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& Developmental Adolescent Health

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Contents

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When the authors are up to 6 they are all listed. If there are seven or more, list the first 6 and add et al. Journal names are listed in the listed in the abbreviated form with the style used

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Tsitsika AK, Andrie EK, Psaltopoulou T, Tzavara CK, Sergentanis TN, Ntanasis-Stathopoulos I, et al. Association between problematic internet use, socio-demographic variables and obesity among European adolescents. Eur J Public Health 2016;26(4):617-622.

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Jameson JL, Kopp P. Principles of human genetics. In: Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jameson JL, editors. Harrison's principles of internal medicine. 16th ed. New York: McGraw-Hill; 2005. pp. 359-379.

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World Health Organization. Adolescent health. Available from: https://www.who.int/maternal_child_adolescent/adolescence/en/ [accessed 2020 Jan 06].

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Figure 1. Diagrams describing the height of the participating adolescents, (a) boys, (b) girls

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Editorial

Dear colleagues,

in the second issue of Volume 2 of the Journal Developmental and Adolescent Health (JDAH), original research articles have a leading role.

There is an original research article studying sexual practices in relation to psychosocial status, in a sample of 1096 adolescents in Greece, revealing very interesting data. Another original research article is focusing on mutual empathy of vulnerable students and teachers and the impact on students' personal well-being and academic performance during the COVID-19 pandemic, also highlighting points of online education. The third original research is presenting the ENABLE European Project, a combined model of socio-emotional learning and peer support against bullying, which has been applied in both primary and secondary education school units.

This issue also offers two review articles : one systematic review concerning the prevalence of Idiopathic Precocious Puberty in girls, during the Covid-19 period, which seems to have been influenced by BMI increase, overuse of electronic devices and psychological stress and one literature review focusing on Cannabis use by adolescents in Greece, in comparison to European and Worldwide context.

We hope that you will find interest in our new issue, which offers valuable original findings and important information about hot topics concerning adolescent health, especially during the pandemic era.

On behalf of the editorial team and content management of JDAH,

Artemis K. Tsitsika MD, PhD
As. Professor in Pediatrics-Adolescent Medicine
Head of the Adolescent Health Unit (A.H.U.)
Chair of "Str. Of Developmental & Adolescent Health" MSc
National and Kapodistrian University of Athens, Greece
President of the Hellenic Society for Adolescent Medicine/Health
Editor in Chief of the Journal of Developmental & Adolescent Health (JDAH)

Sexual practices in relation to psychosocial status of Greek adolescents

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ABSTRACT

Sexual behavior is considered to be an important aspect in adolescents' life and constitutes the focus of this study, as it may have consequences in physical and mental health. In the current study 1096 adolescents participated, with mean age 15 years, while qualitative methodology was used. The results presented were varied. Adolescents who were sexually active had higher scores in conduct problems scales and hyperactivity. Adolescents who were forced to have sex, had higher scores in all scales, except from pro-social scale and in total score, while adolescents with higher academic performance in last year (scoring 18 to 20 out of 20 rating scores) were less likely to have sexual experiences comparing to adolescents with grades under 15 out of 20. Finally, preventive and educational measures for students in sexuality could prevent negative consequences and challenges could be faced.

Key Words: *Adolescence, Sexual behavior, Sexuality, Psychosocial Functionality, Qualitative study*

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Introduction

The expression of sexuality is one of the basic characteristics of puberty and is linked to adolescence (1). Sexuality in adolescence has preoccupied many scientists for decades. The way it relates to psychosocial functionality, is an issue that has also been the subject of global scientific dialogue. The last few years, adolescents are reported to start their sexual activity earlier than older generations. The age group for initiating sexual activity varies according to ethnicity and culture. According to the results of a Pan-Hellenic survey on behaviors related to the health of adolescent students (HBSC / WHO survey), a high percentage of 15-year-old adolescents in Greece (35.0% - mostly boys) report that they had at least one complete sexual intercourse in their life.

That does not necessarily mean that primary sexual experiences are desirable, pleasant or successful. In adolescence, there are many changes regarding sexual hormones which might raise sexual desire leading to sexuality and sexual identity issues (2). In this stage, experimenting with sexual behaviors is natural and expected. Immaturity and lack of knowledge could lead to high-risk behaviors, prior to develop mechanism to protect from them.

Adolescents' sexual activity and experience are various depending on gender, age or cultural differences (3). Social factors and cultural rules are associated with beginning of sexual activity in adolescents. In general, family, educational level and academic performance could affect the decision of sexual engagement. For instance, late sexual activity is linked to higher academic performance and better decision making. Many teenagers delay their sexual activity, due to academic performance focus and vice versa (4). Moreover, early sexual activity, combining with no or partial condom use, raises the risk for adolescent pregnancy and sexual transmitted diseases, while predisposing to continued risky behaviors. In Greece, the ideal conditions for contraception are far from the guidelines. The most common contraceptive method for adolescents is abstinence, following by men's condom, while percentages of contraception pills usage are only 4%, comparing to US where the percentage is 45% (5). At the same time, while different contraceptive methods are used abroad, such as contraceptive patch, DMPA contraceptive injection, vaginal ring, diaphragm and cervical cap, in Greece they are rarely or no used at all.

Furthermore, several studies have mentioned relations between sexual abuse in childhood and poor physical health later in life (6). More than 18 million children under 18 years are abused, while 13.4% of girls and 5.7% of boys are reporting sexual abuse (7).

The purpose of this study is to research the sexuality of adolescents, the behaviors adolescents follow concerning sexual intercourse, their sexual activities and whether they use protection or not and the general sexuality conception. In addition, the possible effects of sexuality on the mental health of the adolescents is studied, with a broader goal to understand these issues in order to suggest possible solutions to what is troubling adolescents.

Methods

The current study was conducted under the research program of MSc "Strategies of Developmental and Adolescent Health", School of Medicine, National and Kapodistrian University of Athens, entitled "What happens in adolescence?". The sample consisted of 1100 students (50.6% girls) with mean age 15 years (SD= 0.7 years), of secondary and high school, during 2018-2019 and 2019-2020 across Greece. Students from several cities of Greece, namely Maroussi, Ilion, Ioannina, Corfu, Cyclades, Pallini, Paros, Tavros and Chania participated. Proper information in parents and carers was provided and consent of participation of their children in the study was requested.

The questionnaire included questions concerning habits, experiences and knowledge about sexual education, body image, adopting sexuality standards, behaviors related to technology use, bullying etc and was based and consist of the following scales:

1. Socio-demographic characteristics, such as gender, age, family status, parents' profession, origin, academic performance etc.

2. Eating Attitudes Test- 26 item (EAT-26). The questionnaire identifies the possible appearance of eating disorder or disturbed way of eating and consists of 26 items (8).

3. Items related to Internet usage and behavior (frequency, location, applications).

4. Items related to Bullying – Cyberbullying. Those items were also used in the EU NET ADB study (9).

5. Internet Addiction Test-Short Version (IAT). The Short form is consisted of 20 questions and those questions were also used in the EU NET ADB study (10).

6. Smartphone Addiction Scale – Short Version (SAS-SV). The scale consists of questions regarding pathological usage of electronic devices such as smartphones, tablets etc (11).

7. Sexuality and Adolescence. Questions were used in previous study, which was published in Greek and Foreign journals (12).

8. Sexualization. The questions estimate the adoption of standards from adolescents as promoted by media.

9. Strengths and Difficulties Questionnaire (SDQ-Hel) Greek Version. The self-report questionnaire consisted of 25 questions, regarding mood disorders, conduct problems and general adaption of children 11-17 years. Specialized personnel using appropriate data sheet processed data from questionnaires. Data analysis performed under SPSS statistical package.

Qualitative values were described as Standard Deviations (SDs), while quantitative as absolute and relative frequencies. Independent t-test samples of students were used in order to compare mean values between boys and girls. Ratios were compared using x2 test and Fisher's exact test. Linear regression analysis was used to estimate the correlations of the SDQ subscales and the overall score with sexual behaviors after controlling for gender and age. Adjusted regression coefficients (b) with Standard Errors (SE) were calculated from the results of the linear regression models. In order to find independent factors related to sexual activity or sexual intercourse or forced intercourse, multiple linear regression models were used in a progressed method (P for subtraction was set to .1 and P for input was set to at .05). Independent values which were used in the models ware gender, age, origin, academic performance in previous year, residence status, parents' profession and working condition. Adjusted probability ratios with 95% Confidence Intervals were calculated from the results of the linear regression analysis. All P values listed are 2-tailed. The statistical significance was set at 0.05 and the analyses were performed using the statistical software SPSS (version 22.0).

Results

Data from 1096 adolescents, 541 boys (49.4%) and 555 girls (50.6%) were analyzed. Table 1 contains the demographic characteristics of the sample and the scales of SDQ. Almost all adolescents were born in Greece (96.3%) and 43.9% had high academic performance in previous year (over 18/20), while 39% had medium (15-17.9/20) and 17.1% had lower (under 15/20). 83.1% lived with both parents, while 15.8% lived with only one parent. Furthermore, the majority of teenagers had at least one parent with university degree; in 92.8% of adolescents the father worked and in 78.4% the mother. The educational status of father and mother was mainly university level education. Total SDQ score was 6.09% approximately (Table 1).

Table 1. Demographic characteristics

	N (%)
Gender	
Boys	541 (49.4)
Girls	555 (50.6)
Age, Mean (SD)	15.0 (0.7)
Born in Greece	1051 (96.3)
Academic performance in previous yea	
<15	186 (17.1)
15-17.9	424 (39.0)
18-	478 (43.9)
Residence status	
With both parents	897 (83.1)
With one parent	171 (15.8)
Other	11 (1.0)
Working father	987 (92.8)
Woriking mother	839 (78.4)
Educational level of father	
Primary school	193 (18.4)
High School	373 (35.6)
University	483 (46.0)
Educational level of mother	
Primary school	109 (10.3)
High school	342 (32.2)
University	610 (57.5)
Emotional	3.22 (2.58)
Conduct problems	3.12 (1.84)
Hyperactivity	3.31 (2.19)
Peer related problems	2.37 (1.86)
Social	7.39 (2.02)
Total SDQ score	11.98 (6.09)

Data related to sexual activity of adolescents are presented in Table 2, concerning the total sample and by gender. Boys had higher percentage (70.9%) in reporting relationship with girls of same age, while girls had also a high percentage (63.8%) in reporting relationship with boys of same age. Homosexual relationships reported by more girls than boys (8% to 6.8%). Furthermore, 68.4% of adolescents were sexual active and there was not significant difference between boys and girls. As sexual activity, intercourse is referred by 21.6% and touching by 48.7%. Girls had higher percentage in kissing experience than boys (82.4% to 65.3%), but in sexual intercourse, boys recorded higher experience (28.6% to 14.7%). Additionally, boys were reported to begin their sexual life earlier than girls (13.5 years to 13.9 years). Forced intercourse was observed in both genders in a significant percentage (8.6%), which is referred to 83 adolescents per 1096 individuals (Table 2).

Table 2. Sexual activity in total sample and by gender

	Total sample N=1096	Boys N=541	Girls N=555	
	N (%)	N (%)	N (%)	P
Have you ever had relationship with girl of same age	392 (41.2)	355 (70.9)	36 (8.0)	<.001+
Have you ever had relationship with boy of same age	372 (39.2)	28 (6.8)	344 (63.8)	<.001+
Sexual axtivity	703 (68.4)	350 (70.6)	353 (66.5)	.159+
If yes define:				
Kissing	519 (73.9)	228 (65.3)	291 (82.4)	<.001+
Touching	342 (48.7)	181 (51.9)	161 (45.6)	.097+
Intercourse	152 (21.6)	100 (28.6)	52 (14.7)	<.001+
Other	112 (16.0)	67 (19.4)	45 (12.7)	.017+
Age of first sexual experience, Mean (SD)	13.7 (1.5)	13.5 (1.6)	13.9 (1.3)	<.001‡
Forced intercourse	83 (8.6)	40 (8.6)	43 (8.5)	.969+

According to Table 3, during the first intercourse, 26% (n=44) of the adolescents did not use contraception (25.2% boys and 27.4% girls), while the number decreased to 32 adolescents during their last intercourse (33%). Additionally, 119 adolescents (70.4%) used condom during their first intercourse, while in the last the percentage decreases to 61.9% (n=60). Very few estimated their fertile days as a way for protection and no one used contraceptive pill. Emergency contraception (morning after pill) was usually used during last sexual intercourse, but in extremely small percentages (Table 3).

A linear regression analysis was conducted with depended values the SDQ scales and independent the sexual behaviors of sexual active adolescents adjusted for gender and age (Table 4). Sexually active adolescents had significant higher scores in conduct problems scales and hyperactivity. In addition, those who had a sexual intercourse some time in their lives had more conduct problems, hyperactivity and higher score in total score. The adolescents, who were forced to intercourse, had more problems in all scales, except from social scale (Table 4).

After multiple linear regression analysis, with dependent value the sexual experience of participants, it was found that the older age was associated with greater probability of sexual experience (Table 5). Teenagers with working mother had also greater possibility to have sexual experience. On the contrary, adolescents with higher academic performance during previous year (scoring 18 to 20 out of 20 rating scores) were less likely to have sexual experience

Table 3. Contraception usage in total sample and by gender

Contraception usage		Total sample N (%)	Boys N (%)	Girls N (%)	P++
During first intercourse					
	None	44 (26.0)	27 (25.2)	17 (27.4)	.162
	Condom	119 (70.4)	78 (72.9)	41 (66.1)	
	Contraception pill	0 (0.0)	0 (0.0)	0 (0.0)	
	Fertile days estimation	5 (3.0)	1 (0.9)	4 (6.5)	
	Emergency contraception	0 (0.0)	0 (0.0)	0 (0.0)	
	Other	1 (0.6)	1 (0.9)	0 (0.0)	
During last intercourse					
	None	32 (33)	16 (29.6)	16 (37.2)	.316
	Condom	60 (61.9)	36 (66.7)	24 (55.8)	
	Contraception pill	0 (0.0)	0 (0.0)	0 (0.0)	
	Fertile days estimation	2 (2.1)	0 (0.0)	2 (4.7)	
	Emergency contraception	3 (3.1)	2 (3.7)	1 (2.3)	
	Other	0 (0.0)	0 (0.0)	0 (0.0)	

Table 4. Association of sexual activity with SDQ scales adjusted for gender and age

	Sexual activity		Had sexual intercourse some time in their lives		Forced intercourse	
	β (SE)+	P	β (SE)+	P	β (SE)+	P
Emotional	0.12 (0.17)	.490	0.15 (0.24)	.513	1 (0.3)	.001
Conduct problems	0.65 (0.13)	<.001	0.9 (0.17)	<.001	0.64 (0.23)	.005
Hyperactivity	0.42 (0.15)	.007	0.5 (0.21)	.016	0.98 (0.26)	<.001
Peers related problems	-0.18 (0.13)	.156	0.41 (0.18)	.022	0.85 (0.22)	<.001
Social	0.02 (0.14)	.873	-0.21 (0.19)	.254	0.07 (0.24)	.763
Total SDQ score	0.78 (0.43)	.071	1.86 (0.59)	.002	3.55 (0.75)	<.001

+ Adjusted regression coefficients (β) with Standard Errors (SE) for age and gender

experience comparing to adolescents with academic performance under 15. Furthermore, adolescents with mothers with educational level of high school and mothers with university degree were more likely to have sexual experience. Girls had less possibility to have sexual intercourse and older age was associated with sexual intercourse possibility. In addition, girls started their sexual activity in older age comparing to boys. Finally, adolescents with higher academic performance during previous year (15-17.9 and 18 to 20) had less possibility of having sexual intercourse than teenagers with lower academic performance (Table 5).

Adolescents living with one parent were more likely to have sexual intercourse than those living with both parents. When dependent value was forced intercourse, it was found that adolescents with higher academic performance during previous year (18 to 20) were less likely to be forced in sexual intercourse than those with lower academic performance. Teenagers with working mother had higher possibility to be forced into sexual intercourse some time in their lives. Students with academic performance reported having a sexual experience some time in their lives (Table 5).

There was not significant difference in both gender concerning having sexual intercourse some time in their lives, and none of the genders was forced to have sexual intercourse. There was not, also, significant difference between those born in Greece with those who did not. Family status and profession of parents did not significant associated with the occurrence or not of sexual experience between adolescents and forced intercourse (Table 5).

Discussion

Adolescence is a period of intense development and great change. Great concerns raised by researchers concerning adolescents' sexual health and their activities.

According to the study, adolescents who were sexually active had higher scores in conduct problems scale and hyperactivity (SDQ). Studies reported that individuals who were sexually abused in childhood, presented conduct problems which are mostly reported in boys (13). Girls also present those problems but not in that intense and complexity as boys. How and why sexuality affects problematic behavior is not yet know. There is no theory or reference to confirm that.

Adolescents who were forced to have sexual intercourse had problems in all scales, except from social scale. This is of high importance since forced intercourse might lead to mental health issues (14). Victims of sexual abuse feel sorrow, anger, depression and have suicidal thoughts that may lead to high-risk behaviors (15). The impact of a rape may take years to be present. Thus, individuals who were sexually abused in childhood or adolescence may struggle with social relationships (16).

The older age was associated with great possibility of sex ual experience. This is natural because adolescence last more than a decade in western societies. In some culture such as the Roma, this may not be applicable. Furthermore, adolescents with working mothers were more likely to have sexual experience. In other studies, there was not a significant association between financial status and parental profession with sexual experience of children (17). Middle class parents seems to talk more to their children, guide them and consult them about contraception. Children who communicate with their parents were more likely to start their sexual life in older age (18).

On the contrary, adolescents with higher academic performance during previous year (18 to 20) had less possibility to have sexual experience comparing to adolescents with lower academic performance (under 15). This could be interpreted as adolescents interested more in their studies and present concerns regarding life. Furthermore, they set higher goal and they are trying to achieve them, through consistency and organization. Teenagers with mothers with high school diploma and university degree were more likely to have sexual experience. In addition, adolescents living with only one parent had greater probability to have intercourse than those living with both parents. This may occur due to lack of guidance and role models. When dependent value was forced intercourse, it was found that adolescents with higher academic performance during previous year (18 to 20) were less likely to be forced into sexual intercourse than adolescents with lower academic performance (under 15). A finding like this requires further investigation and theory, in order to understand why this happens. In addition, teenagers with working mothers were more likely to be forced into sexual intercourse some time in their lives. In our study, 68.4% of adolescents had sexual experience and there was not significant association between boys and girls. In another study with 1072 participants, 73.6% had sexual experience (19).

Concerning contraceptive methods in Tsitsika et al. (2014) study (19), in their last intercourse, adolescents use

Table 5. Results from multiple regression analysis for sexual experience, sexual intercourse and forced intercourse

		Sexual experience		Had sexual intercourse some time in their life		Forced intercourse	
		OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P
Gender							
	Boys						
	Girls	0.87 (0.65 – 1.16)	.347	0.45 (0.30 – 0.67)	<.001	1.16 (0.71 – 1.91)	.550
Age		1.42 (1.17 – 1.74)	<.001	1.66 (1.28 – 2.15)	<.001	0.97 (0.69 – 1.36)	.860
Born in Greece							
	No						
	Yes	1.11 (0.51 – 2.44)	.795	0.59 (0.22 – 1.54)	.279	3.38 (0.44 – 26.26)	.244
Academic performance in previous year							
	<15						
	15-17.9	0.79 (0.50 – 1.26)	.328	0.56 (0.34 – 0.92)	.023	0.88 (0.44 – 1.75)	.715
	18-20	0.47 (0.29 – 0.75)	.001	0.32 (0.18 – 0.56)	<.001	0.45 (0.21 – 0.95)	.035
Residence status							
	With both parents						
	With one parent	1.04 (0.69 – 1.59)	.841	2.12 (1.34 – 3.35)	.001	1.08 (0.57 – 2.06)	.808
	Other	0.41 (0.08 – 2.16)	.290	-++		-++	
Working father							
	No						
	Yes	1.26 (0.73 – 2.19)	.404	1.34 (0.58 – 3.12)	.491	0.46 (0.20 – 1.04)	.063
Working mother							
	No						
	Yes	1.49 (1.06 – 2.09)	.023	1.43 (0.87 – 2.35)	.160	2.44 (1.13 – 5.29)	.024
Educational level of father							
	Primary school						
	High school	1.46 (0.95 – 2.24)	.082	0.81 (0.46 – 1.43)	.473	1.35 (0.63 – 2.90)	.439
	University	1.08 (0.70 – 1.67)	.721	0.90 (0.51 – 1.61)	.733	1.48 (0.68 – 3.22)	.327
Educational level of mother							
	Primary school						

condom by 79.1%, while in this study the percentage was 60%. No protection was reported by 32% of adolescents in this study, comparing to 1.5% in Tsitsika et al. (2014). In addition, 3.4% did not use any contraceptive methods and 79.9% used condom (19). In this study, 26% did not use any contraceptive methods and 70.4% used condom, and the mean age of first intercourse was 13.7 years, while in Tsitsika et al. (2014) was 14.5 years (19).

How and why sexual experience affects problematic behavior is yet to know. In Tsitsika et al. (2014), was reported that early beginning in sexual activities in girls was associated with depressive symptoms, which was not present in this study (19). Adolescent boys who were sexually experienced, tended to externalize their problems more often, as reported in both studies. However, in the present study nor in the other study (Tsitsika et al, 2014) is not known whether psychological problems lead to premature sexual intercourse or if the opposite happens (19). A decrease in years of sexual activity beginning and increase in the absence of protection during sexual activities among adolescents.

Finally, family status, origin and parental profession affect sexual experience in adolescents. Teens who have established a healthy parental relationship tend to avoid having an early sexual experience (20). Family structure seems to affect the sexuality of adolescents. Thus, girls with single parents tended to begin earlier their sexual life. Individuals from homosexual families did not face any problems with their sexuality or sexual orientation. Nevertheless, those studies provide multiple findings (21). Adolescents with parents of high educational level are not in risk for sexual intercourse and do not have multiple sexual partners (22).

The present study presented some limitations, as the relatively small sample size and the use of the quantitative method. A larger sample survey should be conducted in order to extract results that are more valid for adolescents, so that could be generalized. Qualitative research method mixed with quantitative, could provide better results and more in depth analysis. Recall bias did not strongly affect, as the nature of the questionnaire (validity, reliability) makes it capable of dealing with such methodological issues. Concerning strengths, this study contributes to the research dialogue about adolescence. It is a research focused only on adolescent's sexuality with a large sample and a versatile tool, connecting sexuality with psychosocial functionality.

Conclusions

Adolescence is a developmental period of great importance. Since sexual experience is intertwined with normality and life and since adolescents are a vulnerable group due to their characteristics, special emphasis should be given on prevention and appropriate education on these issues. This will help both society and adolescents to cope with the difficulties of modern life. The current study tried to follow that direction and become a reference to adolescents' well-being.

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Mutual empathy of vulnerable students and teachers and its impact on students' personal well-being and academic performance through the online school operated by the Regional Directorate of Education of Attica, Greece during the Covid-19 pandemic.

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ABSTRACT

Purpose: The rapid shift to full online synchronous and asynchronous learning in response to the global pandemic has led to experimenting innovative online learning practices at school level. The present research study summarises the experience gained from the implementation of the Online School of the Regional Directorate of Education of Attica during the academic year 2020-2021. It investigates the impact of mutual empathy on the students' academic performance and well-being through the Online school operation in Covid-19 period.

Methods: In the present research, fifteen (15) vulnerable teachers and six (6) students participating in the Online School were questioned through open interviews after the implementation of Online School during the Covid-19 pandemic in Greece.

Results: Vulnerable students and teachers shared empathy to a sufficient degree through the Online School operation which provided a safe and convenient learning environment. Empathy was positively correlated to academic performance of students through their participation in the Online School.

Conclusion: It appears that the Online School has provided a solution to the existing risk of isolation and marginalization of vulnerable students while reducing family anxiety for their cognitive and socio-emotional development. Finally, it has provided opportunities for teachers to work on their own pace according to individual needs and be able to cope with students' needs through implementing alternative teaching practices with the use of digital tools.

Key Words: *Online School, synchronous and asynchronous learning, vulnerable students and teachers, empathy, academic performance, well-being.*

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Introduction

The Covid-19 pandemic has affected all areas of personal and community life in Greece, leaving an imprint on education and training. The temporary school closure and the restrictive measures taken have resulted, within a short period of time, in a remarkable shift from face-to-face education to distance online education. Thus, the online educational approach, a combination of asynchronous and synchronous learning has revealed a great number of opportunities as well as challenges due to internet dysfunction among adolescents [1].

In addition, the integration of digital tools in school practice is gradually expanding, thus further supporting teaching and learning and allowing online access to a variety of school subjects from anywhere and at any time [2, 3].Students and teachers interact either at the same time or at different times and / or different places [4].

Studies on asynchronous online learning stress that students experience meaningful learning when engaged in participatory learning environments [5]. Learners have opportunities to actively participate in their own learning in a heterogeneous learning environment, to spontaneously interact with their classmates and to demonstrate their learning achievements [6]. Asynchronous online learning promotes interaction and collaboration among students through blogs, email, chat, discussion forums, quizzes, self-assessment tests with feedback, etc. [7]. Synchronous learning, on the other, is an educational communication mode where the student and the teacher, at the same time, co-exist in the same or in a different place, in order for the learning to take place [6, 7]. The students and the teacher are physically separated only in terms of place and not in terms of time, while teaching and communication are provided through technological tools [8]. Synchronous digital tools can enrich the essential interaction between student and teacher and among students and they allow multimodal communication [9]. In addition, synchronous learning provides a variety of multimedia tools and accessible online learning resources that help students develop interactive communication [8]. Mixed learning also helps to evaluate individualized tasks.

Blended learning is a flexible process that focuses on students' needs, develops social interactions by improving critical thinking skills, and makes learning and teaching meaningful and engaging [10, 11]. Student satisfaction attracts, motivates and engages them emotionally in online instruction influencing their achievement and the success of blended learning [3, 12].

The amount of combination of the two parts varies according to the type of activities involved [13]. According to research findings, the integration of peer-to-peer discussions in an asynchronous lesson course leads to a significant improvement in students' performance and positively affects their perceptions and attitudes [14, 15].Mixing live interaction sessions with asynchronous online study provides students with flexibility and makes lessons attractive and effective [16]. It aims to interact, collaborate and engage teachers and students in digital environments by enhancing their involvement in authentic learning situations [13, 14].

Empathy is understood as "emotional" that refers to the existence of emotional response consistent with the other person's emotional state, and "cognitive" who refers to the understanding of someone's thinking [17, 18, 19]. Recent studies have found that the teacher's empathy is an integral part of her/ his role [20] and a component of her/his professional development [21]. It is associated with the effort to feel the positive and negative emotions of her/his students and empathize with them.

The teacher's empathy is mainly related to interpersonal and social empathy. Interpersonal empathy refers to the knowledge of the student's internal situation, his / her possible difficulties in the lessons and the teacher's response with sensitivity [22]. Social empathy is the teacher's ability to understand the family and social conditions of students [23] and is closely linked to students' academic success. Teachers with high empathy take the time to get to know their students' particular problems (e.g. students with serious health problems, low family socioeconomic status, or cultural diversity feel the fear of failure); they apply "active listening", show flexibility in the delivery of homework and help students develop their true potential, encouraging and supporting them to reach the highest possible level.

During the 2020-2021 academic year, the «Vulnerable Students and Teachers Online School of the Regional Directorate for Primary and Secondary Education of Attica» was organized and implemented. Vulnerable students, according to the relevant Greek legislation, are students who due to serious health problems belong to groups of increased risk (Joint Ministerial Decision, Government Gazette 3780/B/8-9-2020). Vulnerable teachers also belong to groups of increased risk, provided they have obtained a special leave of absence following a

reasoned medical opinion (Joint Ministerial Decision, Government Gazette 1856/B/ 15-5-2020, circular no. 136503/E3/ 8-10-2020). Because in both cases there is a risk for their health, they are unable to participate in face-to-face learning. Thus, in the Online School, vulnerable teachers deliver lessons and vulnerable students attend them. Based on the review of the literature, the present research investigates whether the Online School implementation had an impact on mutual empathy between students and teachers, as well as on students' academic performance.

Methods

During the academic year 2020-2021, the Online School enrolled 1096 students from schools in Attica and other parts of Greece and 560 teachers, offered distance learning. The sample consisted of fifteen (15) vulnerable teachers and six (6) vulnerable students through open interviews. The sample concerned students (female and male) and teachers from schools of all educational levels under the authority of the Regional Directorate for Primary and Secondary Education of Attica. All teachers and students were considered vulnerable due to health issues. There were no cultural landmark restrictions and any vulnerable student was free to attend the Online School. Vulnerable teachers were also selected according to the number of students that were enrolled in the Online School.

Regarding interviews, the basic research questions were:

•*What was the effect of mutual empathy on students' personal well-being?*

•*What was the effect of mutual empathy on students' academic performance?*

Indicative evidence reflecting perceptions, thoughts and feelings of teachers and students is reported as follows:

Teachers:

•*T1: "[…] I liked the flexibility in the planning of the courses […] we had degrees of freedom, we could make our choices, to combine the synchronous and asynchronous teaching [..]"*

•*T2: "[…] there must be continuity in order to support these vulnerable groups, the people who do not experience democratic equality in education because of remote or inaccessible areas [...]"*

•*T3:«[…]the combination of synchronous and asynchronous learning was excellent. Students learned inboth ways. However, I believe that synchronous learning was more beneficial to students mainly due to the immediacy of the interaction […] "*

•*T4: "[...] there was emotional contact with my students. "Our warm relationship has had a positive effect on students' learning and performance."*

•*T5: «[...] I applied the method of flipped classroom. The students studied the content at home on their own. They could watch an interactive video and be prepared for the lesson. They were pre-informed before participating. I answered their questions and they could perform demanding exercises. Sometimes they could collaborate in groups […] ".*

•*T6: "[...] We managed to make the children feel like in ordinary class. […]. Synchronous daily communication was effective, perhaps better than non- synchronous communication, as some forgot to upload the exercises and communication was more limited. All the students could study and most of them will succeed in the Panhellenic Examinations and will enter the university […]*

•*T7: «Personally, I hope that there will be no need in the future for the operation of such a school. […] It was indeed a titanic work that in my opinion was crowned with great success. "*

•*T8: "[…] The power of empathy between us triggered the children to greater effort and success"*

•*T9: "For me…. I felt I had one thing in common with the students … we all shared health issues …that's why we should "connect" in a different way"*

Students:

•*Maria (high school student): "[…] The Online School of the Regional Directorate of Attica supported me to graduate high school and attend all the subjects of the last grade […] I had perfect relationships with all the teachers, they understood my personal issues and the improvement in my performance during the year is due to them alone. Although our communication was done through digital tools, I felt that they were always by my side [...] The digital school gave me the strength to complete my preparation for the Panhellenic Examinations and to achieve my dream […] " (the student showed remarkable success and was admitted to the university a little later).*

•*George (upper secondary student): "I'm excited about the digital school. I got a lot of knowledge. I did homework digitally and sent it to my teachers. Two of our teachers were preparing activities at home. They made us watch video lessons and answer questions. We learned the theory*

at home and the teachers answered our questions. We solved more difficult exercises in the classroom […] " (the student entered to university).

•Dimitris (High school student): "[…] In this different school I met new classmates who became online friends and we communicate. I also met new teachers who helped me with online learning. Our teachers and I used Webex and e-class. It was a wonderful combination [...]. ".

•Eleni (High school student): "[…] There was something in common with our teachers, there was compassion […] We were motivated with love and that helped me greatly increase my performance […]".

•Electra (primary school student): "This year I had a unique school experience. At first my feelings were strange, because we were all strangers to each other both the students and teachers. But very quickly I made friends with the children and we all became a very nice group […] ".

•Costas (primary school student): "I really liked the Online School. […] Many times, we learned by playing. This gave me great joy. My teacher was kind. She helped me with my personal health problem. I saw that other classmates have similar problems […] We all became friends and we continue to talk to each other […] ".

Analysis of Results

Teachers commented on the use of synchronous versus asynchronous teaching and learning. They pointed out that the flipped classroom model proved a valuable tool under the COVID restrictions circumstances. Emphasis was placed on the importance of understanding the students' emotional status which underlies the benefits of building positive relationships. Additionally, the teachers pointed out that empathy has been associated with compassionate actions allowing for experiencing moral emotions. Regarding students, the majority stressed the importance of high-quality interpersonal relationships. They commented on the beneficial mutual empathy both with teachers as well as their classmates. Empathy triggered their motivation for learning, thus contributing to improved learning outcomes. Moreover, students pointed out the effectiveness of flipped classroom model, thus implying the impact of cooperation and collaboration.

Synchronous online learning seems to be more effective than asynchronous online learning in terms of performance, emotional exchanges and timing. The tea-chers used the e-classroom to send regular announcements, which served to keep the students committed. In addition, some used email platforms, instant messaging (e.g. Whatsapp) or social media platforms (e.g. Instagram). The existence of different communication channels seemed necessary to maintain communication among students and teachers. Webex "breakout rooms" highly contributed towards this direction. Teachers also used a variety of tools. They experimented with automatic grading quizzes for quick and frequent formative assessment. Some teachers applied the flipped classroom model and used synchronous distance learning for collaborative problem solving, practice, explaining concepts, and answering questions.

Both synchronous and asynchronous learning contributed to the cognitive development of students. In peer-to-peer discussions, students participated in more socio-emotional exchanges, while in asynchronous learning focused more on learning tasks with limited exchanges. Synchronous communication has had a positive effect on students' "sense of belonging", emotions and online collaboration, creating a balanced community of practice.

Discussion

The world pandemic called for a sharper focus on providing quality distance education to ensure quality learning outcomes and successful school attendance. The rationale behind the Online School of the Regional Directorate of Attica was satisfying the individual needs of both students and teachers. Thus, the initiative of the Online School highlights the humanistic perspective in education. Apart from being student-centred, the Online School similarly proved to be person-centred, with teachers at the core of the process. Empathy is the key quality in teachers' and students' relationships. It is the basis of interaction during the learning process and the factor affecting the students' motivation for learning. Empathy had had a positive effect on students' engagement and academic performance.

The Online School managed to create a safe and convenient learning environment for all engaged. *Empathy and compassion* were truly appreciated due to similar health issues and experiences among teachers and students. *Confidentiality* was a key factor by ensuring the students' personalized access protected privacy and personal data. *Individualized learning* was also achieved since priority was provided to the educational, psychological and social needs. *Flexibility* was also accomplished through working at the students' and

teachers own pace, on a schedule that worked best for all. Equally important was the *accessibility potential of material* through attending and reviewing content with no space and time constrains. *Skills' enhancement* and academic performance were achieved through students' time management, and teachers' feedback provision. Finally, the *participatory approach* was exploited through individual learning and group learning.

The Online School has had multiple benefits for vulnerable student groups and teachers. It has contributed to maintaining the students' emotional balance and interest in the learning process, considering the health, habits and lifestyle and empowering the resilience of students during the Covid-19 pandemic [24, 25].It has provided a solution to the existing risk of isolation of vulnerable students while reducing their family anxiety with regard to the cognitive and socio-emotional development of their children. Finally, it has provided opportunities for teachers to work on their own pace, be able to empathize with students' needs and implement alternative practices with the use of digital tools.

Conclusion

The findings of the present research study aim to stimulate discussion regarding the positive impact of the Online School practice for vulnerable students and teachers. It appears that the Online School has provided a solution to the existing risk of exclusion of vulnerable students from the educational process. It has provided opportunities for teachers to work on their own pace according to individual needs and be able to cope with students' needs and implement alternative teaching practices with the use of digital tools. The concerns and needs of vulnerable students do not differentiate fundamentally from those of the general student population; still, there is an additional need for the school to provide a normal school education process, which can respond to their individual needs. This is also an opportunity for teachers to enrich their distance learning practices through digital tools, thus enhancing their digital skills.

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Original Research

PILOTING A COMBINED MODEL OF SOCIO-EMOTIONAL LEARNING AND PEER SUPPORT AGAINST BULLYING IN GREEK PRIMARY AND SECONDARY SCHOOLS: THE ENABLE PROGRAM

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ABSTRACT

The ENABLE program is a European intervention designed to increase student emotional resilience and management of social relationships. The present study aimed to investigate the effectiveness of social and emotional learning (SEL) and a combination of SEL with peer support (SEL+peer support) in a sample of 508 Greek early adolescents, between the ages of 11 to 14 by means of anonymous self-report questionnaires. Assessments were conducted prior to and after the 3-month piloting of the intervention, and indicated that overall students had high baseline social and emotional skills, as well as prosocial attitudes regarding bullying. The intervention improved problem-solving skills, and increased school satisfaction, as well as self-control and emotional awareness. After the intervention, students were more likely to report that they would seek help or report situations of bullying. Overall, this was the first study combining SEL with peer support in Greek primary and secondary schools, with promising results for the combined effectiveness of the programs.

Key Words: *bullying, intervention, peer support, early adolescents*

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Introduction

ENABLE (European Network Against Bullying in Learning and Leisure Environments) is a European program for implementation in the whole school, developed in 2014 in Belgium, Croatia, Denmark, Greece and the United Kingdom. It consists of a holistic approach that aims at the achievement of resilience and wellbeing among young people between the ages of 11 to 14, through a combination of SEL and a peer support scheme. The aim of the program is the strengthening and education of young people to achieve healthier social interactions. There is a focus on early adolescence, as this marks a sensitive developmental period for social relationships and self-management. Also, considering the long-term consequences of involvement in bullying, ENABLE takes a preventative approach to reducing student risks and increasing resilience. The development of empathy, which has been found to play a protective role in bullying perpetration, and self and emotion regulation, are thus core components of ENABLE.

The present school-based study aimed to study the behaviors, attitudes and needs of students in early adolescence, participating in the piloting of ENABLE in Greece. Participants took part in SEL with or without peer support lessons in school, over the period of 3 months. Both before and after the intervention, students were primarily asked to report on behaviors and attitudes towards bullying, as well as on a series of questions on social and emotional skills and wellbeing, and finally satisfaction from different components in life.

It was expected that students participating in the SEL component of the program would present improvement in the area of social and emotional skills and wellbeing, as well as life satisfaction, following the intervention. It was also hypothesized that students participating in a combination of the SEL and peer support schemes would present differences in their reactions to bullying as bystanders, and in their general attitudes towards bullying, and that this improvement would be greater than among the students attending only the SEL component of the program.

Methods

Design and Procedure

The present paper includes baseline outcomes gathered from the piloting of the intervention in Greece. Schools were selected through the ARIADNE network of trained professionals (primarily teachers) in Internet Safety, who undertook the recruitment of teachers from fellow schools and trained them in the delivery of the program, in line with a cascade design [1]. Each trained teacher implemented the program in his or her class, after receiving permission from the school's administration. The final sample included 17 Primary and Secondary Public and Private schools, of which 13 were in the prefecture of Attica, 1 in Peloponnese, and 3 in the island of Crete.

The present survey was conducted after obtaining approval from the Ministry of Education, Research and Religious Affairs and the Institute of Educational Policy (IEP). In addition, active written consent was required from the parents and legal guardians for participants to be eligible, as well as adolescent's oral assent. Questionnaires were answered through a written on-line anonymous survey. The outcomes were measured before the beginning of the program (pre-intervention assessment) and again after the program completion (post-intervention assessment).

The pre-intervention assessment was carried out from February to March 2016 and the post-intervention assessment from May to June 2016. In most schools the survey was administered online on school premises under the supervision of trained research assistants and trained school staff, on classroom computer monitors. In four schools where computers were not available, a pen and paper version of the questionnaire was provided. The duration of the survey was approximately 40'. Participating adolescents were asked to complete the questionnaire anonymously to help ensure confidentiality and to minimize potential response bias. To further secure anonymity, an ID was issued for each student (in the form of individualized url) at pre-assessment, which was re-used for matching questionnaires at post-assessment.

Participants

Participating students in Greece were attending 5th and 6th grade of Primary School and 1st and 2nd grade of Junior High School, with the majority attending 1st grade of Junior High School (63.5%) (See Table 1). The 508 participants were aged 11-14 years and the mean age of the sample was 12.9 years, while girls made up the 53.1% of the sample. The post-intervention sample was smaller (N=321) than the pre-intervention (N=508), due to sickness, end of school obligations and exams. Finally, in a small number of cases, the post questionnaire could not be matched with certainty with the baseline measurement.

ENABLE intervention

The ENABLE program included 10 lessons on SEL, which

focused on self and social awareness, self-regulation and relationship management. These took place during school hours, and aimed at increasing emotional intelligence of students. In addition, it involved 10 lessons on peer support for a smaller number of students, in order for them to become advocates against bullying in school, to encourage positive behavior and support vulnerable students. Apart from the lessons, peer supporters were given continuous support by a trained teacher.

Quantitative Survey

In the ENABLE survey, students were asked to report on bullying-related attitudes and perceptions, social and emotional skills, self-perceived status among their peer group, as targeted in the two ENABLE training modules (i.e. SEL and Peer Support) as well as on their satisfaction with different domains in life.

Bullying experiences and behaviours: bullying others and being bullied

Bullying involvement experiences were elicited with selected self-report questions from the EU KIDS ONLINE survey (Risks and Outcomes updated section), based on a behavioral definition of "being treated in a hurtful and nasty way", without using potentially stigmatizing terms such as "bullying" and "victimization" [2]. Specifically, children reported on their experiences of being bullied, on bullying others, and on how they would react to these experiences. The following definition was provided to the students:

"Sometimes children or teenagers say or do hurtful or nasty things to someone and this can often be quite a few times on different days over a period of time, for example. This can include teasing someone in a way this person does not like, hitting, kicking or pushing someone around, leaving someone out of things or threatening or pressuring them into doing something. When people are hurtful or nasty to someone in this way, it can happen: face to face (in person); by mobile phones (texts, calls, video clips); on the internet (e-mail, instant messaging, social networking, chatroom)."

Attitudes towards bullying

Children's attitudes towards bullying and aggressive behavior, namely beliefs about certain bullying-related behaviors (joining in, reporting), were assessed with selected modified items from the "Attitudes towards bullying scale" (four items rephrased) previously used by Salmivalli and Voeten [3]. Questions were measured on a 4-point Likert scale (Strongly disagree, disagree, agree, strongly agree), where the highest scores indicated stronger negative reactions towards bullying.

Table 1: Sociodemographic characteristics of whole sample

	Pre-intervention		Post-intervention	
	n	%	n	%
Total sample	508	100	321	100
Gender				
Boys	238	46.9	145	45.2
Girls	269	53.1	176	54.8
Age				
11	111	22.1	21	6.5
12	217	43.1	117	36.4
13	152	30.2	161	50.2
14	23	4.6	22	6.9
Grade				
5th grade	73	14.5		
6th grade	75	14.9		
7th grade	320	63.5		
8th grade	36	7.1		

Social and emotional skills (SEL)

Students reported on social and emotional skills by agreeing/disagreeing to a set of statements capturing inter-personal and intra-personal skills, including self-control, emotional differentiation, empathy, problem solving and peer relations. In particular, the following constructs were explored, using 4-point Likert scales (with responses ranging from "not true" to "very true"): Self-control/self-management; Emotional reactivity awareness; Empathy (empathic cognitive concern); Differentiating emotions and verbal sharing of emotions; Problem solving; Prosocial/ helping behaviors; Friendships (dyadic) and group peer relations.

Life satisfaction

Satisfaction with life was measured through questions on satisfaction with multiple domains of life using a five-point Likert scale, with responses ranging from "very satisfied" to "very dissatisfied".

Statistical Analysis

Paired t-tests were used to compare mean responses before and after the intervention in the total sample of students who completed both surveys. Repeated measures ANOVA, taking the two before and after measurements as the within-subjects factor, was used to compare by group (SEL/SEL+peer support), gender or age (between-subjects factor). Logistic regression was used to analyze reactions to witnessing bullying, which were answered on a yes/no scale. Internal consistency was measured for the items concerning satisfaction with life, using Cronbach's alpha analysis.

Results

Reactions to witnessing bullying episodes

Students reported on how they would react to witnessing bullying episodes. Logistic regression was used for each one of the sub-questions, except for "joining in" and "doing nothing" due to their low frequency (see Table 2). At pre-assessment, the most common reaction for both groups (SEL and SEL+Peer support), was to "tell an adult", (54.8% and 51.8% respectively) and second to "talk to the person who is being harmed/targeted" (34.8% and 44.5% respectively). "Tell an adult" remained the most common reaction at post assessment (54.5% and 56.9% respectively). The response "to tell a Peer Supporter" showed an increase in both groups at post assessment compared to pre-assessment, which did not reach statistical significance, either for SEL, p=.82, or for SEL and peer support, p=0.45. The reaction "to tell a third person" showed a statistically significant decrease in the SEL and peer support group (pre 21.8% vs post 8.3%, p=0.004). For the same response, a decrease was also reported in the SEL group, but was not statistically significant (pre 11.9% vs 9%, p=0.36),

Attitudes towards Bullying

At the beginning of the program, most students in both groups (SEL and SEL and peer support) held anti-bullying (pro-social attitudes): the majority of participating students agreed that joining in when someone is attacked is wrong (50%), believed that children who fall victims of bullying should be supported and that bullying should be reported (78%). Consistent with these anti-bullying attitudes, very low endorsement rates (4-8%) were reported for anti-social/ pro-bullying attitudes on teasing others with nasty intent (item of negative valence). Repeated measures ANOVA was used to compare participants' attitudinal response means after the program to those before. No significant changes were found in attitudes towards bullying, with the exception of the question "One should report behaviors that are meant to hurt others", for which the interaction between group and time was significant (F(1,312)= 0.51, p=0.012). This means that the pre/post difference varied between groups. A statistically significant increase in the degree of endorsement of reporting behaviors was shown across assessment points. In the SEL group, there was an increase from the pre-intervention assessment (M=2.96, SD= 1.02)(see table 3) to the post-intervention assessment (M=3.20, SD=.96)(see table 4) while a decrease was recorded within the SEL and peer support group, from the pre-intervention assessment (M=3.14, SD= 1.01) (see table 3) to the post-intervention assessment (M=3.01, SD= 1.09) (see table 4).

Socioemotional skills

Responses to items measuring SEL skills elicited at Pre vs Post assessment are shown in Table 5. More specifically, there was no statistically significant change in self-control against negative emotions (question 17) at post assessment between pre and post intervention, p=0.34, while self-control when aware of one's own mistake (question 18) showed marginally statistically significant improvement from pre (M=2.29, SD=.81) to post (M=2.19, SD=.85), p= 0.062. A slight improvement was recorded at post assessment (M=2.53, SD=.97) compared to pre intervention levels (M=2.61, SD=.92) in the ability to differentiate one's own emotions (question 19), but did not reach statistical significance, p=0.22 . Empathy (question 20), on the other hand, seems to remain positively stable at a consistently high level, at both pre (M=1.56, SD=.76) and post-assessment (M=1.50, SD=.72), p=0.25. Furthermore, while at pre-assessment most students responded that they strongly wish to help people who are upset (question 22) before the intervention (M=3.41, SD=.65), a statistically significant decrease was recorded following the intervention (M= 3.28, SD=.76) in participants' "urge" to actively help others (p 0.009). A significant improvement was observed, in problem solving skills (question 26) from before (M=2.72, SD= .78) to after the intervention (M=2.85, SD=.71), p=.013. The rest of the SEL skills exhibited stability across assessment points, with the exception of a trend for positive change in self-perceptions of peer acceptance (question 27), which was however not statistically significant, p=.10. The t-test analyses of all the above changes for gender and age differentiations showed no differences across genders and age groups.

Life Satisfaction

Paired t-tests were performed for all six *"aspects of life"*

Table 2. Responses to "If you saw someone acting in a nasty or hurtful way would you…."

	SEL & peer support (n=110)			SEL (n=210)		
	PRE	***POST***	***P***	***PRE***	***POST***	***P***
Intervene	36.4% (40)	42.2% (46)	0.32	51.0% (107)	51.2% (108)	0.99
Tell an adult	51.8% (57)	56.9% (62)	0.42	54.8% (115)	54.5 (115)	.99
Tell a peer supporter	17.3% (19)	27.5% (30)	.045	16.7% (35)	23.2% (49)	.082
Talk to the person who is being harmed/targeted	44.5% (49)	35.8% (39)	.18	34.8% (73)	36.0% (76)	.80
Talk to the person who is being nasty	31.8% (35)	37.6% (41)	.31	31.0% (65)	29.4% (62)	.80
Talk to someone else	21.8 (24)	8.3% (9)	0.004	11.9 (25)	9% (19)	0.36
Join in	4.5% (5)	0.9% (1)	.22	0.0% (0)	0.5% (1)	0.99
Do nothing	3.6% (4)	1.8% (2)	.63	1.0% (2)	1.9% (4)	.69

Table 3. Differences of participation in the peer support group pre-intervention

	SEL & peer support		SEL	
	Mean	***SD***	***Mean***	***SD***
Being involved when someone is attacked is wrong	2.51	1.17	2.44	1.14
It is fun when someone repeatedly teases a classmate in a bad way	1.22	.50	1.25	.63
We ought to support students who are attacked or badly teased	3.50	.79	3.51	.69
We must report behaviors designed to hurt or harm someone	3.14	1.01	2.96	1.02

Table 4. Differences of participation in the peer support group post- intervention

	SEL & peer support		SEL	
	Mean	***SD***	***Mean***	***SD***
Being involved when someone is attacked is wrong	2.56	1.14	2.49	1.21
It is fun when someone repeatedly teases a classmate in a bad way	1.25	.60	1.23	.51
We ought to support students who are attacked or badly teased	3.50	.80	3.56	.72
We must report behaviors designed to hurt or harm someone	3.01	1.09	3.20	.96

Table 5. Responses to "How much do you agree with the following statements?" on a scale from 1 "Strongly disagree" to 4 "Strongly agree" compared between assessments Pre and Post intervention.

	PRE		POST		*P**
	Mean	***SD***	***Mean***	***SD***	
I can control my behavior when I am upset.	2.74	.79	2.79	.79	0.34
I can't stop myself from doing something, even if I know it is wrong.	2.29	.81	2.19	.85	0.062
When I am upset, I do not know if I'm sad, scared or angry.	2.61	.92	2.53	.97	0.22
I don't feel very sorry for other people when they are having problems.	1.56	.76	1.50	.72	0.25
I can often understand how people are feeling even before they tell me.	3.13	.74	3.14	.76	0.85
I get a strong urge to help when I see someone who is upset.	3.41	.65	3.28	.76	0.009
My emotions influence my reactions.	2.93	.83	2.84	.90	0.11
I often talk to others about what upsets me.	2.85	.82	2.79	.88	0.32
I try to talk out a problem instead of fighting.	3.25	.82	3.20	.79	0.25
I am good at finding solutions to everyday problems.	2.72	.78	2.85	.71	0.013
I get along with kids my age.	3.36	.65	3.43	.65	0.10
It is easy for me to make new friends.	3.22	.75	3.25	.80	0.49
I have at least one close friend.	3.67	.64	3.72	.59	0.17

* P value from paired t test

(see Table 6). The scale indicated good internal consistency (Cronbach's alpha = 0.67). A statistically significant improvement in the perceived subjective feeling of satisfaction from school performance was observed at post-assessment (M=1.84, SD=.87) compared to pre-assessment (M=2.08, SD=.99), (p<0.001). No other aspect of life showed a statistically significant change. Repeated measures ANOVA were performed for gender, with measurement point being the within-subjects factor, and gender being the between-subjects factor. The scale had lower scores (i.e. higher satisfaction) among boys (M=1.57, SD=.43) than girls (M=1.75, SD= 0.62) at baseline, and among boys (M= 1.53, SD=.58) than girls (M=.173, SD=.69) following the intervention, p=0.002. There was a difference between boys and girls (F (1,315)=10.2, p=.002), but not between the two assessment points (F(1,315)=0.49, p=0.49). No association was observed with age.

Table 6. Responses to "How satisfied are you currently with the following aspects of your life?"

	PRE		POST		P*
	Mean	*SD*	*Mean*	*SD*	
Your school performance	2.08	0.99	1.84	0.87	< 0.001
How much fun you have	1.49	0.76	1.54	0.86	0.24
Your family relationships	1.50	0.85	1.51	0.87	0.94
Your friends	1.48	0.80	1.53	0.85	0.35
Your spare time activities/hobbies	1.72	0.99	1.75	1.04	0.62
Life in general	1.72	0.98	1.70	0.99	0.70
Total scale score	**1.66**	**0.55**	**1.64**	**0.65**	**0.51**

* P values from paired t-tests.

Discussion

The following social and emotional skills of the students were investigated in this school-based study: self-control and awareness of emotional reactions, differentiation of emotions, aspects of empathy and pre-social behavior, problem solving and relations with peers. Students' responses indicated a trend towards improved self-control, especially when they were aware of their mistakes, which was however only marginally statistically significant. In addition, a very small, also statistically insignificant improvement was observed in the ability to recognize emotions (self-awareness). As previously described, the majority of children involved in bullying, especially those having an active role, such as bullies and victims, have some form of emotional deficits. This may include a lack of self-control [4], low tolerance of frustration [5] and a difficulty accurately recognizing negative emotions, often leading to negative reactions.

With regards to the degree of empathy before and after the intervention, contrary to the results of previous investigations that have examined the different roles separately and recorded very low levels of empathy among perpetrators [6, 7, 8,9], in the present study the degree of empathy recorded at baseline was quite high across participants, and was maintained at the same levels after the intervention. An important outcome of the intervention was the statistically significant improvement seen in the problem-solving abilities of students. As mentioned by Andreou [10], bullying perpetrators and victims lack problem-solving skills. The difficulty of managing problems often leads the perpetrators to bursts of aggressive behaviors, fueling the imbalance of power present in bullying.

In the baseline assessment, the whole sample seemed to have functional social relationships, as the students reported they had very good relationships with their peers, made new friends easily and had at least one close friend. Following the implementation of the program, a slight tendency to improve social skills was recorded, notably in terms of their self-perceived acceptance by peers, which was not however statistically significant. Since loneliness, isolation and poor interpersonal relationships are positively linked to victimization

[11], it is positive that across the sample students seemed to have consistently good relationships with their peers. No gender or age relationship was observed before or after the intervention in the experiences of social relationships.

Elements of everyday schooling can affect the degree of satisfaction with both school and life, either positively or negatively [12]. Higher levels of academic performance have also been associated with higher levels of school satisfaction among teenagers [13, 14]. This demonstrates the value of the present study's finding that there was a significant improvement of the subjective feelings of satisfaction from school performance among students. This finding is also consistent with meta-analytic findings on the value of Social and Emotional Learning programs, which showed an 11-17% improvement in the academic performance of participating students [15, 16]. As for the other areas of life satisfaction examined, pupil's responses did not show any particular fluctuations between the two measurement points, and no differences were observed with age. In contrast, there was a difference between boys and girls in both measurements, with boys experiencing greater satisfaction with life. This finding can be explained by a variety of factors, including the better developed emotional awareness often documented between boys and girls, but also earlier maturational changes which may be associated with increased emotional sensitivity.

Observers' Reactions to Bullying Incidents

The second objective of this research was to examine: (a) the reactions of observers to bullying incidents and (b) the perceptions of students about victimization. More specifically, a comparative analysis of the responses of the students who attended only one of the Program's axes, (i.e. the SEL courses) was carried out with the answers of the students who attended both axes (SEL+peer support), before and after the implementation of the ENABLE program. The role of observers is key in preventing, interrupting or continuing bullying. According to Bistrong, Bottiani & Bradshaw [17], the different reaction patterns have the potential to influence the future appearance and persistence of intimidation, as well as its consequences. The reactions described in the investigations have been divided into three main categories: helping the perpetrator (e.g. by engaging in bullying or ridiculing the victim), defending the victim (e.g. interfering, using compassionate words to the victim) and maintaining neutrality (e.g. non-involvement in the incident) [18]. Previous studies have shown that while peers often witness such situations, they appear reluctant to intervene or inform an adult [5]. The first response in both groups was "I would talk to an adult," which shows the need for children to "involve" adults in dealing with the problem.

The ENABLE Program, recognizing the important role of adults in the bio-ecological model of bullying, is addressed to both educators and parents through educational supportive material. The option "I would speak to a supporter" took small percentages in both groups prior to the intervention but showed slight improvement after the intervention. The small percentage is explained by the fact that this is a completely new idea given to students through the implementation of the Peer Support Program, and it is likely that the three-month implementation of the Program was not sufficient. Instead, higher percentages were recorded in both groups for the reaction "I would speak to the the child harmed/targeted" indicating high levels of empathic concern.

Attitudes Regarding Reactions to Bullying

Participating students reported on their perceptions of bullying, through their agreement or disagreement with a range of statements measuring attitudes towards bullying. Few studies have explored pupils' perceptions of the perpetrators or victims of bullying [19]. In the present study the answers of the students of both groups prior to the intervention were predominantly pro-social and opposed to the act of bullying. The students' reactions to the statement "Participating when someone is attacked is wrong" was an exception, where, in both groups, positive and negative answers were found to be equally shared. This is not consistent with the other pro-social perceptions recorded, nor with the extremely low percentage recorded in the question "I would participate in bullying". The most likely explanation is that there was confusion among students on the definition of "participating", which in Greek could be interpreted as intervening. As observed by Salmivalli [20], the paradox is that while most students declare being against bullying and express their support for victims, they do not actually intervene to stop bullying at that moment [21]. Regarding differences in the perceptions of bullying with age, no correlation was found in the present study. This is contrary to findings by Rigby and colleagues [22], who reported that students tend to adopt less compassionate perceptions of victims as they grow older. Similarly, no gender differences were observed in this study, corroborating past findings which found no differences between sexes in relation to their perceptions of bullying.

In general, the comparison of the two groups before and after the implementation of the Program, showed differences in the question "We have to report behaviors that are intended to hurt or harm someone". Specifically, the SEL group showed a significant increase after the inter-

-vention. Reporting of bullying is a very important factor in preventing and addressing the phenomenon in schools, as only one in two victims report bullying to teachers [23, 24]. In a study by Unnever and Cornell [25], students were particularly reluctant to seek help because they believed teachers were either indifferent or tolerant towards bullying. Other reasons for which students are reluctant to report bullying may be fear of retaliation, a sense of inferiority, insecurity or guilt.

The implementation of the ENABLE Program in Greece was innovative, as it was first of its kind to combine a component of SEL with a peer support intervention. However, certain limitations in the implementation of the program need to be acknowledged. Primarily, the teachers who participated in the ENABLE Program were trained and implemented the Program in the classes they were teaching on a voluntary basis. As a result, no randomization process was applied for the participating classes and the school population that participated is not a representative sample at national level. In addition, the duration of the implementation of the program in Greek schools was extremely short, about three months. Also, the second measurement point took place a few days before the students started their annual exams. This may have affected their responses as they were very stressed before the examinations, and this may have reduced the self-reported positive impact of the intervention. Finally, the loss of students at the second measurement point is an important limitation, as the sample substantially decreased between the two points.

Future research would benefit from carrying out surveys in a larger sample of the population, in order to accurately capture the extent and intensity of the problem, and to evaluate the long-term effectiveness of SEL and peer support programs. Besides the frequency and scope of research, it is very important to employ a combination of research tools and a triangulation of sources, such as behavioral observation, teacher and peer reports and focus groups to evaluate the effectiveness of interventions.

This preliminary study aimed, among other things, at exploring the feasibility of applying a combined model of SEL and peer support in Greek schools, by evaluating the first quantitative results. Despite certain limitations of this research, the positive trends recorded are particularly encouraging and indicate the need for a more systematic, universal and longer-term implementation of this model in the future. In particular, international research findings indicate that both the SEL and the peer support scheme have excellent results, which, with appropriate adaptations to Greek reality, could make a decisive contribution to tackling bullying through changes in school culture, school climate, attitudes and behaviors. Importantly, this implementation should take place with the involvement of educators, parents and other members of society actively involved in adolescent development. Particular emphasis has been placed on the value of parental involvement, and the need to re-educate parents in order to improve parent-child relationships and to more effectively tackle violence or victimization.

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Review

Increase of prevalence of Idiopathic Precocious Puberty in Girls, during the Covid-19 Pandemic: What are the possible causes? A systematic Review.

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ABSTRACT

Background: The COVID-19 pandemic changed everyday life dramatically. Lockdowns, imposed to prevent viral transmission have been investigated as possible contributors to negative health outcomes for all ages, as well as disruptors of normal children's development. In this setting, an increase in consults for precocious puberty has been observed.

Aim: To investigate the possible effects of the pandemic and lockdowns on the timing of puberty, along with the mechanisms interfering with pubertal onset.

Methods: The study was conducted, according to the PRISMA guidelines, using the Advanced Search tools of the PubMed and Google Scholar platform. Only the articles that were considered relevant were included.

Results: The review included ten studies, recruiting a total of 1904 individuals who had been referred for possible CPP or diagnosed with CPP, in 5 different countries (Spain, Italy, Turkey, China, Brazil), before and during lockdown. An increased incidence of precocious puberty was reported, upon comparison of data with the pre-lockdown era, while an attempt to highlight the possible causes of this trend was performed.

Conclusions: The most popular factors that could have an influence in pubertal timing were BMI increase, overuse of electronic devices and psychological stress.

Key Words: *COVID-19, Lockdown, Idiopathic Precocious Puberty, Adolescence*

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INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SaRS-CoV-2) is the responsible coronavirus for the Coronavirus Disease 19 (COVID-19) pandemic. The virus was identified in late 2019 in the city of Wuhan in China, after a notable increase in the number of lower respiratory tract infections of unknown origin (1,2). By March 2020, COVID-19 had escalated to a pandemic (1,2). According to the official website of the World Health Organisation (WHO), 468.202.755 cases of Sars-Cov-2 infection and 6.074.058 deaths related to COVID-19 had been recorded until March 20th, 2022 (3).

Many governments implemented measures of social distancing, with the goal of restraining viral transmission and protecting national healthcare systems from excessive work overload. Among measures taken, national lockdowns were the strictest (4). The effect of the pandemic and lockdowns on children and adolescents has been enlightened by studies, examining different aspects of various populations' health, both physical and psychological (5, 6).

Pubertal onset comes as a result of the GnRH axis reactivation, that provokes pulsatile secretion of LH and FSH in the pituitary, and, in turn, sex steroid production by the gonads. The hallmark of these events is the appearance of secondary sexual characteristics. In girls, the main indicative sign of puberty is the increase of breast size, known as thelarche (7). Precocious puberty is defined as the appearance of thelarche, at an age younger than 8 years for girls of Caucasian origin (8). The tendency of earlier incidence of puberty during the last decades constitutes common ground among many specialized centers, but the exact reasons for this afflux of cases remain unknown. In general, abnormalities in pubertal development can be detrimental for both physical and psychological health (8,9,10).

The aim of the present study was to assess the possible effects of the Covid-19 pandemic on the timing of puberty, by comparing the findings of current literature. Multiple centers, globally, have reported an increase in new diagnoses of pubertal precocity during the last two years of the pandemic. The evaluation of these hypotheses, as well as the identification of potential causes for this phenomenon were the primary endpoints of our study.

Methods

The study was designed according to PRISMA guidelines for systematic reviews. For the purposes of the study, the databases of Pubmed and Google Scholar were used in two independent searches by two reviewers. Data were compared and discussed, and no significant disagreements arose. Firstly, a thorough examination of publications until the 6th of March was conducted on Pubmed platform, using the following terms: [((pubertal disorders) OR (precocious puberty) OR (delayed puberty)) AND (covid 19)]. Fifteen (15) articles appeared as results of this initial search. After reading the abstracts of all results, only five (5) were included as relevant to the study topic. Later, a new search with the same terms was performed on the 25th of May on Pubmed and Google Scholar. On Pubmed, 20 articles appeared during the second search. Additional research on the Google Scholar Platform did not reveal any additional articles, during the same dates. Only original studies examining incidence of precocious puberty and possible causative factors for that were included. The process followed for study selection is shown in Table 1.

Results:

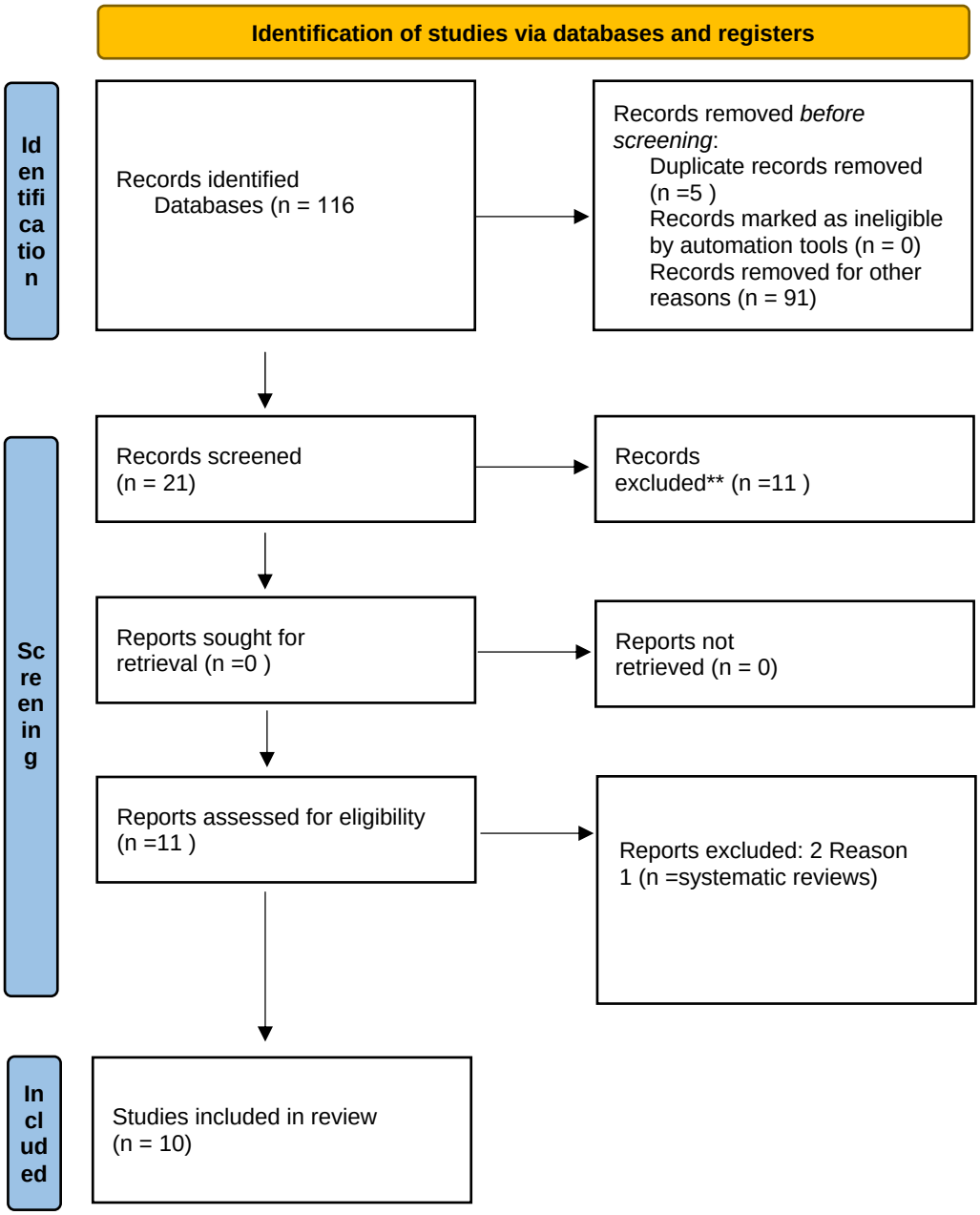
Epidemiologic data:

The systematic search concluded to ten studies. In total, data of 1904 subjects were estimated. Among them, 826 and 1066 were females with probable or confirmed CPP before (2015-2020) and during the COVID-19 pandemic (2020-2021), accordingly. 57 subjects were followed up for disease progression. Subjects enrolled came from countries such as Italy (6 studies), Spain (1 study), Turkey (1 study), China (1 study), and Brazil (1 study).

During most of the studies, researchers attempted to compare the number of referrals or confirmed cases of CPP in girls before and during the pandemic. Their results indicated a clear increase in the number of CPP cases. Also, in some of the studies anthropometric and hormonal values were estimated, while lifestyle parameters were recorded in an effort of highlighting possible etiologic factors of the trend of CPP incidence increase. All the studies reported an increase in the yearly diagnoses or referrals for CPP in girls.

The subjective experience of significant increase in the cases of pubertal precocity was confirmed by Ariza Jime-

Table 1. Study selection process.



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71 For more information, visit: http://www.prisma-statement.org/

-nez et al., who indicated a statistically significant increase in cases of precocious puberty during the Spanish lockdown (p=0.0092) in a tertiary hospital, during the pandemic (11). The time points under investigation were March to December of 2019 and 2020, and the subjects included were all patients younger than 14 years old visiting the pediatric endocrinology department for the first time. During 2019, a homogenous distribution of cases was noted, followed by a significantly greater incidence during the last 3 months of 2020 (11).

A total increase of 108% from March to September 2020, compared to the same time period of 2019 (246 new cases in 2020, while 118 cases were recorded on 2019) was indicated by Verzani et al. (12). However, body measurements, such as height, weight, and BMI were not significantly affected (12).

Another study examined the changes in the incidence of precocious puberty among female subjects during the Italian lockdown, in comparison to those diagnosed during the previous 5 years, after excluding secondary cases (13). Stagi et al. not only reported a statistically significant increase, in novel cases of precocious puberty ($p<0.0005$), but also an acceleration of already diagnosed slow progressing cases (13). Interestingly, the hormonal (peak LH, after LHRH stimulation test, LH and E2 for the accelerated puberty group) and anatomical (uterine length, ovarian volume) indexes of disease progression were also statistically affected in both groups (13).

In their retrospective study during the Italian lockdown, Chioma et al. discovered a significant increase in consults for precocious puberty, while the percentage of CPP diagnoses to consults also raised upto 122%, during lockdown period of 2020, compared to 2019 (14). No significant differences in body weight and other anthropometric and biochemical parameters were noticed among patients recorded in 2019 or 2020 (14). After distributing questionnaires among patients, the researchers reported an increase in hunger and stress related psychological aggravations (14).

In the study by Umano et al. a comparison of the incidence of CPP among girls visiting a tertiary unit of pediatric endocrinology in Italy between April 2020- April 2021 and the previous 3 years (2017-2020) indicated, not only a 2.5-fold increase in the incidence of CPP in girls (35 during lockdown to 34 during the previous 3 years), but also an exacerbation of sleep disturbances and postponing of bedtime in this patient group during lockdown in comparison to controls (15).

A study by Acar et al. calculated the novel cases of CPP during a one-year period and compared them to the ones of the last 3 years (2017-2019) (16). Fifty-eight new cases were detected among girls during the first wave of the Covid 19 pandemic in Turkey (April 2020- March 2021), which was double the number of cases, during the same time periods of each of the previous 3 years (2017- 2019) (16). However, there were no significant differences in biometric parameters, such as BMI, height, bone age, bone age/ chronological age and Tanner stage in the CPP patients diagnosed between different years (16).

An increase in the number of monthly visits and incidence rate of CPP cases in girls during 2020 was ascertained by Chen et al. (17). Interestingly, GnRH levels were higher among the patient group of 2020 and the levels of MKRN3 and ghrelin were significantly lower in patients diagnoses in 2020 (17). Similarly, LHRH stimulation tests increased together with new diagnoses of CPP among girls in a tertiary center in Italy (18).

A brief review of the studies included is shown in Table 2.

Lifestyle parameters:

In these studies, most investigators attempted to assess the role of multiple parameters that could contribute to earlier pubertal onset. BMI, use of electronic devices and psychosocial stressors were the main factors that were examined.

Results concerning BMI were controversial. Internationally, sedentary lifestyle and repeated consumption of food of low nutritional value were common characteristics of everyday life during lockdowns (11,12,14). One study reported higher Z score of weight among girls diagnosed with CPP during the pandemic (19). Even though some studies revealed a statistically significant increase in BMI (13), indicating a possible causative role in the appearance of CPP, others did not confirm this change (14, 16, 18).

The use of electronic devices was undoubtedly increased during the lockdown both for scholar and extracurricular purposes, as shown by most studies. (12,13,14). This increase was especially evident in girls during 2020, compared to the previous year (14). The study by Stagi et al. exhibited a 2.5-fold increase in the use of these devices by children, during lockdown (13).

These changes came with sleep disturbances among many patients diagnosed with CPP, as noted in the study by Umano et al. Excessive somnolence, sleep breathing disorders, sleep-wake transition disorders, along with delay in bedtime were the most increased among girls with CPP (15). The COVID-19 pandemic came bearing aggravating effects on psychological and social parameters (20,21). In an effort to reveal the possible influence in behavioural and psychological outcomes, Chioma et al. distributed questionnaires among participants. The answers revealed a clear increase of behavioural and psychologic disturbances.

Table 2. Overview of articles included in our study.

Researchers (Year of Publication)	Country	Population in comparison	Outcome	Possible causes
Jimenez et al. (2021)	Spain	All children under 14 years old visiting the local pediatric endocrinology department from March to December of 2019 and 2020	Increase in new cases of precocious puberty during lockdown (87) versus 2019 (45) (p=0.0092)	Decrease in physical activity, dietary deviations, use of electronic devices, psychological stress
Verzani et al. (2021)	Italy	All consultations in Endocrinology Unit of Bambino Gesù Children's Hospital from March to September of 2019 and 2020	108% increase in the number of precocious puberty cases in 2020 compared to 2019 (246 to 118)	Increase in low quality food consumption, excessive use of electronic devices, psychological stress
Stagi et al. (2020)	Italy	Patients with new diagnosis of CPP, untreated patients with slow-progressing CPP during March- July 2020 and similar groups during March- July 2015-2019	Significant increase (p<0.0005) in yearly count of new cases of precocious puberty (37 during 2020 versus 89 during 2015- 2019) and acceleration of slowly proceeding precocious puberty (p < 0.0005), affected hormonal and rapid development of anatomic characteristics (uterine length, ovarian volume) and Tanner staging	Significantly increased use of electronic devices (p < 0.0005), according to parents' answers in questionnaires distributed
Chioma et al. (2022)	Italy	Children examined for precocious puberty in five Italian centers during March-September 2019 and 2020	122% more referrals for precocious puberty investigation (152 versus 338 in 2019 versus 2020), increased percentage of CPP diagnoses (41%/26%) among females in 2020, compared to 2019	No deviation in hormonal and anthropometric profile, while on-screen time was increased
Acar et al. (2021)	Turkey	Girls diagnosed with CPP in a three year period before lockdown April 2017 to March 2020, and girls diagnosed from April 2020 to March 2021	Clear increase in CPP cases during April 2020–March 2021(58), compared to cases from April 2017 to March 2020 (66)	No significant increase in BMI. No possible causative factors investigated due to retrospective type of the study
Umano et al. (2022)	Italy	Girls with CPP visiting a tertiary pediatric endocrinology Unit from April 2020 to April 2021, and girls with CPP from 2017-2020	2.5-fold increase in CPP cases during April 2020-2021 (35), compared to yearly cases during 2017-2020 (34). Higher levels of oestradiol, LH and FSH in CPP cases after lockdown, compared to patients before lockdown	Later bedtime in CPP subjects compared to controls during lockdown, increase in sleep disturbances (total rate, excessive somnolence, sleep breathing disorders, sleep-wake transition disorders) no change in total hours of sleep, no significant change in use of electronic devices
Chen et al. (2022)	China	Girls diagnosed with CPP during March- August 2020 (n=191) and inpatient CPP girls during March-August 2016-2019 (n=209) in Shanghai Children's Medical Center	Increase in monthly visits and incidence rate of CPP in girls during March-August 2020 (2020), compared to March- August 2016-2019 (2016-2019).	Higher levels of GnRH among 2020 CPP girls, lower MKRN3 and ghrelin levels in the 2020 CPP girls
Oliveira Neto et al. (2022)	Brasil	22 girls diagnosed with CPP during July 2020 to June 2021 and 33 girls diagnosed from March 2019 to February 2020	-	Wider association of CPP with higher Z-score of weight, lower ovarian volume and shorter interval between thelarche observation and CPP diagnosis
Peinkhofer et al. (2022)	Italy	Girls undergoing LHRH stimulation testing in a tertiary centre during 2019 and 2020	+22% increase of LHRH stimulation tests (38 versus 45 in 2019 versus 2020) and +38% increase in diagnoses of CPP in 2020 compared to 2019 (26 versus 16 accordingly)	Lower BMI SDS among girls with CPP in 2020 (median 0.11 [IQR -0.52;0.72]) than girls diagnosed in 2019 (median 0.93 [IQR 0.38;1.10]) (p =0.01).
Turriziani Colonna et al. (2022) (from abstract)	Italy	26 referrals for suspected CPP during the COVID-19 pandemic and 64 during the previous 3 years	Increase in CPP diagnoses during the pandemic (11 (39.3%) children during pandemic, versus 15 (24.2%) in the previous 3 years). Accelerated rate of pubertal progression in 22/45 (48.9%) patients, more children in stages T3 and T4-5.	Hypothetically, due to weight - BMI increase, or psychological burden of the pandemic.

Discussion:

The results of the above-mentioned studies confirm the international subjective view of an increase in new diagnoses of CPP, among female subjects. However, a definite answer, concerning the factors responsible for this phenomenon has not been acknowledged yet. It is certain that during the pandemic, major changes in everyday life were introduced, acting as possible contributors to idiopathic precocious puberty. These alterations along with the possible effects of the disease are estimated to be contributors to long-term negative health outcomes, even during the 22nd century (20). The three most studied parameters that were affected during lockdown and were hypothesised to participate in early onset of puberty were obesity- increase in BMI, use of electronic devices, and psychosocial stress.

Lockdowns were accompanied by an increase in the risk of obesity among children, adolescents, and young adults. This was partially attributed to changes in alimentary habits. Not only the amount of food intake was increased, but also the nutritional value of meals was severely deteriorated (22). Simultaneously, there were variable changes in physical activity. In Germany, for example, even though organised sports were halted, habitual exercise was increased, leading to an augmentation in the amount of daily physical activity among children and adolescents (23). However, many studies revealed a substantial decrease in physical activity during quarantine, internationally, due to restricted access to physical activity (24,25).

The correlation between obesity and probability of CPP has been extensively studied (26). Some hypotheses include fatty acid-mediated hypothalamic inflammation and subsequent activation of microglia, which, in turn, stimulates GnRH producing neurons. Another suggestion involves the neuropeptide phoenixin, that could be activated by fatty acid consumption. Phoenixin enhances GnRH expression, contributing to the initiation of the hypothalamic- pituitary- gonadal axis function, that is responsible for pubertal onset (27). Leptin, a hormone produced in adipose tissue, is also suggested as a regulator in pubertal onset, by giving the hypothalamus 'feedback' on the amounts of total body adipose tissue, allowing initiation of puberty. However, the implication of adipocyte-produced hormones does not end there. Insulin resistance, that often accompanies obesity, comes with hyperinsulinemia, along with sex-hormone-binding globulin (SHBG) alterations. Aromatase overproduction by adipocytes could increase estrogenic exposure among girls, during prepubertal years (26). Even though studies were inconclusive concerning BMI changes in the course of lockdowns, among children and adolescents, a potential contribution to early puberty has not been excluded.

A definite increase in the use of electronic devices during lockdowns was recorded, internationally. Devices were no longer used exclusively for entertainment, but also for scholar purposes, thus increasing on-screen-time. Stagi et al. referred to findings of studies, that indicated a possible provocation of CPP by melatonin disruption from electromagnetic fields (13). The exact role of melatonin in CPP is not known, even though abnormal melatonin values are a common finding in HPG axis disorders (28). While some studies indicated a fall of melatonin levels during the dawn of puberty, others failed to establish such a correlation (29,30). Despite the conflicting results of studies, there might be a proportional correlation among levels of melatonin and age of pubertal onset, meaning that lower levels of melatonin come with greater sexual maturation (29,30,31).

During lockdowns, populations are, by definition, obliged to stay in isolation for extensive periods of time. Social gatherings and activities are suspended, which creates a stressful familial environment. Studies that examined the psychosocial effects among Italian families during lockdown indicated that behavioural and psychological problems of children derived from parents' difficulty facing the stressful events of lockdown (22). Internalization of anxiety in girls has been correlated with precocious puberty. (32). According to Chioma et al. stress could intensify GnRH secretion in predisposed females (14).

Finally, a common characteristic among articles reviewed was that the increase in novel diagnoses of precocious puberty during lockdown was significantly more prominent among girls (12,14). The reasons for what might be an indication of sexual dimorphism remain unknown (14).

Despite the large number of patients included in these studies, the risk of bias could not be excluded, upon study selection. The increase in the incidence of CPP could potentially be partially attributed to more prompt actions by parents. Closer monitoring of children development during the pandemic, aided by the rise of hours spent at home, might have contributed to the increase of referrals for

CPP.

The major strength of the present review is the potent number of subjects included, as well as the diversity of their ethnic backgrounds. Most of the studies included in this review are of European origin (Italy (6), Spain (1), Turkey (1)), where similar lifestyle and weather conditions apply. Also, a thorough research of possible causative factors was performed. As far as limitations are concerned, no clear etiologic relation among risk factors and CPP could be established. Moreover, the extent of available articles covering this topic are not yet adequate for safe conclusions. It is definite that the number of studies that have been published, concerning the increasing incidence of CPP during lockdowns is limited. Results from a greater number of specialized centers, all over the World, are still expected, in order to have a more elaborate overview of a possible trend.

Conclusion:

Lockdowns constituted a widely used tool in the hands of governments for the confrontation of the pandemic. Data arising from current literature report a substantial increase in new cases of precocious puberty, especially among females. This finding has started to become evident in studies conducted in different countries under lockdown. The factors that have led to this phenomenon are still under investigation, but obesity, due to malnutrition and sedentary lifestyle, overuse of electronic devices, and psychological stress are the most frequent explanations. More in-depth analysis of this trend and its possible etiologic factors seems to be needed, to investigate the causes and dimensions of an arising epidemic, the one of pubertal precocity.

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Review

Cannabis and adolescence: The current situation in Greece comparing to European and Worldwide context

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ABSTRACT

Adolescence is a period of life that makes people vulnerable and prone to illegal substances. They are more likely to commit offenses than any other age group. In recent years, there has been an increase in the use of cannabis by adolescents worldwide. Cannabis has now been described in several countries, including Greece, as the dominant illegal substance and has been more closely linked to youth culture, as the age of starting cannabis is usually younger than for other drugs. Cannabis has very low acute toxicity and a very small mortality rate compared to other drugs, but morbidity is the most important impact on public health. In many countries, medical cannabis is considered legal in certain specific quantities, but the laws vary from country to country. The use of cannabis is examined and studied on many levels mainly because it affects teenagers in many areas including cognitive, social, and psycho-emotional. Some studies around the world confirm that the earlier and more prolonged exposure to cannabis use, the greater the damage. The fact that it can lead to adverse conditions in adolescents makes it imperative to proceed to primary prevention in the school environment but also in the society of each country. This will properly shape the adolescent's perception of cannabis and help identify other problems that occupy everyday life of adolescents preventing them from starting cannabis use or stop them from continuing using it.

Key Words: *adolescence, cannabis, drug, behavioral disorders, public health*

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Introduction

Adolescence is one of the most important and interesting periods of human life [1]. It is characterized by a particularly difficult transition from childhood to adulthood and is important both for the adolescent himself and for the people in his environment. It is a period of intense biological, cognitive and psychosocial changes [2,3]. During this period, a very important element for the teenager is his peers since he is prone to the pressure of the group and simultaneously seeks autonomy from his parents [2]. At the same time, the adolescent is characterized by significant changes in his behavior and cognitive functions, where cognitive deficits in risk assessment are identified. A main reason for this refers to the slow development of the prefrontal cortex [2,4]. This is why the adolescent brain is vulnerable to environmental impulses [3]. Also, an important factor seems to be the cultural context in which the teenager moves, the family environment, his personality, and psychosynthesis [5]. Adolescents are susceptible to developmental disorders caused by exogenous substances, such as cannabis use which can lead to a wider range of problematic behaviors [6].

In Europe and around the world, there is an increasing trend in cannabis use by adolescents. Adolescence is a developmental period of great importance. Also, adolescence in combination with the special characteristics of the individual, as well as his environment are important predisposing factors. This review aims to present data and information from Europe and around the world on cannabis use by young people and to highlight the importance of preventing and informing young people.

Cannabis or Hemp

Cannabis (Cannabis sativa L.) is a plant that exists in nature in many variations and is the first illegal substance that teenagers experiment with [7,8]. Currently, all its types (fiber, seed, marijuana, hashish) are classified in the species “Cannabis sativa” with two subspecies: the Cannabis sativa L. subsp. Sativa and the Cannabis sativa L. subsp. indica with different varieties depending on the use [9]. The most common method of its use is smoking with tobacco or ingestion with food [10] (Table I).

The greatest variation between varieties of drugs is their cannabinoid content (more than 400 chemicals and about 60 alkaloids) [9]. Among these, the most well-known are D-9 tetrahydrocannabinol (THC) which is the main psychoactive substance and cannabidiol (CBD) which has an antipsychotic, sedative effect and is associated with health benefits [9,11].

The mechanism of action of Δ9-THC is the result of its binding to the receptors of the endocannabinoid system (CB1, CB2) resulting in psychoactive intoxication and other systemic effects on peripheral tissue. Cannabinoid receptors are located in the central nervous system such as in the basal ganglia, hippocampus, and cerebellum and in immune cells and spleen [12,13]

A study reports that mitochondria also have CB1 receptors. Δ9 – THC stops the mitochondrial activity and can block the basic neurodevelopmental processes which involve CB1 receptors, damaging brain communication at sensitive ages [14]. Overdose does not cause anesthesia, coma, or death because basic vital functions such as breathing are not affected [13]. According to DSM – V (Diagnostic and Statistical Manual of Mental Disorders) during chronic dosing a disorder from cannabis use may develop, as 9% of those experimenting with cannabis will become addicted [15,16].

Numerous uses in medicine are found in cannabinoids and other substances of cannabis due to their soothing and analgesic action in the prevention and treatment of nausea and /or vomiting. These symptoms can happen in the advanced stages of diseases such as cancer, in chronic diseases such as in patients with multiple sclerosis (mainly relievers) and in AIDS [9,17]. Their therapeutic uses can be seen to asthma treatment and glaucoma and are constantly proven by studies. Cannabinoids and other substances of cannabis can also be used as antidepressant, as appetite stimulant, etc. [10, 17-18].

Legislation

The Cannabis legal framework is divided into 3 categories: cultivation, medical use, and recreational use. The only countries in the world that have legalized cannabis in all three categories are Canada and Uruguay [19]. In Greece, the legalization of industrial hemp took place in 2015. In all EU Member States, possession of cannabis for personal use is an offense, but 1/3 of these countries do not enforce imprisonment and most have legalized its medical use, such as Switzerland and Norway. The legalization framework differs significantly in all these countries. In contrast, the EU does not support the legalization of recreational cannabis use, and all countries impose imprisonment for illegal supply and possession [20].

Epidemiological data

The prevalence of cannabis use is 2.5% of the world's population, approximately 147 million people, compared with 0.2% who use cocaine and 0.2% who use opiates. Higher rates are found in the US, Oceania, Europe and increasingly in Africa and Asia [17,21]. According to the World Health Organization, cannabis abuse has risen rapidly, exceeding cocaine and opiate abuse over the past decade. In the last year, 15.5% (15,8 million) of young adults (15-34 years old) in the EU used cannabis. Due to the disruption of services due to the COVID-19 pandemic, the figures for 2020 should be interpreted with caution. Also, at the ESPAD report, it is derived that although it is too early to assess the consequences from the purchase and use of drugs in the Ukrainian war, there are, however, significant consequences. [22].

Greece

The National Documentation and Information Centre on Drugs (E.K.T.P.) states that cannabis is the most popular drug among young people, both in Greece and in Europe [23]. The ESPAD survey which was conducted in 2015 among 16-year-olds in Greece, shows significant ($p < 0.05$) changes in the rate of cannabis use between 2003 and 2015. In all other European countries, the prevalence of cannabis remained at the same level during the same period [22].

The percentage of 16-year-olds who report their first trial or onset of cannabis use at a very young age (≤13 years) remains stable over the last 20 years. One in 2 (50.8%) 16-year-olds in Greece consider cannabis use or experimentation "harmless". According to the most recent panhellenic survey of EPIPSY (University Mental health Research Institute - ΕΠΙΨΥ), which was conducted in spring 2019 in a nationwide representative sample of 17,733 students aged 16-18, (of which 5,988 were 16-year-olds), 8.20% have used cannabis at least once. [23]

Europe (Table II)

According to the 2022 European Drug Report, 15.8 million young adults (15-34 years old) in Europe, represent 15.5% of the total young adult population. Marijuana (herbal cannabis) and hashish (cannabis resin) are the main species of cannabis they use [22]. In 38 countries in Europe and North America, a study was conducted on adolescents that showed that the release of cannabis and partial prohibition policies were associated with higher levels of regular cannabis use among adolescents [24]. In addition, data from a study in Norway showed differences in cannabis use between adolescents with a migrant background and adolescents with a non-immigrant background. The prevalence of cannabis use was 10.6% between the 2nd generation of European immigrants and those from the US and 3.7% among the 2nd generation of Asians. This may be due to cultural differences because cannabis is more culturally acceptable and even legal in some countries [25].

Asia (Table III)

In Hong Kong, the results of a study showed that over 90% of adolescents had never used substances or cigarettes and only 10% had used them regularly (in the last 6 months) [26]. In Southeast Asian countries, a WHO study shows the aggregated estimate for substance use to be 2.5% for the 10 countries studied. The low level of parental commitment increased the risk of substance use while the high level appears to be a protective factor against mental health and substance use problems. Bullying was also connected to mental health and substance use (Indonesia OR: 5.47 – CI 95%) and in almost all Member States of the WHO South east Asia Region, the presence of mental illness increased the chances of using [27]. In a study conducted in 5 Asian countries, the prevalence of cannabis use throughout their lives was 0.9%. Compared to America and Europe it was generally found lower, probably due to the greater release of cannabis in these countries [28].

Oceania (Table IV)

In New Zealand, a significant association between cannabis and cognitive function (attention, learning, and memory tests) was found in adolescents aged 13-18 who were regular users (use more than once a week). Also, it was found that 52% of the general population had tried cannabis, with 70% of it, being adolescents (in age range up to 21) [29]. It was also found, in a sample of adolescent cannabis users, that a weakening in the ability to collect data and evaluate information before making a decision was observed, and especially, the earlier and more prolonged the exposure, the greater the harm was. [30]. A prospective study showed that the daily use by young women was associated with more than five times an increase in the chances of developing depression and anxiety [OR: 5.6, CI 95%: 2.6-12, P=0.003] [31]. In Victoria, Australia, it was shown that those who use cannabis at least weekly in adolescence had higher risks for subsequent illegal drug use and were less likely to complete tertiary education than non-users [32].

Africa (Table V)

Table I: Main hemp products

<table>
<tr><th>Marijuana</th><th>Hashish</th><th>Hashish oil</th><th>Industrial Hemp</th></tr>
<tr><td>Greenish mixture prepared from dried leaves and cannabis flowers</td><td>Dark-colored dried cannabis prepared from the dried resin of the plant (compressed under heat)</td><td rowspan="2">A concentrated extract from hashish and sticky material produced from cannabis leaves after special treatments (abundant in cannabinoids)</td><td rowspan="2">It is used in the diet (seeds, oil), in colors and dyes, cosmetics, fabrics (fibers), construction material, and for pharmaceutical use</td></tr>
<tr><td>Contains 0.2-5% D9 – THC</td><td>Contains 5-12% D9 - THC</td></tr>
<tr><td colspan="4">- When smoked (alone or within a mixture with tobacco): the action of cannabinoids begins within a few minutes and lasts 2-3 hours
- Oral intake: the action begins after 30-40 minutes and lasts 5-12 hours</td></tr>
<tr><td colspan="4">*Synthetic cannabinoids (K2/spice): they are human-made chemicals that are usually sprayed on dried plants. They are sometimes deceptively called "synthetic marijuana" because they act on the same brain cell receptors as THC. They are unsafe, have unpredictable effects, and are life-threatening (they can induce vomiting, violent behavior, suicidal thoughts, etc.)</td></tr>
</table>

Based on national population surveys, cannabis use ranges from 2% to 9% among South African adolescents. Studies report that the younger the age of one's first cannabis exposure and the more frequent the use, the greater the negative effects on mental health and the risk of developing psychosis later in vulnerable people, are. [33]. In addition, frequent cannabis use (several times a week) was associated with an increased rate of transition to suicidal ideation for young men aged 10-24 years but there is no evidence that suicidal ideation led to cannabis use in this population [34]. Research in South Africa found a high prevalence of cannabis use in adolescent patients with the first episode of psychosis [35].

America (Table VI)

From a large survey, the US National Drug Addiction Agency (NIDA) reported increased rates of marijuana use in middle and high school (grades 6 to 12) and an increase in the daily use of marijuana in the younger grades. These results represent the 2nd highest annual increase ever measured in a similar survey [36]. In North Carolina, cannabis use was associated with cognitive and behavioral disorders, such as decreased attentional performance, short-term memory, etc. [37] In Chicago, it appeared that the systematic use of marijuana before the age of 17 was associated with unemployment among men, children out of wedlock for men and women, and finally the abandonment of high school ($p>0,004$) [38]. In Victoria, British Columbia, and Canada, cannabis use was associated with psychotic symptoms (<22 years) and depressive symptoms between the ages of 16-19 and after 25 years of age [39]. In Mexico, it was shown that marijuana is the most used drug, with a prevalence of 3.2% of lifetime use, in comparison to all illegal drug users, who represented 5.2%. Drug use among Mexican adolescents is lower than among adolescents from other developed countries, while its increasing prevalence requires consistent public health actions, especially prevention strategies [40].

Table II: Studies in Europe

RESEARCH DATA		RESULTS	
Oslo – Norway (2014)	A cross-sectional study in high school based on 10,937 adolescents aged 14-17 years (questionnaires)	Prevalence of cannabis use→10.6% among 2nd generation of European immigrants and those from the U.S. & 3.7% among 2nd generation Asians.	Differences in cannabis use between adolescents with or without a migrant background may be due to cultural differences as cannabis is more culturally accepted and even legal in some countries [25] Asian 2nd generation → OR (95% CI): 0,34 (0,24-0,47) p<0.001
In 38 European and North American countries (2015)	A cross-national study examines the associations between types of cannabis control policies at a country level and the prevalence of adolescent cannabis use among 172,894 adolescents aged 15 years.	Teenagers were more likely to use cannabis (OR = 1.10, p = .001), use last year (OR = 1.09, p = .007) and systematic use (OR = 1.26, p = .004) (With boys more than girls) in relation to the differences in protection policies applied to various countries.	Cannabis release and partial prohibition policies were associated with higher levels of regular cannabis use among adolescents. The correlation between cannabis legalization and regular use was significant only in cases where the policy had been in place for more than 5 years [24]

Table III: Studies in Asia

RESEARCH DATA		RESULTS	
Southeast Asia (2014-2017)	A cross-sectional survey of students aged 13-17 examined the relationship between drugs & mental health in 10 countries.	The pooled estimate is 2.5% across the 10 countries that were studied. Substance use remains high in Bhutan (12%), Maldives (4.4%), Thailand (5.3%), and Timor-Leste (4.6%). Low levels in Indonesia (1%) and Buckland (1.3%)	The low level of parental engagement in most countries increased the risk of suicide attempts, feelings of loneliness, anxiety disorder, and substance use. In contrast, high levels of parental engagement appear to be a protective factor against mental health problems and substance abuse. Bullying has also been connected to mental health and substance use, and the presence of mental illness has increased the chances of using it [27]
5 Asian countries: Iraq, Malaysia, Mongolia, Kuwait, Vietnam (2017)	A cross-sectional study to assess the prevalence of cannabis and amphetamine use and to investigate factors related to substance use among adolescents in 38,941 adolescents (average age of 15.4 years)	The prevalence of lifetime cannabis use was 0.9% of participants. Strong relationships with peers or colleagues can help protect against illicit substances.	Prevalence of cannabis use was generally lower than reported in the Americas and Europe (due to higher cannabis release) [28]
China- Hong Kong (2009)	A replication study with 44 schools through questionnaires with 7,151 Chinese Secondary 2 (Grade 8) students (3,707 boys and 3,014 girls)	Problematic behavior and its association with substance use and alcohol were investigated.	90% had never used drugs or cigarettes in the previous 6 months and 10% had regular use. Life satisfaction was negatively correlated with substance abuse and crime (p <0.01) [26]

Table IV: Studies in Oceania

RESEARCH DATA		RESULTS	
Australia (2012)	Questionnaires and structured interviews for obtaining psychiatric, medical, and neurological history in 175 adolescents (mean age 18.3, range 16.5-20; 55% female). 48 cannabis users, 65 alcohol users, and 62 non-substance-using controls-recruited from a longitudinal cohort.	The age of the first cannabis trial was 15 years (p <0.001). Greater damage after early-onset and prolonged exposure to cannabis use.	The results show increased risky and impulsive decision-making in adolescents who are exposed to cannabis. The young cannabis users did show sensitivity to losses, suggesting that greater impulsivity early in their drug-using career is more evident when there is a lack of negative consequences [30]
Victoria, Australia (2010)	10-year follow-up for the results of occasional cannabis use in adolescence with a representative sample of 1943 secondary school adolescents.	From 1992 to 2003, a total of 10 series of teenagers with different average ages (from 14.9 to 24.1 years)	Occasional adolescent cannabis users who continued to use occasionally as young adults were at higher risk for illicit drug use in adulthood and less likely to complete higher education than non-users [32]
New Zealand (2007)	Questionnaire on alcohol and drug use, depression and other psychiatric disorders or ADHD and interviews (2 hours) with 70 adolescents 13-18 years old who do not have a confirmed mental disorder.	52% of the general population have tried cannabis and 70% of adolescents by the age of about 21. 68.5% had used cannabis in the last 28 days (p <0.01).	A significant relationship between cannabis and cognitive function in adolescents 13-18 years and using more than once a week (regular users). They performed worse on attention, learning and memory tests [29]
Victoria, Australia (2002)	A prospective study lasting 6 years with the participation of 44 secondary schools with 1601 students aged 14-15 years. Clinical interviews weighted for anxiety and depression.	60% of participants had used cannabis by the age of 20 & 7% were daily users.	Daily use of young women has been associated with a more than fivefold increase in the chances of reporting a state of depression and anxiety. [OR (95% CI): 5.6 (2.6-12) P = 0.003] Frequent cannabis use in adolescents predicted about twice the risk of developing later depression and anxiety (OR: 1.9, 1.1-3.3) [31]

Table V: Studies in Africa

RESEARCH DATA		RESULTS	
South Africa (2014)	Review of mental illness in adolescents from cannabis use.	Based on national population surveys, cannabis use varies between 2-9% in South African adolescents. 61.8% of adolescents (10-18 years old) who admitted to psychotic symptoms, reported cannabis use throughout their lives.	The negative effects on mental health seem to be greater when first exposure to cannabis occurs at a younger age and when use is more frequent. There is a correlation between early cannabis use and an increased risk of developing psychosis later in vulnerable individuals [33] Intensive cannabis use (several times a week has been associated with an increased rate of suicidal ideation in young men aged 10-24 years. There is no evidence that suicidal ideation has led to cannabis use in this population [34]
Durban, Kwazulu-Natal, South Africa (2013)	Psychiatric records of patients in 45 adolescents aged 12-18 years who had been admitted to a psychiatric clinic for at least 2 years	31 people (68.8%) reported a history of cannabis use throughout their lives.	There was a high prevalence of cannabis use in adolescent patients with FEP (first episode of psychosis) and there was an association between early presentation age and longer duration of symptoms and diagnosis of psychosis or schizophrenia. However, there was no link between cannabis use and a family history of mental illness [35]

Table VI: Studies in America

RESEARCH DATA		RESULTS	
USA (2019)	42,000 students from 400 public and private Gymnasiums and Lyceums (13-18 years old) of 8th, 10th and 12th grade by the National Organization for Drug Addiction (NIDA) **Middle (Grades 6–8) and high (Grades 9–12)*	Declining trends compared to previous years in smoking, alcohol and drug use, excluding marijuana. High school marijuana increase is the 2nd largest annual increase ever measured in a similar survey. 2,6 → 3,9% (8^{n}) 7 → 12,6% (10^{n}) 7,5 → 14% (12^{n})	60.9% use it to experiment. In 2019 daily marijuana rates increased significantly in the small classes with 1.3% (0.7 -2018), 4.8% (3.4 -2018) and 6.4% respectively for 8th, 10^{th}, and 12th grade. Marijuana smoking in the 12th grade →7,5% (2018) at 14% (2019) monthly usage [36]
Victoria, Colombia, Canada (2018)	Self-report measures for diagnostic symptoms, DSM V (CU = cannabis use. CUD = cannabis use disorder with psychotic, depressive, and anxiety symptoms) in 662 adolescents 12-18 years old random sample over 10 years (2003-2013)	The correlations between cannabis use, and cannabis use disorder with psychosis, depression, and anxiety symptoms in adolescents and adults were examined.	The use of cannabis (CU) was associated with psychotic symptoms after the age of 22 and with depressive symptoms between the ages of 16-19 and after 25 years. It was not associated with anxiety symptoms. CUD was associated with psychotic symptoms after the age of 23. - Depressive symptoms in the ages of 19-20 and after the age of 25. - Anxiety symptoms only in the ages of 26-27 years [39]
North Carolina, USA (2012)	Telephone and in-person interviews in combination with structured questionnaires [Drug History Questionnaire (DHQ)] for adolescents aged 14-17 years & classification based on marijuana use history. Users with at least 4 days/week for at least 6 months and non-users.	Cannabis use is associated with cognitive and behavioral disorders such as impaired attention, short-term memory, decision making, impulse control and intelligence.	These signs may be related to the increased risk of these individuals for a future psychiatric condition, including psychotic and emotional disorders as more serious substance use disorders [37]
Mexico (2007)	Of the country's 1,834,661 teens, 3,005 (71% agreed to take part in the survey) were 12-17-year-olds living in Mexico City.	-5.2% have tried illegal drugs -2.9% have tried it in the last 12 months -3.2% systematic use of cannabis -1.9% of cannabis use in the last 12 months - Marijuana is the most commonly used drug with 14 beng the average age of first time use	While drug use among adolescents in Mexico is lower than among adolescents in other developed countries, their growing prevalence requires sustained public health actions, and particularly prevention strategies [40]
Chicago, USA (2006)	A prospective study (ages 6 to 32-33) of young African Americans in Chicago. The social and behavioral effects of early and heavy cannabis use (on employment, marriage, etc.) were examined.	Marijuana use before age 17 was associated with adult unemployment in men and high school dropout ($p = 0.004$)	Early cannabis use in adolescence shows a marginal correlation in women & was negatively correlated in men and women in terms of marriage. There was no correlation between adolescent paternity or motherhood, but it was associated with extramarital parenting for both genders [38]

Treatment and prevention

According to NIDA and a plethora of studies, the systematic implementation of prevention programs in the school community prevents young people from using psychoactive substances.41 Statistics in Greece (2015) show a significant increase in the number of health education programs by the Ministry of Culture, Education and Religious Affairs in primary education, as well as in the number of students who participated in them. On the contrary, the corresponding interventions in secondary education have been reduced. An example of a program is the «I know what I want» (Ξέρω τι Ζητάω) implemented and evaluated in the framework of a multicenter study in seven European countries (Austria, Belgium, Germany, Greece, Spain, Italy, and Sweden). The first results of the program demonstrated that the students who participated showed a decrease in the use of alcohol, tobacco, and cannabis [20,41]

O.KA.NA (Organization against Drugs), through the action "pilot programs, alternatives to imprisonment" based on the program "Fred goes Net" (FreD) (early intervention program for young substance users implemented in European countries including Cyprus) organizes and operates the user support service, which aims at the prevention, treatment and reintegration of users [2].

A recent EMCDDA survey identified more than 60 drug-related mobile applications, almost half of them coming from Europe. This is due to the transition to the new digital generation, where adolescents appear to be quite active. Most applications have provided information on drugs, combined with some form of intervention [11,22]. At the same time, through the internet and social networks, adolescents can be informed, for example from the Adolescent Health Unit of the University of Athens, the "We know how" page, the Foundation "A World Without Drugs" etc.

Finally, in Greece, prevention and treatment programs are provided by recognized bodies. Indicatively they include KETHEA (Therapy Center for dependent individuals), Rehabilitation Unit 18 ANO, the Psychiatric Clinic of the National and Kapodistrian University of Athens, the General Public Hospitals, the independent association THESEAS within the framework of the Municipality of Kallithea and the Greek Center forMental Hygiene and Research. Non-governmental bodies are also included (eg Hellenic Centre for Intercultural Psychiatry and Care and the Hellenic Red Cross). The basic types of treatment provided by the above-mentioned bodies are divided into four different types of intervention:

1. Treatment of pharmaceutical treatment of dependence
2. Psychosocial therapeutic interventions (internal adult residence, adult outpatient, adolescent external stay)
3. Psychosocial therapeutic interventions within the criminal/penitentiary system and
4. Physical detoxification services [2,20].
   In addition, interventions in the community can be done with the help of parental groups, and media information campaigns.

Conclusions

In conclusion, cannabis has now become a part of the daily routine of teenagers worldwide, raising concerns for the scientific community and public health. The maturing and continued development of the endocannabinoid system during adolescence suggests that early, systematic, and heavy cannabis use makes them vulnerable, creating cognitive, behavioral, social, and even psycho-emotional problems throughout their lives. In Greece, the utilization rate is increasing, but compared globally, it remains at low levels, with the first places being held by North America, Oceania, and Europe according to the existing data. Perhaps the harsh legislative framework of some countries in Asia and Africa is the cause of their low prevalence, but this does not mean the rates of usage in these countries are not significant and that they will not increase as well over time. The fact that it is a "cheap" and more easily accessible drug for adolescents makes it more attractive because its long-term effects are unknown and increases the chances of their involvement with other illegal substances. Prevention plays an important role in the fight against cannabis and by extension to all drugs, and it ensures a better future for tomorrow's adults.

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