

Article

Cannabis Use and Emotional Intelligence in Adolescents during COVID-19 Confinement: A Social Network Analysis Approach

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Abstract: Confinement by COVID-19 had negative consequences on adolescent mental health, including increased cannabis use. Cannabis is related to variables that influence health and well-being. Emotional Intelligence is associated with adaptive coping styles, peer relationships, and social-emotional competencies. In adolescence, peer selection plays a unique role in the initiation of substance use. However, there are no studies during a confinement stage that analyse the relationships between networks, Emotional Intelligence, and cannabis use. The aim of this paper is to describe and analyse the consumption and friendship networks of an adolescent classroom and their relationship with Emotional Intelligence, cannabis use, and gender during COVID-19 confinement. Participants completed different questionnaires for Emotional Intelligence, cannabis use, and the consumption and friendship network. The sample consisted of 21 students from 10th grade, of which 47.6% were consumers. The friendship network correlates with the consumption network, and significant associations between emotional repair and being a cannabis user. The regression model points to the friendship network as a significant variable in predicting the classroom use network. This study highlights the role of the Social Network Analysis in predicting consumption networks during a COVID-19 confinement stage and serves as a tool for cannabis use prevention interventions in a specific population.

Keywords: adolescents; cannabis; confinement; COVID-19; emotional intelligence; social network analysis



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1. Introduction

Numerous health-risk behaviours begin in adolescence [1], including cannabis use. In Spain, the age of onset of cannabis use is 14.9 years, where 3 out of 10 students aged 14–18 years admit to having used it at some point, and 19.3% of them have used it during the last 30 days [2]. Adolescence is a critical transitional period, with changes influenced by a range of biological and social processes, and with puberty potentially affecting young people's behaviour either because they see themselves differently or because other social agents respond to them in distinctive ways [3]. Thus, adolescence is a period of vulnerability in which the reward system is changing [4]. Dopamine is known as the reward molecule [5] and substance abuse increases dopamine activity which has an impact on their future functioning [6]. Thus, engaging in certain problem behaviours can change this system and lead to lifelong substance dependence [4]. In this regard, a review points to the important role of the adolescent reward system where gender differences exist, and points to the mesocorticolimbic pathway as central to changes in social reward and reward learning in adolescence. It also confirms that these adolescent reward circuits are highly vulnerable to social stress and drug abuse [7].

Substance use and abuse is a risk factor for young people's health, making them more likely to manifest social and personal problems and to develop poorer psychological adjustment and emotional competences [8]. In this sense, Emotional Intelligence (EI) is positively associated with adaptive coping styles, peer relationships, socioemotional competence, and social skills [9]. A systematic review determining the relationship between EI and the use of legal and illegal substances indicates that low levels of EI point to problematic substance use in all population groups [10]. In regard to the relationship between EI and early cannabis use, adolescents who pay too much attention to their emotions are more likely to use cannabis when offered by friends [11]. In adolescent relationship changes, peer influence becomes more important and this influence is able to explain their behaviour [12]. Young people tend to sort themselves into peer groups based on similar characteristics, providing a basis for approval, validation, and reinforcement of social identity [13]. Thus, Social Network Analysis (SNA) can be used to prevent adolescent risk behaviours, such as alcohol, tobacco [14], or cannabis use [15]. Peer processes are one of the most proximal risk factors for substance use during middle school and prior research indicates that peer selection plays a unique role in the development of substance use during adolescence [16]. Current evidence indicates that having friends or being linked to friendship networks with substance users increases the risk of using both initially and over time; therefore, SNA is needed to provide insight into these complex connection mechanisms [17]. Adolescents may feel more comfortable offering cannabis to their friends or trying it when it is offered by their friends [18]. In this sense, one of the strategies to achieve changes in behaviour is to use network properties, such as centrality, proximity, eigenvector, or betweenness to identify influential actors [19], where the eigenvector has been used to measure the popularity of adolescent substance use, such as tobacco [20].

In January 2020, the World Health Organization (WHO) declared COVID-19 as a global emergency [21]. School closures due to the pandemic have effected students' education [22]. Recent studies have already shown that during the COVID-19 pandemic, psychosocial changes have negatively affected young people's mental health and academic performance [23], including differences in gender and psychological impact, where female gender was associated with greater psychological impact, increased stress, anxiety, and depression [24]. Studies of cannabis use patterns in adolescents during the COVID-19 period are scarce. Contrary to what might be expected, cannabis use among adolescents did not decrease during the period of confinement.

All in all, the literature highlights the influence of friends on substance use, as well as the association between EI and cannabis use. However, no studies have been located that address these two issues through a social network analysis. Therefore, through a SNA approach, this study will contribute to understanding the behavioural patterns of young people during the period of home confinement due to COVID-19 and how these relate to cannabis use and EI. Thus, the objectives of the present study are as follows:

To describe cannabis use, EI, and the consumption and friendship networks of adolescents during the COVID-19 confinement.

To analyse the consumption and friendship networks and their relationship with adolescents' EI.

2. Materials and Methods

2.1. Study Design

A cross-sectional, descriptive, and correlational study was conducted in a public high school in a rural area of the El Bierzo region (Castilla y León, Spain). A non-probabilistic convenience population was selected.

2.2. Study Population

The population is composed of all students enrolled in 10th grade of high school in a center of León (Spain) during the 2019/2020 academic year. The criteria for selecting the class were that there should be a continuity with peers that would allow them to get to

know each other and be at the age at which they started using cannabis. The selected class had a total of 28 students of whom 21 agreed to participate in the study.

2.3. Variables and Measuring Instruments

Sociodemographic Data

This Section Includes Two Questions on the Age and Gender of the Participants.

Cannabis Use

The Spanish Survey on Drug Use in Secondary Education (ESTUDES) [2] was used to measure cannabis use. It consists of different items, classified by substance, from which those referring to the cannabis use were selected. The questionnaire consists of 10 items in which they were asked whether they were users and when they had last used cannabis (in their lifetime, in the last year, and in the last month). Finally, they were asked whether they would use cannabis if it were legal.

Emotional Intelligence

EI was evaluated through Trait Meta-Mood Scale [25] in its validated Spanish version (TMMS-24) [26]. It is composed of 24 items in three dimensions of eight items each: attention or being able to attend to feelings appropriately ($\alpha = 0.90$); clarity or understanding of emotional states ($\alpha = 0.90$) and repair, which can be defined as being able to regulate emotional states appropriately ($\alpha = 0.86$). Answers were scored using a five-point Likert-type scale (not at all, somewhat, quite a lot, very much, and completely).

Friendship and Consumption Networks

The friendship and consumption networks were identified. To determine the consumption network, students were asked to name only those peers in their class with whom they would consume. A distinction is made between a friendship network and a consumption network to determine whether patterns of association in substance use are maintained with friendship ties during home confinement, or whether, on the contrary, the influence that certain leading actors within the classroom may exert can lead to cannabis use. For the friendship network, students had to nominate their classmates from 0 or not sharing free time with them, to 4, almost always together. Previous research has used Likert scale to reflect the intensity of contact [27,28]. To create the friendship network, a symmetric network is created where for each participant who spends most of the time with a peer, the peer also names him or her with the same intensity, as has been done in similar studies [29,30].

2.4. Procedure

The data were collected through an online platform created for this purpose that allows for anonymity and confidentiality of the results. Data were obtained during the first half of May 2020 within the confinement period at home. The online questionnaire was carried out in different web programming languages, PHP (Zend, Minneapolis, MN, USA) and MySQL (Oracle, Santa Clara, CA, USA) for its dynamisation, together with a front-end based on HTML5 (World Wide Web Consortium (W3C), Cambridge, MA, USA), CSS (World Wide Web Consortium (W3C), Cambridge, MA, USA), JavaScript (Oracle, Santa Clara, CA, USA) (and jQuery (The OpenJS Foundation, San Francisco, CA, USA)), complying with different standards and measures that facilitate its visualisation on different devices (responsive design).

2.5. Data Analysis

SPSS v 26.0 software was used to analyse the frequencies and percentages of sociodemographic variables, cannabis use, and EI. Network analyses were conducted with UCINET v 26.0 and Net Draw software for their representation [31]. To obtain the network

data, a 21×21 matrix was created. The matrix was read as follows: for rows, "A nominates B" and for columns, "A is nominated by B".

The network metrics were expressed in their normalised values, which means that for each of them the measure was divided by its maximum value expressed as a percentage. The metrics used and their definition can be seen in Table 1. To analyse the data and the relationships between the two matrices and the variables EI, gender, and consumption, the quadratic assignment procedure (QAP) was used to develop standard errors to test whether significance of association exists between variables. Subsequently, multiple regression analyses (MRQAP) were applied via Double-Dekker Semi Partialling, modelling the dichotomous dependent variable (consumption network) with the rest of the matrices as independent, both incorporated in the UCINET program. For these analyses it was necessary to transform the results obtained in the different questionnaires into matrixes.

Table 1. Descriptive statistics for Emotional Intelligence.

EI dimension	Gender	M	SD	Min	Max
Attention	Men	22.22	8.80	13	40
	Women	23.67	4.50	14	29
Clarity	Men	23.11	8.12	12	34
	Women	19.25	5.85	9	27
Repair	Men	19.78	10.69	0	37
	Women	20.33	6.57	11	32

Note: M: Mean; SD: Standard Deviation; Min-Max: Minimum-Maximum.

2.6. Ethical Considerations

For minors to participate in the study, prior authorisation from their parents or legal guardians was necessary. The study data were processed in accordance with Constitutional Law 3/2018, of December 5, on the Protection of Personal Data and the guarantee of digital rights and the General Regulation on Data Protection of the European Union EU 2016/679 (RGPD).

The study was approved by the Ethics Committee of the University of León (ETICA-ULE-035-2019) and has the permission of the competent education authority of the region (Provincial Directorate of Education, Castilla y León).

3. Results

The sample consisted of 21 students, of which 57.1% were female ($n = 12$) and 42.9% ($n = 9$) were male. The mean age of the participants was 15.68 ± 0.75 years. Participants' self-report of cannabis use indicated that 47.6% ($n = 10$) were consumers. From the percentage of cannabis users, the following can be extracted: Regarding lifetime use, 9.5% ($n = 2$) report having used for more than 40 days, 9.5% ($n = 2$) between 10 and 19 days, and 23.9% ($n = 6$) for less than 3 days. The mean age of initiation for cannabis use was 14.44 ± 1.33 years. In terms of the form of consumption, 40% ($n = 4$) of the individuals reported never having consumed alone, 20% ($n = 2$) rarely or occasionally, and 10% of the individuals ($n = 1$) consumed alone quite often. Finally, 21.1% ($n = 4$) of individuals say that they would use cannabis if it were legal.

Regarding the mean scores obtained for the different dimensions of EI, attention was 23.05 ± 6.53 (min = 13; max = 40), for clarity 20.91 ± 6.99 (min = 9; max = 34), and for repair 20.09 ± 8.34 (min = 0; max = 37). To understand the meaning of these values, the results for each of the EI variables were segregated by gender of the participants (see Table 1). These results indicate that men have adequate attention and low emotional clarity and repair that should be improved. With respect to women, the results are low and need to be improved in all dimensions (attention, clarity, and repair).

The metrics for friendship and consumption networks can be found in Table 2. As can be seen, differences have been observed in the density and number of relationships for both networks; nevertheless, the results obtained in the rest of the analysis maintain

a similar line. Adolescents do not exclusively select their students for substance use. We found differences in the structure of the consumption network and the friendship network in the classroom. The consumption network has a lower density (0.12) and a total number of ties of 49, while the friendship network has a higher density of relationships (0.82) and a higher number of ties of 345.

Table 2. Network metrics and their definition.

Metric	Definition	Friendship Network M \pm ST (Min-Max)	Consumption Network M \pm ST (Min-Max)
Density	The total number of ties divided by the total number of possible ties	0.82 \pm 1.19	0.12 \pm 0.32
Indegree	The number of edges directed into a vertex in a directed graph	29.88 \pm 10.97 (11.25–48.75)	11.67 \pm 6.61 (5–30)
Closeness	The shortest paths between all nodes, then assigns each node a score based on its sum of shortest paths.	72.84 \pm 8.243 (62.50–86.96)	InCloseness: 6.592 \pm 0.399 (6.09–7.49) OutCloseness 19.05 \pm 23.73 (4.76–83.33)
Betweenness	The number of times a node lies on the shortest path between other nodes. Calculates the centrality of an actor based not only on their connections, but also based on the centrality of that actor's connections	2.06 \pm 1.56 (0.25–6.22)	1.43 \pm 3.09 (0–10.53)
Eigenvector	The clustering coefficient of an actor is the density of its open neighborhood.	28.16 \pm 12.62 (10.59–49.22)	26.41 \pm 15.97 (10.96–68.21)
Clustering Coefficient	Closeness to the core of each actor.	1.402	0.293
Coreness	The number of relations in the shortest possible walk from one actor to another	0.17 \pm 0.13 (0.003–0.38)	0.15 \pm 0.156 (0.01–0.57)
Geodesic Distance		1.39 \pm 0.49	1.89 \pm 0.87

Note: M: Mean; SD: Standard Deviation; Min-Max: Minimum-Maximum.

The representation of the consumption and friendship networks is shown in Figure 1. The size of the nodes varies according to the eigenvector. The other variables of interest represented are gender and whether the individual is a cannabis user.

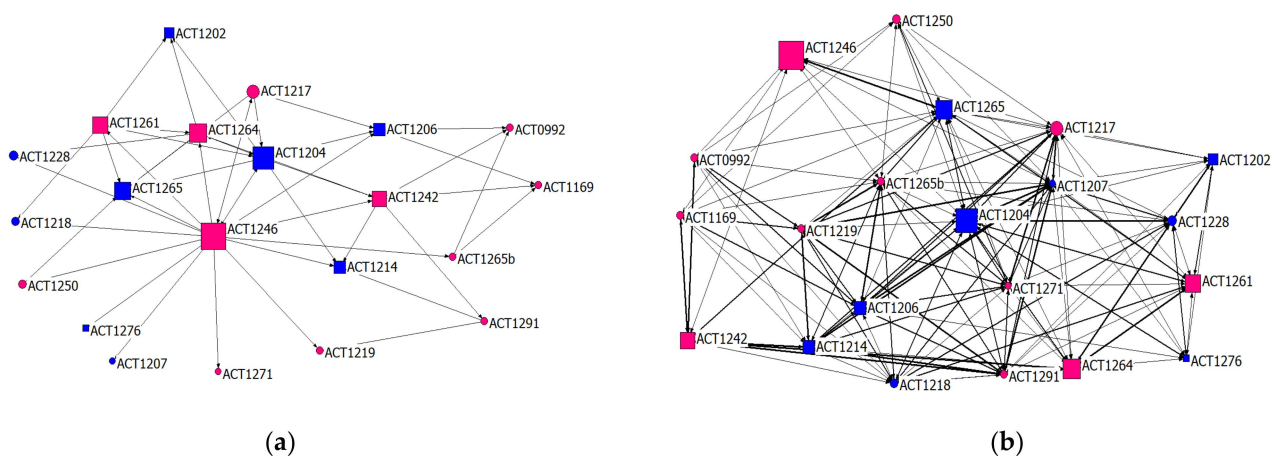


Figure 1. Consumption (a) and Friendship (b) networks. Colour: Gender (pink female, blue male). Shape: Consumption circle: non-consumer, square: consumer. Node size: eigenvector. Friendship network shows tie strength.

QAP correlation results can be seen in Table 3, where at a significance level $p < 0.01$ it can be stated that the two networks are positively correlated; however, their relationship is

weak (QAP = 0.16), also the consumption network is negatively correlated with emotional repair (QAP = 0.17; $p < 0.05$) and being a consumer is negatively related with emotional repair (QAP = 0.19; $p < 0.01$).

Table 3. QAP Correlations.

Variable	Consumption Network	Emotional Repair	Emotional Clarity	Emotional Attention	Cannabis Users	Gender
Emotional Repair	−0.17					
Emotional Clarity	−0.06	0.25 *				
Emotional Attention	−0.10	0.28	−0.02			
Cannabis Users	0.07	−0.20 **	0.02	−0.02		
Gender	−0.01	−0.01	−0.05	−0.09	0.07	
Friendship Network	0.17 **	0.01	0.07	0.10	−0.01	0.09

Note: This procedure allows to determine the association between networks for the EI and cannabis use variables data were transformed into relationship matrices, * $p < 0.05$, ** $p < 0.01$.

Subsequently, MRQAP regression analysis (see Table 4) was carried out to predict the selection of actors in the consumption network given the friendship network, the individuals' EI, gender, or whether they are cannabis users. Through MRQAP, a significant relationship was obtained between friendship and the consumption network, indicating that substance use is carried out with individuals they consider to be friends. On the other hand, there is no significant relationship between the results of the dimensions of Emotional Intelligence, sex, or being a cannabis user, and being chosen by their peers to consume. The model explains 6.43% of the variance in the classroom consumption network, with the friendship network being a significant factor in the formation of these ties. The intercept indicates that if an individual selects another actor to use together, the probability that they are friends is 0.18.

Table 4. MRQAP Regression.

Variables	Un-Stdized	Stdized Coef	<i>p</i> -Value	As Large	As Small	As Extreme	Perm Avg	Std Err
Emotional Repair	−0.01	−0.12	0.15	0.94	0.06	0.15	0.00	0.00
Emotional Clarity	−0.01	−0.05	0.51	0.72	0.28	0.51	0.00	0.00
Emotional Attention	−0.01	−0.09	0.20	0.91	0.09	0.20	0.00	0.00
Cannabis Users	0.03	0.05	0.25	0.13	0.87	0.25	0.00	0.03
Gender	−0.03	−0.04	0.33	0.84	0.16	0.33	0.00	0.03
Friendship Network	0.04	0.18	0.00	0.00	1.00	0.00	0.00	0.02
Intercept	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Discussion

The aim of the present study was to determine the relationships between cannabis consumption and friendship networks, EI, gender, and being a cannabis user in a sample of adolescent students from a network analysis approach during COVID-19 home confinement. The literature indicates that friendships influence cannabis use and this effect is stronger in mutual and reciprocal friendships [18]. In this sense, the results obtained in this

study report a significant association and relationship between the friendship network and the consumption network, although the effect of these is low.

A significant negative relationship has been found between emotional repair, being a cannabis user, and the classroom consumption network; however, the sample size of the present study results in a low statistical power, making it necessary to conduct further research. The literature indicates that EI is associated with cannabis use. A study conducted among Spanish adolescents shows that the dimension of attention correlates positively with cannabis use, while emotional clarity and repair are negatively associated [32]. Otherwise, a previous study conducted in Hungarian adolescents points to a weak relationship between EI and substance use, where multiple linear regression indicates that although it is not a key factor in use habits, it shows an individual effect on use [33]. During lockdown due to COVID-19, Spanish children showed a lower level of EI at intrapersonal, interpersonal, and adaptability levels, which highlights the negative influence of lockdown on children's EI [34]. Therefore, this may explain the negative relationship obtained with emotional repair and the cannabis use network. In the general population, improved EI may contribute to the adoption of self-care activities and be beneficial for reducing stress, physical, and mental health during the pandemic [35]. The results obtained in the present article indicate that the sample of adolescents has low levels of EI that need to be improved and that can lead them to a situation of risk for cannabis use, since the difficulty of regulating their emotions due to the lack of the necessary strategies has been seen to be able to explain the abuse of cannabis use among young people [36]. However, studies focusing on the adolescent population and EI during the confinement stage are scarce.

SNA can be used as an intervention strategy to promote behaviour change, where the size and composition of networks is of interest for the development of substance use prevention interventions [37]. In the early stages of the COVID-19 period, cannabis use does not seem to have changed among adolescents [38]. However, once the confinement was in place cannabis use increased, and adolescents who were more popular were more likely to use among peers, including with friends via technologies, such as sending messages, photos, or videos related to their use to friends privately through social networks sites, or also sharing this content publicly on their social media; on the contrary, those concerned about their reputation predicted a greater likelihood of using in face-to-face peer contexts [39]. These findings are consistent with the results presented in this article as the subjects point to individuals with whom they consumed during the period of confinement, so perhaps they either did not strictly adhere to the recommended measures or used the new technologies. Estimating the effects of peer selection and socialisation has advantages in advancing knowledge of adolescent substance use, with implications for the development of prevention and intervention programmes [16]. In this sense, youth substance use prevention programmes focus more on peer socialisation than on peer selection [40]. In those adolescents who change friends frequently, the possibility that a friend can influence an individual's behaviour is limited [41], so perhaps although a relationship is found between friendship and the consumption network in the present study, its effect is diminished by being in a situation of confinement. The centrality and cohesion of the clique to which adolescents belong exerts a certain degree of influence on leisure behaviour; a clique with strong cohesion highly affects leisure behaviour [42]. Moreover, in university students' selection and influence mechanisms contribute to the homophily of cannabis use, students are more likely to select others with similar lifetime and past 30-day cannabis use behaviours [43].

The results obtained in the present study demonstrate the role of SNA as a tool to implement prevention interventions, identifying the networks in the schools where individuals who are most at risk of initiating cannabis use are located. It is therefore important to carry out initiatives aimed at educating young people about the risks associated with cannabis use and teaching them to resist peer pressure [44]. SNA has been used to identify lead actors in a classroom and train them to deliver an intervention to prevent e-cigarette use, with higher student engagement and likelihood of recommending it to their friends

than the intervention delivered by experts [45]. Although a substance use intervention for adolescents may be successful, the impact of the school-based social networks in which they are immersed can influence their future behaviour with iatrogenic results.

The present study contributes to the field of the study of adolescent networks, cannabis use, and Emotional Intelligence during the stage of home confinement due to COVID-19. The methodology employed emphasises its novelty. In addition, it presents certain limitations that need to be considered. Firstly, the small sample size is not representative of the high school students who live in Spain, so the results should be interpreted with caution, especially regarding the regression model obtained. The sample size, along with the limited geographical region where the study was conducted, makes the results not generalisable. In addition, we must point out the possible response bias in answering the questionnaires. As this is a cross-sectional research study, it is not possible to determine the effect of confinement; however, it would be of interest to implement longitudinal and/or experimental methodologies that would allow us to verify healthy changes in this group.

5. Conclusions

To our knowledge there are no studies relating cannabis use during the stage of home confinement due to COVID-19 in the adolescent population and relating it to the SNA and Emotional Intelligence. By means of the SNA, we can identify how the central actors in the network are cannabis users within the consumption network, being perfectly identified by their peers as users. On the other hand, in the friendship network, these individuals are found in both central and peripheral positions and maintain strong friendship ties with the rest of the peers, but especially with those who are also users.

The results of this study indicate that substance use can take place in situations where adolescents are in confinement due to the COVID-19 pandemic, and, in addition, they can continue to use with their classmates, although, due to the situation experienced, it is possible that this use was carried out using new technologies.

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Informed Consent Statement: Written informed consent has been obtained from the subjects involved in the study.

Data Availability Statement: The data processed in this article are part of a doctoral thesis in progress. They will be available on request from the corresponding author after exploitation.

Conflicts of Interest: The authors declare no conflict of interest.

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