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2016; Sellés et al., 2016). On the other hand, the rates of overeating have increased dramatically in the last decade, especially among the young population (World Health Organization [WHO], 2019), where binge eating again becomes the main problem. Binge eating is characterized by excessive and intermittent palatable food intake in a short period of time, marked by feelings of lack of control (American Psychiatric Association [APA], 2013). Furthermore, these episodes are not usually driven by metabolic needs and occur in the absence of hunger and are referred to as hedonic eating (Escrivá-Martínez et al., 2020a).

In recent years, research has reported elevated comorbidity between alcohol and eating disorders. For example, previous studies reported that people that present high fat consumption show also higher alcohol consumption (Escrivá-Martínez et al., 2020b), that people with an alcohol use disorder experience binge-eating episodes frequently (Flores-Fresco et al., 2018; Root et al., 2010; Schulte et al., 2016), and that people seeking treatment for eating disorders also presented an elevated alcohol consumption (Conason & Sher, 2006; Wiederman & Pryor, 1996). Along this line, there are also several studies performed with animal models that demonstrated that exposure to a high-fat diet in a binge pattern during adolescence increases vulnerability to alcohol consumption in mice (Blanco-Gandía et al., 2017).

When discussing binge drinking or eating disorders, the adolescent and young adult population become the focus of interest, as both behaviors are especially prevalent in these life stages (Fouladi et al., 2015; Gomez et al., 2017; Kessler et al., 2013; Laghi et al., 2014). Young adults are used to consuming large amounts of fast food, high in sugars, fats, and calories (Blüher, 2019) and also large quantities of alcohol (EMCDDA, 2020). Despite the elevated comorbidity that has been reported, a large proportion of these young adults do not generally meet clinical criteria for either disorder. During youth, the central nervous system undergoes structural and functional remodeling, to end up forming the adult brain (Spear, 2013; Spear & Silveri, 2016; Toga et al., 2006). Youth is a period in which there is an increase in risk-taking behaviors, impulsivity, and novelty-seeking and, therefore, it is an especially vulnerable stage for the development of several psychiatric disorders (Bava & Tapert, 2010; Marzilli et al., 2018; Oliva et al., 2019). A few years ago, a study reported that there are two peaks where humans are more vulnerable to developing intermittent excessive behaviors, such as binge eating, which are the beginning of puberty and the end of adolescence (19-24 years) (Stice et al., 2013). In this sense, impulsivity could be why eating behavior and excessive alcohol intake present high comorbidity among young people (Mason et al., 2018; Ocampo et al., 2012; Steward et al., 2017).

But beyond neurobiological changes, the environment plays a crucial role in the development of maladaptive behaviors. The area where people live could be an important factor to take into account in the development of these intermittent excessive behaviors, as, in most cases, they were learned in the close environment. There are few studies on the differences in binge drinking and binge eating comparing young people from rural and urban areas, but it was found that those who live in rural areas have a greater risk of alcohol consumption (Donath et al., 2011; Iniesta et al., 2019; Obradors-Rial et al., 2014). A recent study by Lee & Um (2021) has indicated that urban adolescents (15 years old) tend to eat more fast food and exercise less than rural adolescents, also presenting a higher alcohol intake. However, those living in rural areas presented more stress and obesity levels, which indicates the need to better examine the factors determining these health habits in young people (Lee & Um, 2021). Among obesity rates, eating patterns become crucial for healthy habits, as some people binge but are not obese or do not present me-

tabolic consequences. To date, there are no studies comparing rural versus urban young adults that analyze these behavioral patterns, such as binge eating and binge drinking, which are characterized by intermittency and excess, and focused on obtaining reward and pleasure.

Thus, the main aim of the present work was to examine the prevalence of binge eating and binge drinking in an undergraduate population (19-30 years), which is an especially vulnerable period in life, and to determine possible differences between young people coming from rural versus urban areas. Further, due that previous studies have reported a positive relationship between emotional eating, external eating and food addiction with binge drinking (Escrivá-Martínez et al., 2020b), in the present study it was intended to explain this comorbidity with a mediational model, where binge eating would be acting as a possible mediation between the living area and alcohol consumption in undergraduates.

2. Material and Methods

2.1. Design

This study follows a cross-sectional design, where data were collected at one time-point in a sample of Spanish undergraduate students.

2.2. Participants

A total of 2605 participants were accessed, of whom only 2552 completed the whole questionnaire. Students came from 54 different degree studies in the branches of knowledge of Arts and Humanities (8.5%), Sciences (16.1%), Health Sciences (19.6%), Social and Legal Sciences (34.4%) and Engineering and Architecture (21.3%). Three inclusion criteria were considered: (a) being between 18 and 30 years old (early adulthood) and (b) being an undergraduate student. A total of 91 were excluded because they did not meet any of the inclusion criteria, leading to a final sample of 2461 students, 67.6% women (n = 1664), 32.4% men (n = 797), aged between 18-30 years (21.18 ± 2.5 years), of whom 38.4% (n = 945) came from rural areas, while 61.6% (n = 1516) came from urban areas of the region of Aragón, Spain. The prevalence of alcohol consumption was considered to be 93% and an absolute error of 1.1% (Encuesta sobre Alcohol y otras Drogas en España 2019-2020 [EDADES], Observatorio Español de las Drogas y las Adicciones, 2021).

2.3. Procedure

The type of sampling in this study was simple randomized, since all the university students had the same probability of participating in this study. Participation was completely voluntary. Students were requested to participate via the e-mail distribution list of their university. They received an e-mail explaining the purpose of the study, their data treatment, and the inclusion criteria, with a link to the online questionnaire. After accessing the questionnaire, they had to give their consent for the treatment of their data. Data were collected in April 2020 and the dataset can be found on Mendeley (Montagud-Romero et al., 2021).

2.4. Instruments

2.4.1 Sociodemographic questionnaire

This part of the survey was developed to gather information about sex, age, and place of origin. To categorize whether participants came from rural or urban areas, we asked them about their municipality of origin. Then, considering the classification of population density of the Organization for Economic Cooperation and Development (OECD, 1994), which establishes municipalities with values <150 inhabitants/km^2 as rural, we categorized manually all the responses as rural or urban areas.

2.4.2. Alcohol Use Disorders Identification Test

Alcohol consumption was assessed with the Alcohol Use Disorders Identification Test (AUDIT, Saunders et al., 1993), adapting the consumption items A2 and A3 to better screen for binge drinking in university students (Motos-Sellés et al., 2020). This instrument detects 98% of cases. Scores range between 0-40 points. In the present study the cut-off points were established in three subtypes: controlled consumption (1-5 women, 1-7 men), risky consumption (<13 for both women and men), and alcohol dependence (> 13) (García-Carretero et al., 2016). These cut-off points are more precise and validated in university population. In this work, Cronbach's alpha was .76.

2.4.3. Binge Eating Scale

Second, the Binge Eating Scale (BES, Gormally et al., 1982) was used in its version validated in Spanish undergraduates (Escrivá-Martínez et al., 2019). This self-report scale is made up of 16 items: The first 8 items describe behaviors (such as eating too fast, eating large amounts of food), and the remaining 8 items are related to feelings and thoughts or cognitions about food (for example, fear of not being able to stop eating). Most items had a response range from 0-3 (0 = *no severity of BES symptoms*; 3 = *serious problems of BES symptoms*). Items 6 and 16 in the version by Escrivá-Martínez et al. (2019) had only 3 levels (0-2). Thus, a total range of 0 to 46 points was obtained in binge-eating disorder symptoms. A score of 17 or fewer points indicates minimal food-related problems, a score between 18 and 26 indicates moderate binge-eating behaviors, and a score greater than 27 indicates severe binge-eating problems or binge-eating disorder. Cronbach's alpha for the sample of this study was .89.

2.5. Ethical considerations

This study was designed following the ethical principles of the International Declaration of Helsinki (World Medical Association [WMA], 2010) and obtained a favorable opinion from the region Research Ethics Committee (No. 04/2020, CEICA).

2.6. Data analyses

Firstly, means, standard deviations, reliabilities (Cronbach's alpha), and Pearson correlations were calculated. Then, an ANOVA was performed with a between-variable -Area (rural vs. urban)- for the AUDIT and the BES scores. Post hoc tests were performed with Bonferroni comparisons. One of the main novelties in binge eating and drinking patterns are the possible individual differences that can be given by the area of provenance. Due to the relationship between binge eating and binge drinking, we aimed to explore if scores in the BES could have a mediating role in this relationship. For this purpose, a mediational analysis was carried out through the macro-PROCESS v3.5 (Hayes, 2018), putting the area of origin (rural vs. urban) as the predictor or independent variable, the AUDIT score as the out-come variable and the BES score as mediator of interest. Mediation effects were calculated bootstrapped (k=10,000) and bias-corrected 95% confidence intervals (CI) were estimated for the indirect effects (Preacher, Rucker & Hayes, 2007). All statistical analyses were performed with SPSS-26 for Windows.

3. Results

3.1. Prevalence of alcohol consumption and binge eating behaviors

Descriptive statistics among the variables are shown in Table 1. The results obtained in the total AUDIT score showed that 7.4% (*n* = 182) of the young people did not consume alcohol, 43.7% (*n* = 1076) had controlled consumption, 37.7% (n = 927) presented risky consumption, and 11.2% (*n* = 276) met dependency criteria.

Regarding the scores in the Binge Eating Scale, 88.1% (*n* = 2168) of the sample had minimal food-related problems, 9.5% (*n* = 234) presented moderate binge-eating behaviors, and 2.4% (*n* = 59) obtained scores that could be considered as severe binge eating disorder. Pearson's correlations indicated a low but significant association between the AUDIT and BES total scores ($r = 0.120$, $p = 0.0001$).

Table 1. Descriptive data on the AUDIT and Binge Eating Scales as a function of living area

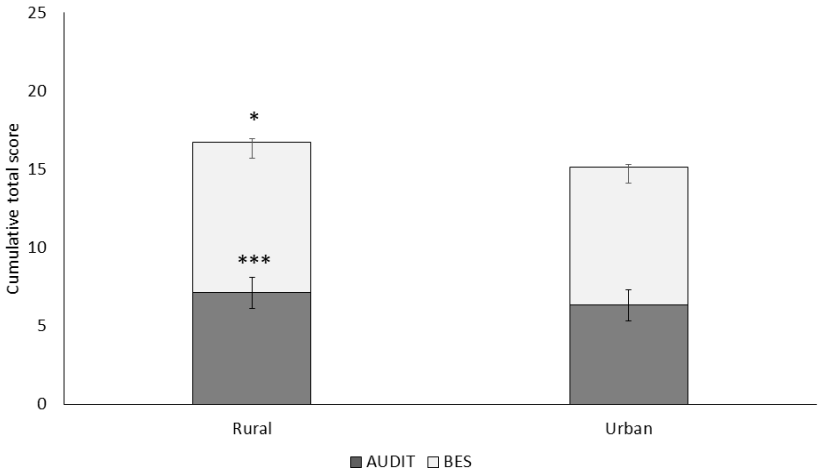
Variable	Area	M	SD	α
AUDIT	Rural	7.14	4.7	0.76
	Urban	6.33	4.7	
Binge Eating Scale	Rural	9.6	6.9	0.89
	Urban	8.8	6.9	

3.2. Rural vs. Urban comparisons

When comparing the results regarding the living area of the participants (see Figure 1), the ANOVA showed a statistically significant effect of the variable Area on alcohol consumption, $F(1, 2459 = 17.386$, $p < .001$, and binge eating behaviors, $F(1, 2459 = 5.984$, $p < .05$, where university students from rural areas obtained higher AUDIT scores (rural: $M = 7.14$, $SD = 4.7$; urban: $M = 6.33$, $SD = 4.7$) and Binge Eating scores (rural: $M = 9.6$, $SD = 6.9$; urban: $M = 8.8$, $SD = 6.9$) than those from urban areas.

Figure 1. Alcohol consumption and binge eating

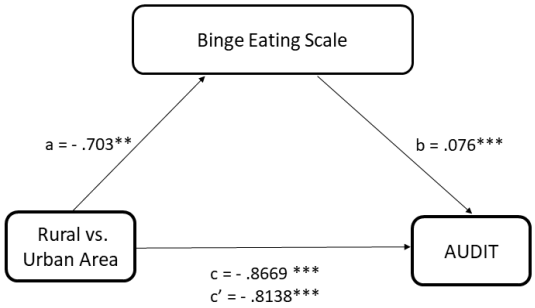
Cumulative total scores of AUDIT + Binge Eating Scale (BES) in participants of rural vs. urban areas.



Note: *p < .05, ***p < .001 indicate significant differences compared with urban individuals.

As there was a low positive correlation between BES and the AUDIT scores ($r = 0.120$; $p < .0001$), a mediational analysis was carried out to determine whether binge eating behaviors had a mediating effect between the area of origin and alcohol consumption in this sample of undergraduates. The results of this analysis showed that, as illustrated in Figure 2, the area from which students came significantly predicted the scores obtained on the Binge Eating Scale, which, in turn, was related to the scores obtained in the AUDIT total score, 95% confidence interval- CI [-.1070, -.0107].

Figure 2. Mediational analysis



Note: Mediational analysis where the living area predicts the total AUDIT scores through the mediation of the Binge Eating Scale (95%, CI [-.1070, -.0107]). ** $p \leq .01$. ** * $p \leq .001$.

4. Discussion

The impact of the living area and context on intermittent excessive behaviors like binge eating or drug abuse has been scarcely explored. Recent literature indicates that young adults are more vulnerable to developing these types of behaviors and that binge eating and binge drinking present high comorbidity in this population. However, this study is the first one that helps to elucidate one of the environmental factors that may be mediating this relationship, such as the context or living area of the young adults. Our main results indicate that young people who come from rural areas are more sensitive to developing intermittent excessive behaviors such as binge eating and binge drinking. Therefore, they are also more vulnerable to developing a future eating or substance use disorder. Moreover, the mediational analysis revealed that eating patterns may play a fundamental role in the increase of alcohol consumption in this student population that comes from rural areas.

Alcohol consumption is integrated into everyday life and has become a widely socially accepted legal substance. In this study, it was found that the proportion of abstainers was quite low, corroborating what previous studies have shown (Galán et al., 2014). In addition, the alcohol intake pattern has undergone a transition in the last 20 years, especially in adolescents and young people (including university students), becoming an episodic intake of large amounts of alcohol in a very short period of time, generally on weekends and holidays (Cortés-Tomás et al., 2010; Espejo et al., 2012; Patrick et al., 2019). The AUDIT test data showed that more than 35% of the university population in this study presented risky alcohol consumption, thus increasing their susceptibility to developing drug addiction problems in the future. The generalization of the consumption of alcoholic beverages in young people is socially accepted, as it is related to leisure, fun, and social practices (Franco et al., 2009; Merchán et al., 2014). Regarding the Binge Eating Scale, 88.1% of the sample did not present signs of binge eating behaviors, whereas 11.9% exhibited scores between moderate or severe binge eating behaviors. Several reports have informed that more than 30% of young people between 17-18 years consume salty snacks daily, as well as a high number of sweets and sugary soft drinks (daily and more than once) (WHO, 2015).

Both binge eating (mostly sugars and ultra-processed foods) and binge drinking are patterns of intensive, excessive, and intermittent consumption, which present clear common characteristics, such as a compulsive intake of the reward (drug or food), a loss of control of the intake, and negative emotional states and discomfort when the reward

is not available (Blanco-Gandía et al., 2021a; Gomez et al., 2017). Recent studies have highlighted the importance of the comorbidity of the two disorders, which are highly prevalent in this population (Escrivá-Martínez et al., 2020; Flores-Fresco et al., 2018; Sonneville et al., 2013). However, the directionality of the relationship between binge eating and binge drinking has hardly been studied, and the results are inconclusive (Escrivá-Martínez et al., 2020a). Some animal studies have demonstrated that binge eating increases vulnerability to drug use, such as alcohol and cocaine (Blanco-Gandía et al., 2017, 2021a, 2021b). This is the reason why in the present work binge eating acted as a mediator in our model. Furthermore, prospective studies in humans reported that binge eating predicts the risk of binge drinking and drug abuse (Field et al., 2012; Micali et al., 2015; Sonneville et al., 2013). In these studies, it has been suggested that disordered eating might induce negative emotions of guilt and shame, which are sometimes regulated through alcohol consumption (Caton et al., 2015). Regarding the rural context and depopulated areas, we found some psychosocial characteristics such as higher unemployment rates (Pinilla & Sáez, 2017), limited development of social relationships, and fewer leisure and recreational activities (Iniesta et al., 2019). Students from rural areas obtained higher scores both in the AUDIT and Binge Eating Scale. The first outcome could be explained by this limitation in recreational activities, which lead young adults to consume more alcohol and engage in celebrations and cultural traditions, which are generally celebrated by the whole town and are closely related to alcohol and food consumption (Rodríguez et al., 2003). Other studies have described that living in rural or urban areas can lead to differences in psychological variables and alcohol consumption, supporting the higher risk that people in rural areas have (Donath et al., 2011; Font- Ribera et al., 2013; Gallego et al., 2005; Iniesta et al., 2019; Obradors-Rial et al., 2014).

Some studies have shown that consumption of high-fat and sugar-rich diets can also increase alcohol use in university students, with high comorbidity between the two (Escrivá-Martínez et al., 2020a). Along the same lines, several studies suggest that the prevalence rates of eating disorders are higher in addicted population (Root et al., 2010). Concerning binge eating behaviors, there are no studies to date that have evaluated the relationship between binge eating episodes and the area or region to which individuals belong, although it is known that the context can be a key factor for the development of certain maladaptive excessive behaviors.

These findings invite us to broader the horizons in binge drinking prevention policies, as in the last years the possible influence of eating patterns and binge eating has been shown to be a crucial element. There are several individual and social factors that can precipitate or prevent possible risky drinking behaviors, such as the area of origin, where people in rural areas are placed in a more vulnerable position than young people living in urban areas. However, eating patterns are commonly forgotten as possible triggers of binge drinking. The results of the present work could be helpful in detecting people who show these intermittent excessive behaviors, such as binge eating or binge drinking, and improving interventions that address possible health risk behaviors during young adulthood. Some prevention strategies could detect adolescents living in rural areas that present alterations in their eating patterns, such as emotional eating or binge eating, that are beginning to drink in groups on the weekends, being a possible gateway to alcohol addiction. However, it is necessary to perform more studies about this relationship that can highlight the possible causality between the three variables studied in here.

5. Conclusions

More and more people are deciding to live in rural settings due to the multiple benefits that this environment provides. At the same time, people living in this type of area are in a particularly vulnerable situation at a psychosocial level, given the few leisure and recreational options, the limited social relations, and being focused on having fun and reward only through palatable food and alcohol. The analysis carried out in this study confirmed that the students' area of provenance is a significant predictor of the two intermittent excessive behaviors studied. People living in rural areas presented high scores on the Binge Eating Scale and, in turn, these behaviors facilitated high scores on the AUDIT. Therefore, we can affirm that risky alcohol consumption in rural youth is not only determined by their area of origin, as their attitudes to food are similar to those shown in alcohol consumption. As the literature has shown, we confirm that alcohol consumption and binge eating behaviors are related, but we add that the environment seems to determine whether these two behaviors become prevalent in university students.

Limitations

The present study presents several limitations that future research should consider. The fact that the sample only includes undergraduate students implies that this study cannot be generalized to the whole rural population, where there are also young people with low education and where the prevalence of the two behaviors has been found to be high. The instruments employed in this study are commonly used in previous research, but it would be interesting to take more measures, such as impulsivity or executive functions like inhibitory control, and also those related to eating behaviors which may be more sensitive to detect certain maladaptive patterns, such as the Eating Disorder Inventory-3, the Dutch Eating Behavior Questionnaire or the Yale Food Addiction Scale.

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Author contributions

All the authors contributed equally to the study and have approved the final version of the manuscript.

Conflict of interest

All authors declare that they have no competing interests.

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