

Editorial



Dear colleagues,

in this issue of the Journal Developmental and Adolescent Health (JDAH) the submissions are most interesting and offer valuable information and original findings about hot topics concerning youth health and development.

A review article on peripheral precocious puberty highlights main mechanisms of this less common condition and there is also a systematic review on cocaine use and anxiety/panic symptoms strong correlation.

A case report using a tool evaluating parenting skills to be used for adoption/fostering procedures provides an idea of significant practical value.

The issue offers three articles of original research: primary school children are found to be more resilient during covid-19 pandemic vs adolescents, while empowered children have better school performance in an impressive, up to date work. A clinical survey during the 2008 economical crisis on internet overuse, pointing out certain familial status patterns as significant factor for this expression and physical activity as a protective condition. A cross sectional study on primary school children reveals internet misuse when early overuse and online gaming was noted.

We are very enthusiastic that a lot of articles keep coming in and new researchers expose their work and ideas. Have a great time exploring the present edition.

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

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Pathophysiology of Peripheral Precocious Puberty in girls: an overview

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ABSTRACT

Precocious puberty can be distinguished in central, or peripheral, based on the presence or absence of the Hypothalamic- Pituitary- Gonadal axis activation. The pathogenesis of peripheral precocious puberty (PPP) is based mainly on excessive estrogenic exposure, either endogenous or exogenous. The congenital causes of PPP include McCune- Albright syndrome (MAS) and Congenital Adrenal Hyperplasia (CAH). The main causes of acquired PPP are oestrogen producing tumours, which are mainly of ovarian or adrenal origin, hypothyroidism and environmental oestrogens or substances with estrogenic function.

Key Words: *precocious puberty, peripheral, pseudopuberty, pathogenesis*

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Introduction

Puberty is considered as a crucial developmental period, characterized by many physical, psychological, and social changes. It is known as a time of growth acceleration, gonad maturation (morphological and functional), as well as a period of increased sex steroid gonadal hormone secretion (testosterone for males, oestradiol and progesterone for females) and, finally, of gain of reproductive capacity (1). Steroid sex hormones are responsible for the development of secondary sexual characteristics, including the breast development and menstruation due to uterine maturation, in girls.

Physiology of Pubertal Onset

Physiologically, pubertal changes are incited by the reactivation of the Hypothalamic- Pituitary- Gonadal (HPG) Axis, because of an increase in Gonadotropin Releasing Hormone (GnRH) pulsatile secretion, resulting in Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) secretion (1,2). Naturally, this birth-active neuroendocrine axis, is suppressed during childhood, only to be reactivated at the beginning of puberty.

The exact mechanism that causes GnRH pulses to increase in amplitude is not yet elucidated. However, peptides, such as kisseptin, neurokinin-B and dynorphin have been proven to play a major role in GnRH secretion (1). Leptin, a hormone produced by adipocytes, that mainly acts as an appetite suppressor, by inhibiting neuropeptide Y (NPY), also seems to upregulate GnRH secretion. The timing of pubertal onset is defined by hormonal, genetic as well as environmental factors, including obesity, nutrition, general health and exercise (1,2).

In girls, breast development, termed as thelarche, is considered as the landmark of entrance to the pubertal age, since it is controlled by oestrogens (2). Menarche, usually, follows after approximately two years (3).

The aim of this review was to collect available data, regarding the pathophysiologic mechanisms involved in peripheral precocious puberty and enlighten some dimensions of this topic that remain unanswered.

Definition

Precocious puberty is defined as development of secondary characteristics of sex, occurring at an age of 2.5 SD before the mean age in girls of the same population.

In most Western countries, this translates as onset of puberty before the age of 8 years old in females, and 9 years old in males. Menarche before 10 years of age is also defined as precocious puberty by some. Precocious puberty can be distinguished into two separate subtypes: central and peripheral. In central precocious puberty (CPP), there is premature activation of the HPG axis, resulting to sex steroid hormones production. Conversely, in peripheral precocious puberty the hypothalamus and pituitary gland remain suppressed, while there is sex steroid overproduction-for- age in the periphery. Sites of production include the gonads, the adrenals, and ectopic secretion, while exogenous oestrogen exposure may also trigger early pubarche (2,3).

Peripheral Precocious puberty

“Pseudopuberty” is a term commonly used for Peripheral Precocious Puberty (PPP), since the increase in GnRH pulses, which constitutes the normal inciting event for pubarche, is absent. On the contrary, the elevated concentration of estrogens in the periphery creates negative feedback, suppressing the hypothalamus and pituitary gland. Thus, minor reaction is noted during LHRH stimulation testing (3,4).

The main causes of precocious puberty in girls are distinguished into two categories (genetic and acquired) and summarised in Table 1 (1).

McCune- Albright Syndrome (MAS)

MAS is a rare disorder, of an estimated prevalence between 1/100.000 and 1/1.000.000, defined by the triad of polyostotic fibrous dysplasia, café- au- lait skin spots and precocious puberty (5,6). Among the many endocrinopathies arising in the setting of MAS, autonomous ovarian activation seems to affect a percentage of 85% of patients (7).

The genetic base of MAS is relatively complex. The syndrome has been attributed to postzygotic mutations in the GNAS gene locus. The most common mutation results in the substitution of arginine by histidine in the position 201 of the Gsa protein. Different mutations have also been found but are less common. (8) The GNAS gene encodes the Gsa subunit of a G signalling complex, that resides in many tissues involved in MAS. Consequently, the mutations described above lead to the production of a Gsa subunit that is constantly activated and, there-

-fore, to a substantial increase in intracellular cAMP, which, in turn, enhances the production and secretion of hormones in affected tissues. Patients with MAS represent somatic mosaics, as suggested by the fact that disorders commonly affect only one side of the body, “respecting the midline”. This theory also explains the wide variety in clinical presentation (5,6,9).

Interestingly, there have been reports of progression from PPP to CPP in girls of advanced bone age (over 11 years old). PPP in girls with MAS can occur from neonatal years to early childhood and is induced by hyperactivated follicular ovarian cells, forming unilateral cysts, independently of gonadotropin stimulation. These cysts are morphologically complex, consisting of liquid, solid as well as haemorrhagic components and are responsible for the secretion of high levels of estrogens. Consequently, girls typically present with vaginal bleeding, which might or might not be accompanied by breast development and body growth. Vaginal bleeding might be episodic or recurrent, with irregular intervals, possibly persisting until adulthood (9, 10).

Congenital Adrenal Hyperplasia

Congenital Adrenal Hyperplasia (CAH) is a term describing a group of autosomal recessive diseases, caused by defects in enzymes of the adrenal cortex. These enzymes participate in the biosynthetic pathway of adrenal steroids. In 95% of cases, CAH results from mutations that decrease activity of 21-hydroxylase, an enzyme responsible for cortisol and aldosterone production. Decreased production of these two hormones stimulates adrenocorticotrophic hormone (ACTH) secretion by the pituitary gland. Androgenic production is independent of 21-hydroxylase activity. Thus, ACTH stimulates androstenedione and DHEA production by the adrenal cortex, which are then converted to testosterone. An 11 beta hydroxylase (11OHase) deficiency, 3 beta hydroxysteroid dehydrogenase (3 β HSD) deficiency, p450 oxidoreductase deficiency, 17 hydroxylase deficiency and lipoid CAH (StAR) deficiency are reported as less common causes of CAH (10,11).

CAH due to 21-hydroxylase deficiency has an average prevalence of 1/15,000 births, even though countries that implement neonatal screening, such as

Sweden, report a higher incidence and better prognosis. CAH is distinguished in two forms, classic and non-classic. Classic CAH is, in turn, subdivided into a salt-wasting and non-salt-wasting form, based on 21-hydroxylase activity. In the former, 21-hydroxylase activity is excessively low, resulting in aldosterone insufficiency and sodium wasting through urine. Virilisation is severe, with ambiguous external genitalia, ranging from clitoromegaly to a common urogenital tract. In the latter, serum sodium is preserved due to adequate levels of aldosterone. In this case, virilisation occurs, but is usually less severe. In both forms internal genitalia remain unaffected. The non-classic form of adrenal hyperplasia (also known as “late onset CAH”) typically presents later in life with a milder clinical appearance, characterized by oligomenorrhea, hirsutism and/or infertility (10,11).

Androgen excess results in early growth spurt, with advanced skeletal maturation, but eventual degradation of height potential. Consequently, the average adult height of CAH patients is significantly lower than that of the average population. Adolescent and adult women with CAH might suffer from hirsutism and other androgen-mediated gynaecologic disorders, including menstrual irregularities and infertility.

Ovarian tumours and cysts

Ovarian tumours are responsible for precocious puberty in 11% of affected girls. Some of these tumours secrete estrogens, able to cause breast development and vaginal bleeding (12).

Ovarian sex-stromal tumours consist of granulosa cells, sertoli cells, theca cells, leydig cells, and fibroblasts of gonadal stromal origin. Among them, juvenile granulosa cell tumours (JGCT) represent 67% of sex-stromal tumours during childhood. JGCT produce sex steroids and are, therefore, responsible for precocious puberty or virilization, when they occur in adolescence or later in life (13). Malignant germ-cell tumours account for 2.9% of all malignant childhood tumours, in patients younger than 15 years old. Tissues that are affected, other than the ovaries include the CNS, the coccyx, the testes, retroperitoneum, and mediastinum (15, 16). These tumours, especially of ovarian origin, can produce β -

Table 1. Causes of PPP in girls can be distinguished into genetic or acquired.

Causes of PPP in girls	
Genetic	Acquired
McCune- Albright Syndrome (MAS)	Ovarian Tumours
Congenital Adrenal Hyperplasia (CAH)	Ovarian Cysts
	Adrenal Gland Tumours excreting sex steroids
	Hypothyroidism
	Exogenous estrogenic exposure

Table 2. EDRs and their actions in girls (25,26,27)

EDR	Use	Action in girls	Mode of Action
DDT	Pesticides, Antimalarial	Early menarche, increase in danger of breast cancer	Binding to ERs
Dioxin	Industrial process	Breast development in prepubertal girls	Estrogenic, anti-estrogenic, alterations in gene expression ^(25,26)
Bisphenol A (BPA)	Polycarbonate plastics, epoxy resins	Precocious puberty, Diabetes, Heart disease	Binding to ERs, promotion of immature glucuronidation activity
Polybrominated biphenyls (PBB)	Plastic protection from burning	Early menarche, thelarche, pubic hair development	Estrogen antagonists(?)
Phthalates	Plastic food containers	Defeminization, Breast development	ER α and ER β binding
Atrazine	Herbicide	Increase in danger of breast cancer	Increase in aromatase
Zeranol	Meat and grains	Breast development	Interference in the cell cycle, binding to ERs
Isoflavones	Food	Breast development, Breast cancer, Precocious puberty	

HCG, imitating the actions of LH and only partially those of FSH. Thus, ovarian theca cells are stimulated to produce androgens. Still, FSH is needed to enhance aromatase activity, so that androgens are converted to estrogens. This process takes place in granulosa cells. That is why, some suggest that, in girls with germ-cell tumours, aromatase activity depends on different factors (16).

Adrenal tumours

In girls, PPP due to adrenal tumours is extremely rare. Adrenocortical tumours represent less than 0.2% of pediatric tumours. Girls present a two-fold increase in risk of presenting an adrenal tumour, compared to boys. The most common presenting signs and symptoms result from virilization (17). Feminizing tumours are even more rare. From 1922 to 1982, there were reports of only 10 cases of girls with precocious puberty, caused by feminizing adrenal tumours (18). Often, adrenal tumours of childhood arise as a manifestation of genetic syndromes, such as Li-Fraumeni or Beckwith-Wiedemann syndrome.

Hypothyroidism

Juvenile hypothyroidism is a rare cause of precocious puberty. PPP typically arises in the setting of severe hypothyroidism and can manifest as breast tissue enlargement, maturation of the external genitalia and even vaginal bleeding. Growth retardation is another common finding. Interestingly, pubic hair, which is a feature of androgenic function, is absent in precocious puberty of juvenile hypothyroidism (19). Another notable element is the fact that symptoms are completely reversible once thyroid hormone is replaced.

The exact pathophysiologic mechanism of precocious puberty in hypothyroidism is still under investigation. Many hypotheses have been proposed over the years. In 1960, Van Wyk et al. suggested that precocious puberty and juvenile hypothyroidism could result from 'nonspecific overproduction of multiple pituitary hormones', incited by thyroid failure (20). Another theory focuses on estrogen metabolism disorder, caused by decreased thyroxine. However, the exact metabolic effects of hypothyroidism in estrogens remain unknown (19).

According to Hemady Z. S. et al, the predominant theory is that precocious puberty in juvenile

hypothyroidism is a result of increased levels of prolactin. TSH overproduction, seen in primary hypothyroidism is often accompanied by prolactin elevation, due to TRH stimulation. This theory suggests that prolactin has an immediate effect on ovarian cells, resulting in estrogen secretion (19). Koutras, on the other hand, refers to a «spillover» effect of TSH, which can have effects similar to LH and FSH, leading to early or -more commonly- delayed pubarche (21).

Environmental estrogens

Fetal and childhood exposure to estrogens is considered as a possible cause of many adverse events in later life, including precocious puberty. Even low doses of steroids can exert severe disruption of the fine balance between pituitary gland and the gonads (23). On the contrary, Partsch et al. estimated that estrogenic contamination of food could not constitute a valid cause of precocious puberty, since it is not systematic, but rather sporadic (5).

Endocrine disruptors (EDRs) are natural or artificial chemicals, that have an impact on the human endocrine system (23). The establishment of a causative relation between endocrine disruptors and sexual precocity is hard, mainly, because of the wide range of chemicals present in the environment, in combination with the long latency period between perinatal exposure and puberty. EDRs are substances, present in many widely used objects, including drugs, pesticides, detergents, fertilizers and heavy metals (24). Because of their similarity to natural hormones, EDRs can act as estrogenic or androgenic agonists or anti-agonists, or have effects on GnRH, leading to peripheral or central precocious puberty. As far as the estrogenic effects are concerned, they might be exerted via immediate action on estrogenic receptors of oestrogen-sensitive tissues, aromatase action enhancement, or augmentation of tissue sensitivity to estrogens (24,25). The main EDRs, connected to precocious puberty in girls are shown in Table 2. There is disagreement among different studies on the exact role and effect of some substances, accused as EDRs. For example, while BPA is commonly accused of causing precocious puberty in girls, Yum et al. (26) failed to track high levels of these substances in the blood of girls with precocious puberty. On the

contrary, levels of BPA and phthalates were higher in the blood of healthy controls.

Prevention of precocious puberty and other endocrine abnormalities could be achieved by controlling the exposure to EDRs. Many countries have already prohibited the use of some substances with proven effects on endocrine tissues. However, more research needs to be conducted, in order to clarify the exact impact and mechanism of action of certain substances in estrogen- dependent tissues and overall health.

Conclusion

The pathogenesis of peripheral precocious puberty, also termed pseudopuberty, is quite variable, since it can be attributed to many different causes, genetic or acquired. What is common in every case of peripheral precocious puberty is the excessive estrogenic secretion, which is independent of the hypothalamic-pituitary regulation.

Early detection of signs of pubertal precocity, such as thelarche, menarche or pubarche is crucial and should prompt immediate referral to a paediatric gynecologist or endocrinologist for further investigation. Specialist intervention can be of vital importance and even completely reverse pubertal onset, as can happen in precocious puberty, in the setting of severe hypothyroidism.

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Possible correlations between cocaine use, generalized anxiety and panic disorders in adolescents and young adults: a review of the literature

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ABSTRACT

BACKGROUND: Substance use disorders have been associated with a vast range of harmful behaviors. The purpose of this review is to evaluate the possible correlations between anxiety disorders, especially generalized anxiety disorder (GAD), panic disorder (PD), panic attacks and cocaine use among adolescents and young adults.

METHODS: A literature search was conducted to evaluate pertinent studies up to July 06, 2020 in Google Scholar, PubMed, Embase and PsycInfo databases.

RESULTS: A total of 20 articles were considered eligible; most studies reported that young people who experienced PD, panic attacks or GAD were more likely to have been cocaine users, with the risk being higher when individuals were addicted.

CONCLUSIONS: The association between cocaine use, PD and GAD, poses significant challenges to health providers of adolescents and young adults, as comorbidity complicates the treatment, prognosis and course of the disorders.

Key Words: *Panic disorder; generalized anxiety disorder; cocaine use; substance use; adolescents*

Introduction

Substance use and substance use disorders (SUDs) are vital public health problems [1], as they are associated with a vast range of harmful behaviors, besides premature mortality [2]. Numerous studies indicate a positive correlation between problematic substance use and psychiatric disorders [3,4]. People diagnosed with a psychiatric disorder are twice and four times as likely to be diagnosed with an alcohol and drug use disorder, respectively, compared with patients without a psychiatric disorder [5]. The underlying causes have not been adequately studied, but one interpretation could entail substance use as self-medication [6,7]; however, the chronological relationship between substance use and psychiatric disorders is controversial. Legal or illicit substance use has been associated with anxiety disorders [8-12].

Anxiety disorders include a range of clinical syndromes, such as panic disorder (PD), generalized anxiety disorder (GAD), social anxiety disorder (SAD), obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD) and agoraphobia [4,13]. All of the above conditions, although characterized by anxiety, nervousness, tension and a variety of physical symptoms, each have specific psychopathological characteristics [14]. The overall prevalence of anxiety disorders, in the general population, is high. According to population surveys, up to 33.7% of people are affected by an anxiety disorder during their lifetime, but there is a natural decrease with advancing age [15, 16].

The hallmark of PD is the recurrence and unexpected seizures of severe anxiety, known as panic attacks. Panic attacks are characterized by physical and cognitive symptoms, such as sweating, shortness of breath, tachycardia, tremor, which emerge precipitously and reach their peak within 10 minutes [4]. The prevalence of PD, globally, ranges from 1.7 to 3.7% [17,18]. A diagnosed panic disorder may be present with or without agoraphobia [4]. Agoraphobia usually develops in response to panic attacks. The main feature of agoraphobia is the manifestation of anxiety when the person is in situations or places where help – in case of an unexpected panic attack – may not be available or escape may be difficult [19].

GAD, is a relatively common and debilitating anxiety disorder characterized by excessive stress and anxiety in various aspects of life. Although pathological anxiety is the main feature of this disorder, most

patients experience multiple physical symptoms, such as tension, irritability, fatigue, sleep disturbances, sweating, dizziness, palpitations and difficulty concentrating [20]. Anxiety disorders and substance use have been studied by many researchers, with many studies investigating the causal link between a particular type of anxiety disorders and the legal and / or illicit substance use. Proper recognition of anxiety disorder is very important for an effective intervention given the high rates of comorbidity [4]. According to the available literature, the correlation between anxiety disorders and substance use / abuse is often seen in people who experience negative emotions and, consequently, use these substances as a form of treating and relieving anxiety symptoms [21,22]. On the contrary, studies have also shown that substance use can affect the development of psychiatric disorders [23].

The use of cocaine, powder or crack, by high school students, has an annual prevalence (used at least once during the previous year) of about 7% globally [23,24]. Its use had been more frequent in the mid-1980s (above 14%), probably due to a decrease in heroin availability, and increased availability and affordable price of cocaine [25,26]. A lower incidence was recorded in the early 90's (almost 4%), and has an average of about 7% per year prevailing in the new century [23]. Cocaine use and cocaine use disorder (CUDs) have been associated with a number of adverse effects, such as increased vulnerability to serious medical conditions or infections, increased hospitalization, and even death [27-30].

Anxiety and mood disorders are closely linked to CUDs. In particular, cocaine use can cause panic attacks, phobic reactions, compulsions and obsessions, which may persist after cessation of use [31-33]. The comorbidity between cocaine use and social phobia [34] and post-traumatic stress disorder [35,36] tends to occur among people with severe cocaine use / abuse and family or personal history of disorders [37]. Cocaine users seeking treatment also report significant levels of anxiety and panic, as a side effect of cocaine use [31,38].

Thus, the purpose of the present review is to identify and highlight through the available literature the possible correlations between anxiety

disorders, especially GAD, PD and panic attacks, and cocaine use among adolescents and young adults.

Methods

Data Sources

A literature review was conducted in the following electronic databases: Google Scholar, PubMed, Embase and PsycInfo, with end-of-search date July 06, 2020. The following search algorithm was used: (cocaine OR coke OR bernice OR crack OR blow OR “crack cocaine”) AND (teens OR teenagers OR adolescence OR adolescent OR adolescents OR “young adults” OR “younger adults” OR youthful OR youngster OR young) AND (“generalized anxiety disorder” OR GAD OR “panic disorder” OR “panic attack”). Snowball method was moreover utilized to scan reference records of retrieved full-content articles in order to search manually for additional relevant literature.

Eligibility Criteria, Data Extraction, Analysis

The inclusion criteria for this review are the following:

1. Articles written in English.
2. Studies should be conducted only on humans
3. Articles published at any time
4. Original research articles and studies were selected (cross-sectional, case series / control, clinical and cohort studies). Case reports, dissertations, conference posters and newspaper articles were excluded
5. Anxiety disorders or symptoms (GAD, PA, PD) data could be measured by self – reported surveys, diagnostic criteria (DSM – III, DSM – III – R, DSM – IV, ICD – 10), standardized scales or diagnosed by healthcare professionals
6. Cocaine use or cocaine use disorder data should be presented, analyzed and discussed in eligible studies and an association with either GAD or PA and PD should be reported. Studies which included cocaine users who developed any other anxiety disorder, except GAD, PA and PD, were excluded.
7. Population spanning adolescents (14 – 17 years) or young adults (< 30 years)

No limitations, such as ethnicity, country or journal, were considered.

Using these criteria, two independent reviewers (P.I and K.E) screened the titles and the abstracts of the retrieved articles. After this initial screening, the relevant

full texts were read, and the ones that met the inclusion criteria were collected.

From the analysis, the following data were extracted for each study: PMID or DOI, name of first author and year of publication, region / country where the study was conducted, language, study period and design, sample size and selection of sample, percentage of males, mean age and age range, study population, statistical analysis, type and assortment of cocaine use, time of cocaine use, assessment for diagnosis of GAD and panic disorder and correlation between cocaine – GAD, cocaine – panic disorder.

Results

Study selection

After the search in databases, 3620 articles were retrieved in total, including duplicates. After removal of duplicates (n = 3010), 610 items were selected for extensive review. From them, 457 items were excluded as irrelevant to the topic and three articles as reviews. The remaining 150 full – text articles were subjected to further consideration; of them, two articles were excluded because of language. Finally, 20 articles were included in the review [2-4,13,23,25,27,31,33,40-51]; half of them (n = 10) were cross-sectional [2-3,13,23,25,33,40,45,46,50], seven were case-control [27,31,43,47-51], two were cohort studies [41,44], and one was case- crossover [42]. The included relevant studies are presented in Table 1.

Descriptive Analysis of the Included Studies

Based on geographical distribution, the studies investigated the following populations: 15 studies were conducted in the USA [2, 23, 27, 31, 33, 40-44, 47-51], four studies presented data from Brazil [4,13,45,48] and one study included participants from Spain [25]. Eight studies enrolled young adults between 18 and 30 years old [13, 25, 33,41,43-45,47], four studies enrolled participants >18 years old [2,31,50, 51], three studies included only adolescents between 14 and 18 years old [4,23,46] and one study included adolescents and young adults > 14 years old [42]. However, three studies used a wide age range criterion including adolescents, young adults and adult participants [27,40,48], whereas another study referred to adults in general, without further study referred to adults in general, without further specification [49].

Table 1: Eligible studies – examining association between cocaine use and panic disorder or / and generalized anxiety disorder – Demographic characteristics

First author (year)	Region, Country	Language	Study Period	Study Design	Sample Size	Percentage of males	Mean age	Age Range
Sareen et al., 2006	USA, Ontario	English	Early 1990s	Cross-sectional	NCS (n=5877), OHS (n=8116)	Not reported	Not reported	NCS 15 – 54 OHS 15 – 64
Alvarado et al., 2010	USA	English, France, Spanish	2000 – 2002	Cohort study	1692	46.7% (2000 – 2002)	21 years	18 – 22 years
Valentiner et al., 2004	USA	English	2004	Cross-sectional	399	Not reported	18.4 years	18 – 24 years (young adults)
O'Brien et al., 2005	USA	English, France, Spanish	1994 – 1997	Case – crossover	1071	Not reported	Not reported	Youth was 12 – 17 years and 18 years and older
Deacon et al., 2000	USA	English	2000	Case – control	279	52%	19.7 years	Young adults
Newcomb et al., 1987	USA – Los Angeles	English	1980 – 1984	Cohort study	739	30%	21.5 years	19 – 24 years
Kligus & Pumariega, 2009	USA – South Carolina	English	2009	Cross-sectional	31	23 boys from 31	16 years	14 – 17 years
Narvaez et al., 2014	Pelotas, southern Rio Grande do Sul, Brazil	English	Not reported	Cross-sectional	1560	82.1%	Not reported	18 – 24 years
Ohanessian, 2014	USA	English	Spring of 2007	Cross-sectional	905	54%	16.1 years	15 – 17 years
Buckner et al., 2011	USA, Washington, DC	English	Not reported	Case – control	304	58.6%	43 years	19 – 66 years
Mackesy – Amuti et al., 201	USA, Chicago	English	Not reported	Case – control	570	62%	23 years	18 – 25 years
Zubaran et al., 2013	Brazil	English	Not reported	Case – control	100	88%	20.1 years	11 – 40 years
Ziordonis et al., 1994	USA	English	June 1986 – July 1988	Case – control	263	74% White, 61% African America	27 White, 29 African American	Adults
Conway et al., 2006	USA	English	2001 – 2002	Cross-sectional	43093	Not reported	Not reported	18 years and older
De matos et al., 2018	Brazil	English	2007 and 2009	Cross-sectional	1560	43.6%	21 years	18 – 24 years
Pires et al., 2014	Brazil	English, Spanish	July 2009 – December 2009	Cross-sectional	1081	28.7%	Not reported	14 – 19 years old (adolescent)
Herrero et al., 2008	Barcelona, Spain	English	End of 2003 – 2006	Cross-sectional	139	62.6%	23.8 years	18 – 30 years
Blanco et al., 2018	USA	English	2001 – 2002	Cross-sectional	43093	Not reported	Not reported	18 years or older
Anthony et al., 1989	USA	English	1980 – 1984	Case-control	5896	Not reported	29.7 years	18 – 44 years
Weiss et al. 1986 [	USA	English	Not reported	Case-Control	30	63.3%	29.7±5.8 years	21-42 years

* NESARC: National Epidemiological Survey of Alcohol and Related Conditions, UCPel: Universidade Católica de Pelotas

Regarding gender distribution in the included studies, eight studies did not report the gender distribution [2,31,33,40,42,49-51], and the other 12 studies recruited both male and female participants [4, 13, 23, 25, 27, 41, 43, 44-48]. Among the latter, five investigated mainly male participants [23,25,45,47,48], whereas two studies investigated mainly female participants (more than 60% males or females in the population, respectively) [4,44], and five studies demonstrated an approximately balanced male – female ratio [13,27,41,43,46].

Assessment of cocaine use

The majority of the studies used questionnaires (interviews), whereas others used screening tests or medical records to establish the cocaine use. Specifically, 15 studies used interviews [2,27,31,33,40-43,45, 48-50], one used history data which were obtained from self-

report questionnaire [51], four studies used rating scales [44,46] or screening tests [4,13] to check current and lifetime substance use and two studies did not report their methods [23,25].

Most researchers created a drug use questionnaire using the drug category sheet in the Structured Clinical Interview and asked the respondents to answer “yes” or “no” to the question regarding ever use of any form of cocaine, including crack, snorting, powder, leaves, free base, or coca paste, even once [27,33,40,41,43,49,50]. One study used psychiatric interview to evaluate the main addictive substance and the one causing the most salient dependence [48], whereas one study used the National Household Surveys on Drug Abuse (NHSDA) questions to define cocaine use, include crack or smoking, in the past month or in the past 12 months [42]. In addition, one

study administered all participants to Mini International Neuropsychiatric Interview (MINI), a clinical interview based on DSM – IV and ICD – 10 criteria for the diagnosis of Axis I disorders (Narvaez et al., 2014), one study used an audio computer – assisted self – interview (ACASI) to assess drug use among other parameters [48] and one study used Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM – IV (AUDADIS – IV) for advance measurement of substance use and mental disorders [2].

Moreover, two studies used rating scale to evaluate the frequency of cocaine use during the past 6 months with the following categories: (1) “Never”, (2) “Once or Twice”, (3) “A few times”, (4) “Once a month”, (5) “Once a week”, (6) “Once a day” and (7) “More than once a day” [44,47]. One study used screening test, and especially the self – applied Alcohol Smoking and Substance Involvement Screening Test (ASSIST 2.0/OMS), to evaluate the frequency of use and the possible dependence in a list of several legal or illicit psychoactive / psychotropic substances, included crack cocaine [4,13].

Establish Panic Disorder / Generalized Anxiety Disorder Diagnosis

The majority of the studies used DSM – III / DSM – III R (n = 5) [23,40,44,49,51] and DSM – IV / DSM – IV – TR / ICD – 10 (n = 7) [2,27,45, 47,48,50] criteria to establish GAD diagnosis. Moreover, one study used 41 item Screen for Child Anxiety Related Disorders (SCARED) [46], to assess a child’s recent anxiety symptoms and one study Mini International Neuropsychiatric Interview (MINI) [13] to evaluate the number of stressful events during the last year, whereas 7 studies did not report the diagnostic method [4,25,31,33,41-43]. Similarly, the majority of studies used DSM – III / DSM – III – R (n = 5) [23,40,41,44,49] and DSM – IV / DSM – IV – TR / ICD – 10 (n = 10) [2,25,27,33,42,43,45, 47,48,50] criteria to establish PD diagnosis. Furthermore, one study applied diagnostic interview schedule [31], one study used SCARED [47] and one used MINI [4]. Two studies did not report the diagnostic method [13, 51].

Panic Disorder

Herrero et al., (2008) [25] with their study highlighted the moderately high incidence of psychiatric comorbidity (42.4%, CI 34 – 51%) in a sa-

-mple of young cocaine users that were recruited on the street. The most common Axis I disorders were mood disorders (26.6%) and anxiety disorders (13%), with panic disorder correlated 4.3% [25].

The majority of studies observed correlations between cocaine use and PD. Conway et al., (2006) [50] found virtually positive and statistically significant ($p < 0.05$) associations between specific cocaine and anxiety disorders, especially PD with agoraphobia. A few years later, Pires et al., (2014) [4], also found a strong relation between panic disorder and substance use (included cocaine or / and crack). Especially, subjects who used – at least once – one of the substances, showed at least two times higher likelihood to have current panic disorder [4].

According to one study [44] several significant relationships were observed between cocaine use and indicators of psychopathology, including panic and phobia symptoms, but a negative association was found between cocaine use and panic / phobia symptoms and panic disorder diagnosis. Especially the authors indicated that females with a panic / phobia disorder were significantly less likely to have used substances that may impair their thought processes and motor behavior, or diminish their sense of control, such as cocaine.

Panic attacks

Antony et al., (1989) [31] showed statistically significant associations between the risk of panic attack and use of cocaine (RR = 3.2). Subjects who had used cocaine during follow – up were 14 times more likely to experience a panic attack, as compared with subjects who did not use cocaine during the follow – up interval (CI 2.4 – 85.6) [31]. Similarly, O’ Brien et al., (2005) [42], based on case – crossover estimates, demonstrated that cocaine use was associated with a 3 – to – 4 – fold increased occurrence of panic attack (RR = 3.3, $p = 0.049$, CI 1.0 – 13.7) [42]. Same results were found from the study by Alvarado et al., (2010) [41], that revealed a modest, but statistically robust association linking use of cocaine at least once with the occurrence of a panic attack – like experience (OR = 1.9, $p = .003$) [41].

On the contrary, Deacon et al., (2000) [43], indicated that non – clinical panickers were not more likely than non – panickers to report having used cocaine. These results suggested that the use of cocaine is probably

not inducing many panic attacks in non – clinical populations [43]. Correspondingly, Valentiner et al, (2004) [33] did not found a strong relationship between panic attacks and cocaine use, with the results showed that panickers were significantly more likely to report sedative / opioid / stimulant and other drug use, whereas, were not significantly more likely to report alcohol / tobacco / cannabis / hallucinogen and cocaine use, compared with non – panickers. Even more than that, the results did not find any correlation between number and severity of panic attacks among panickers who did and did not report substance use, especially cocaine use [33].

Generalized Anxiety Disorder

Weiss et al., (1986) [51] found that the rate of affective disorder in the sample of hospitalized chronic cocaine abusers was found to be significantly higher (3.3%) than that in a group of opiate and depressant abusers admitted to the same facility [51]. It is worthy to note that the prevalence of each anxiety disorder was consistently much higher among respondent with dependence than for those with abuse (eg cocaine use disorder and GAD = 10.4%, cocaine abuse and GAD = 8.1%, cocaine dependence and GAD = 14.7%). Among gender, the associations between specific anxiety disorders and drug use disorders were nearly all positive and statistically significant, and few gender differences were observed (eg the associations between panic disorder with agoraphobia and cocaine dependence were greater for men than for women) [51]. Sareen et al., (2006) [40], who conducted two surveys found that among those with lifetime use of cocaine, among other drugs, approximately one – third of participants had at least one lifetime anxiety disorder diagnosis (OR 2.0) (NCS OR 2.39 for GAD and OHS OR 1.39 for PD) [40].

The results from the study of Kilgus and Pumariega (2009) demonstrated that cocaine – preferring adolescents have higher co morbidity and more anxiety disorders (GAD 9.7%) than the general population of adolescents. Additionally, more boys met threshold criteria for anxiety disorders (43% vs. 25%); overanxious and generalized anxiety disorders were reported together. Same results demonstrated to study of Narvaez et al., (2014) [45], who also found a strong association between lifetime crack cocaine use, substance use disorders and psychiatric disorders, included generalized anxiety disorder (20.5%) among

other [45].

Zubaran et al., (2013) [48] investigated anxiety symptoms among inhalant cocaine user and crack cocaine users and found that both crack and inhalant users encounter critical side effects of anxiety, with inhalant users presented significantly more anxiety symptoms than crack users. Particularly, 90% crack users and 53.1% of inhalant users demonstrated the absence or low levels of anxiety whereas 10% and 46.9% demonstrated the presence of anxiety, respectively. Among crack and inhalant users who experienced anxiety, 4% and 28.6% presented light to moderate levels of anxiety, while 6% and 18.4% presented moderate to severe levels of anxiety, respectively [49]. In contrast, de Matos et al., (2018) [13] indicated a scare relationship between crack cocaine use and GAD (the prevalence of GAD was significantly higher among those who abused / were dependent on stimulant substances like crack cocaine [2%]) [13].

Ziedonis et al., (1994) [49], who studied the psychiatric comorbidity and differences in current and lifetime rates for specific disorders among African – American and White cocaine users, discovered that the current and lifetime rates both for psychiatric disorders and cocaine use disorders did not differ significantly for the two racial groups. Whereas, compared with African Americans, Whites had altogether higher rates of lifetime attention deficit disorder, major depression, alcohol dependence and conduct disorder, while African – American addicts, especially women, were more likely to meet criteria for a current diagnosis of anxiety disorders and phobia [49]. On the other hand, both men and women cocaine users reported frequently feelings of nervousness, tenseness and restlessness (anxious mood and diagnosis of GAD), among other symptoms such as low interest or / and energy, depressed mood, psychotic proneness, impaired cognitive functions, sleep disturbance, lack of purpose in life, etc.[44].

Similarly, according to one study of Ohannessian et al., (2014) [46] the relationship between anxiety and substance use differs by sex and ethnicity / race. Especially, for African – American and Caucasian boys, higher levels of social and separation anxiety were related to less substance use. In contrast, higher levels of generalized anxiety disorder and panic disorder were related with more substance use for African – American boys. However, none of the anxiety disorders were related to substance use for African – American girls or

or Hispanic girls or boys [46].

Discussion

Many of the investigated studies in this review found that adolescents and young adults who reported using cocaine, have experienced PD or / and GAD, with risk being higher when individuals are addicted compared to use of cocaine [4, 13, 23, 25, 33, 40, 44, 45, 48, 50, 51]. In contrast to the studies that have documented positive relationship between cocaine use and PD / GAD, particularly, some studies have not identified an increased likelihood of anxiety disorders among cocaine users and non – users [33,44].

Large – scale epidemiological studies in US and European adult populations with SUDs [52,53], as well as community and clinical studies on substance – abusing / using youth people [54,55], reported a higher incidence of substance – related psychiatric disorders. This situation is so – called “Dual Diagnosis” [56]. The term “Dual Diagnosis” is used by many physicians to categorize patients diagnosed with both SUDs and psychiatric disorders. Patients with dual diagnosis constitute very heterogeneous groups, with many possible combinations of two or more diagnosed SUDs and psychiatric disorders. Therefore, they are associated with poor prognosis in treatment options. It should be noted that previous studies have recognized the need for new therapeutic approaches to address both problematic situations [38, 49]. One explanation for this dual diagnosis often point out that many people may use psychoactive substances to reduce negative emotions such as anxiety, panic attacks and depression [11]. Another explanation for high rates of dual diagnosis is that certain substances can cause panic attacks or other negative emotions [11,57].

Cocaine use and cocaine use disorder (CUDs) remain serious public health concerns. Cocaine use has also been associated with a number of adverse effects, such as increased vulnerability to serious medical conditions or infections, increased hospitalization, and even death [27-30]. However, although cocaine is a widely abused drug, it is not adequately studied in adolescent populations [23]. Given that both SUD and anxiety disorders often begin after adolescence, it is not surprising that there is some evidence that substance use behaviors and symptoms of anxiety disorders coexist during late adolescence [58].

Many of the investigated studies in this review found that adolescents and young adults who reported having experienced psychiatric disorders were more likely to report using sedatives, opioids, stimulants and other drugs, included cocaine. In particular, anxiety disorders, including PD and GAD, were the most prevalent mental disorders among cocaine users, with the risk being higher when individuals are addicted compared to use of cocaine. This strong association is consistent with the finding that the severity of these psychiatric conditions is positively correlated with the progression from abuse to addiction, as well as, with heavier use patterns [4,13,23,25,33,40,44,45,48,50,51].

Even so, the main evidence of the present review indicates that cocaine use in these age groups is associated with increased risk of developing panic attacks, as compared with non – cocaine use [31,41,42], a finding which is supported by clinical observations and laboratory data on the pharmacological activity of the drug [59]. Based on present and previous studies and case reports, cocaine use was associated with 3.3 – fold elevated incidence of panic attacks [31].

Furthermore, results from multiple – group analyzes showed that the relationships between anxiety and substance use differ by gender, ethnicity and race. In particular, higher levels of predicted GAD and PD symptoms and substance use were more common among African – American boys, followed by Caucasian youth. [46, 51].

In contrast to the studies that have documented positive relationship between cocaine use and psychiatric disorder in adolescents/young adults, particularly anxiety disorders (included GAD and PD), some studies have not identified an increased likelihood of anxiety disorders among cocaine users and non – users [33,44,58].

Although the present results revealed a number of correlations between cocaine use and psychiatric comorbidities, particularly anxiety disorders (PD and GAD), they were unable to identify the causal link between them. A reasonable hypothesis for this relationship is that they share similar predisposing factors or are subject to a common underlying pathology. A third explanation for the present findings includes the idea of using drugs as a form of self – medication to relieve the symptoms of a pre – existing disorder [33, 45], although long-term, drug use can worsen these symptoms [45].

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The use of MMPI-2 in the evaluation of parental capacity/suitability in judicial assessments

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ABSTRACT

Purpose: The purpose of this study is to investigate the parental capacity/suitability in judicial conflicts concerning child custody as well as childcare in cases of child disuse or abuse using the MMPI-2.

Methods: The MMPI-2 questionnaire is weighted in the Greek population for the last thirteen years. It is administered exclusively by trained psychologists to adults over 18 years of age with a duration of approximately 1 to 2 hours. The examinee is asked to respond «true» or «false» in a series of 567 items. A Case Report is used as example for the analysis of the personality and psychological profile of a woman requested child custody.

Results: The use of MMPI-2 enables substantial information to the psychologist referring to mental health of disputant parents, their personality characteristics, while depict their capability to carry out their parental roles. Furthermore, it features any possible problematic behavior, that may negatively affect their everyday life as well as their suitability as caregivers in cases of child abuse and disuse. Also, the moderate or high scores on the MMPI-2 Validity Scales K and L, as well as the lack of elevations in psychopathological scores at the Clinical Scales, may comprise an important beginning element, in order the psychologist to investigate the positive characteristics which are important to have a positive evaluation of the examinee parent.

Conclusions: The present case study focuses on the analysis and interpretation of the MMPI-2 Scales concerning parental assessment for judicial use. According to MMPI-2, the examinee does not show signs of psychopathology nor problematic behavior in general.

Key words: MMPI-2;parental capacity/suitability;child custody;judicial use

Introduction

Psychologists and mental health professionals are often asked to give opinions on issues related to parenting ability and suitability in litigation for the custody of minors, as well as the capacity for the custody and care in cases of abuse or neglect. The MMPI-2 Personality and Psychopathology Questionnaire is used in custody court cases. Numerous studies, qualitative measurements and results analyses, report that many psychologists, about 70-84%, used MMPI-2 to assess parental competence in similar cases [1,2]. Extensive research studies in recent years, describing the high validity and effectiveness of its findings in creating valid and reliable clinical personality profiles [3], have contributed to its widespread acceptance in clinical settings.

According to Ackerman [4], prior to the 1900s children were viewed as property. In the early 1970s, in USA, with the enactment of the Uniform Marriage and Divorce Act (UMDA), custody issues focused on the best interest of children. Psychology became aware of its ever-increasing role in child custody evaluation cases. In 1994 the APA developed guidelines to be utilized in child custody evaluation proceedings, which were revised in 2009, however these guidelines were considered to be aspirational and not mandatory. The Guidelines are both validating and affirming for psychologists already follow them [4].

Psychological assessments are based on multiple methods of gathering information and explore a wide range of topics such as personality traits, parent-child mental health, child adaptability to family and school environment, parent-child emotional bonds, parental ability to raise the child, substance abuse by parents and/or addicted parents, violence, and general family circumstances.

The MMPI-2 provides the most holistic, validate and reliable estimate of personality, psychopathology and behavior comparing to any other psychometric assessment. The MMPI-2 is the revised version of the MMPI questionnaire and is weighted in the Greek population for the last sixteen years [5]. Only trained psychologists it is allowed to administer this inventory in people over 18 years old. The duration of the administration lasts between 11/2 to 2 hours approximately.

The examinee is asked to respond «true» or «false» in a series of 567 items. The combinations of the answers structure the test's scales that are categorized into Validity Scales and Clinical Scales and are then analyzed and interpreted to identify psychopathological personality traits or a profile without psychopathology. In total, the Greek version of the MMPI-2 contains 117 Scales [5].

Aiming to analyze in the most proper way the use and importance of MMPI-2 in child custody affairs, it is presented an MMPI-2 protocol of a case study which refers to a woman who has started a court battle to obtain custody and adoption of her husbands' children, who passed away a year ago.

Cases examined during the diagnostic evaluation with the MMPI-2

The MMPI-2 provides the psychologist with information about the mental health of opposing parents, their personality traits as well as a visual perspective on their ability to perform their parenting roles. This highlights their potentially problematic behaviors, which can affect their daily lives and their suitability as caregivers, in cases of child abuse and neglect.

The findings from the varied analysis of such cases gave the literature a rich picture of the data obtained from the examination with the MMPI-2 [6], which facilitate clinicians to obtain a clear view of the patients and are presented below in detail.

Positive self-image

Parents, aiming at the good image they will give, adopt a defensive attitude, and deny behaviors that are usually encountered in the population. During the administration of the MMPI-2, an overly positive self-image is inferred from the validity scales when they exceed one standard deviation above the mean. However, most parents give valid protocols [3].

Parental cooperation

An important question that arises during the evaluation is whether the parent presented himself or herself accurately. The cooperation can be estimated from the high values of the Lie (L) scale or the Correction (K) scale, if the examinee tries with his/her answers not to make obvious and/or to hide mental health problems [7,8,9,10]. The social and educational status of the examined parent affects the style of answers [9].

Suspicion or mistrust of the examination

The examinee may develop suspicion or mistrust of the assessment process, as well as concern that the psychologist or judges may not understand him or her. However, from the clinical scales, the high values on the scale of paranoia (Pa) and from the scales of content, that of cynicism (Cyn), provide information, which may not simply reflect the temporary pressure exerted by the subject during the examination, but a more general cautious attitude [11].

Anxiety during the examination

The MMPI-2 can capture both parental anxiety levels and adjustment difficulties; in other words, the parent's ability to manage this relationship [12,13]. High values on the scales of psychasthenia (Pt), anxiety (Anx) and post-traumatic stress disorder (PK) are related to this assessment [13].

Manifestation of mental symptoms

Regarding the children of mentally ill parents, they have been found to be at risk of developing social, emotional, and behavioral disorders [15,16]. Indicatively, many studies indicate that the De scale detects depression [17,18]. The anxiety (Anx) and psychasthenia (Pt) scales detect anxiety. In fact, depression and anxiety questions are so subtle that it is difficult to be concealed by the defensive adversaries. The scale of psychopathic deviate (Pd) illuminates on issues of narcissism, self-interest, and family conflicts [19].

Problem-solving ability

The elevation of the values on the scales of validity Correction (K) and Lie (L), detects the denial of everyday problems. High values of the hysteria (Hy) scale indicate a denial of mental symptoms [20,21], as well as the existence of parental anxiety. Low values on the ego strength scale (Es) reflect less psychological adjustment and lower ability to handle difficulties [19].

Interpersonal difficulties and conflicts

The Scales that reflect elements of interpersonal difficulties are those of social introversion (Si), social difficulties (Sod), psychopathic deviate (Pd) and hypomania (Ma) [11]. In particular, the paranoia scale (Pa) shows the ability of the parent to trust and cooperate with others, such as the ex-spouse, the child, the social worker, or family counselor [19].

Evaluating parents with no history of antisocial behavior but who have committed antisocial acts may reveal personality traits such as impulsivity, high risk, rule-breaking, immature behavior, narcissism, and selfishness. The research highlights the scales of psychopathic deviate (Pd), hypomania (Ma), aggression (AGGR) and antisocial practices (ASP) [22].

At the same time, aggressive behavior towards the child, the other parent or the authorities, or the expression of anger and the way it is managed are reflected in the scales of psychopathic deviate (Pd), paranoia (Pa), hypomania (Ma) and anger (ANG) [11,23,24].

Behaviors of abuse or neglect

Issues of extreme impulsiveness, narcissism, or aggression of the parent towards the child are important in the evaluation of custody, as they may be related to cases of abuse or neglect. The MMPI-2 psychopathic deviate (Pd), paranoia (Pa), schizophrenia (Sc), anger (ANG) and hostility (Ho) scales can alert the psychologist to possible aggressive parental behavior [25,26].

Emotional alienation

MMPI-2 can detect difficulties in establishing or maintaining relationships with inappropriate emotion, through various Scales, such as that of paranoia (Pa) [19]. At the same time, one parent may not cooperate with the other parent and create problems occupying social services [27].

Marital adjustment

Marital adjustment was studied both initially with the MMPI and later with the MMPI-2, to investigate the induction of family conflicts [28]. The marital distress scale (MDS) provides evidence-based assessment of marital stress, close relationships between spouses and marital problems [29].

Substance abuse

Substance abuse problems by one or both parents affect parental behavior, and it must be ensured that alcohol or drug use is a minor risk factor for the marital state. The MMPI-2 addiction admission scale (AAS), Addiction Potential Scale (APS), and the MacAndrew Alcoholism Revised scale (MAC-R) report abuses in parent ratings [30].

Motivation for treatment or rehabilitation of mental health

The MMPI-2 Negative Treatment Indicator (TRT) is a scale that helps to understand the problems of a helpless and desperate parent, especially with the subscales of low motivation (TRT1) and inability to disclose (TRT2). There are side effects of rehabilitation, such as taking sedatives that affect parental care and should be considered by a psychologist. Memory impairments, reduced decision-making ability, and wasted time and energy indirectly have a negative effect on children [31].

CASE REPORT OF THE REQUEST FOR PARENTAL SUITABILITY WITH THE CONTRIBUTION OF THE MMPI-2

The administration and analysis of the following MMPI-2 protocol, refers to a 49-year-old woman from the Philippines, who has been residing in Greece for the past 25 years and knows the Greek language very well. She was married to a Greek citizen, who had four children from a previous marriage and who passed away a year ago. The examinee has started a court battle to obtain custody and adoption of his children. Importantly, her relationship with the children was particularly good, with both positive emotions, as at least described by her and the children.

Her lawyer requested for a personality assessment to use it to the court, against the request for children's custody from relatives of the maternal family.

The analysis' data for each of the groups of the Psychometric Assessment Scales is recorded next:

VALIDITY SCALES

There is a significant elevation in the Scale of «Infrequency Psychopathology» (FP). This elevation indicates the need of the examinee to emphasize her existing problems. This element, to some extent, reduces the reliability of the measurement and indicates the existence of some stressful elements of the subject. Also, the elevations observed in these measurements in the Scales of defense (K) and positive self-presentation (S), are expected. In particular, the «correction» answers of the examinee, with a relatively rational defense, seem to be somewhat increased.

CLINICAL SCALES

In this protocol the values of the clinical scales are exceptionally low, so no pathological data are observed

from the specific measurements.

Figure 1. Diagram of Validity Scales

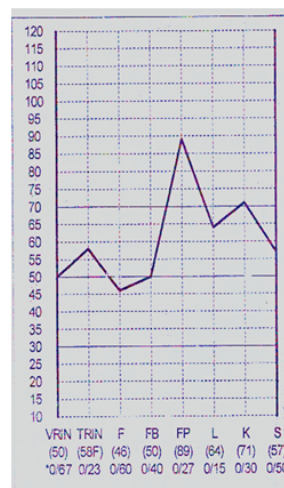
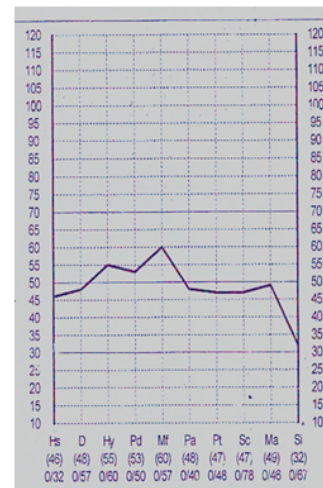


Figure 2. Diagram of Clinical Scales



CLINICAL SUB-SCALES

In this protocol, without showing clinical elevations, limited personality traits of a person who feels that she is misunderstood and deprived as well as elements of relative denial of social stress, without caring much about the opinions of others, are demonstrated.

RESTRUCTURED CLINICAL SCALES

Essentially pathological elements are not indicated. The examinee shows a slight picture of a person who feels that she has fallen victim to external situations as well as a person who finds it difficult to gain relationships of trust.

CONTENT SCALES

No substantial pathological elevations are observed here either. The only noteworthy fact is that some suspicious behaviors as well as limited sociability are recorded.

CONTENT COMPONENT SCALES

Several strange experiences are reported by the examinee, which, however, based on her overall picture, cannot be assessed as psychotic or as evidence of severe psychopathology.

PERSONALITY SCALES AND SUPPLEMENTARY SCALES

Regarding personality traits of the examinee, it is estimated that to a limited extent, she is a person with

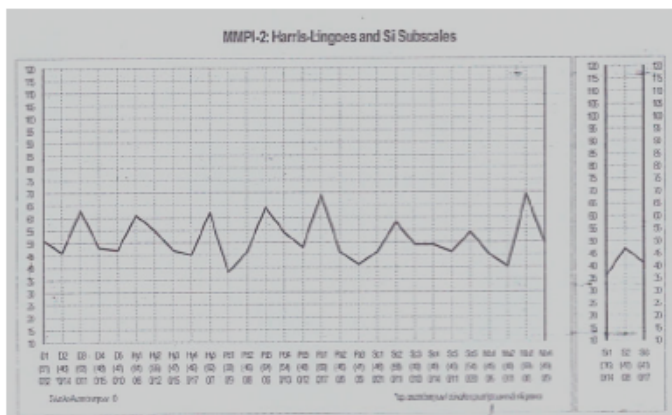


Figure 3. Diagram of Clinical Sub-scales

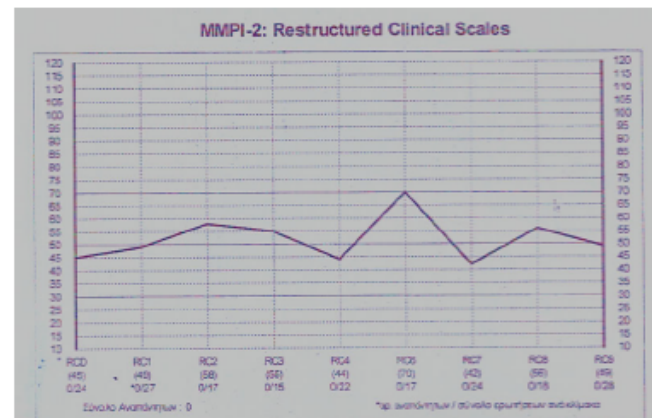


Figure 4. Diagram of Restructured Clinical Scales

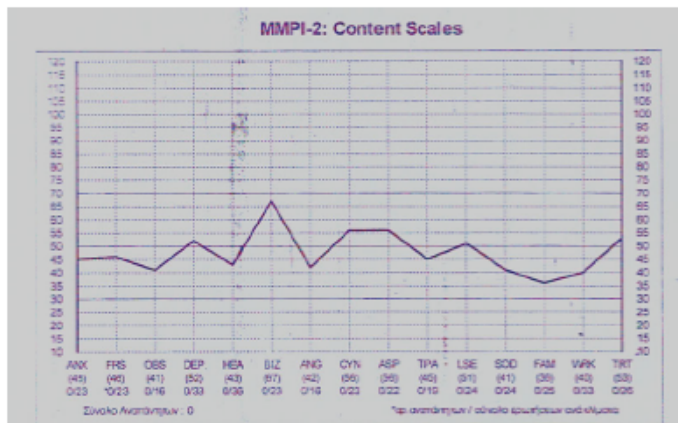


Figure 5. Diagram of Content Scales

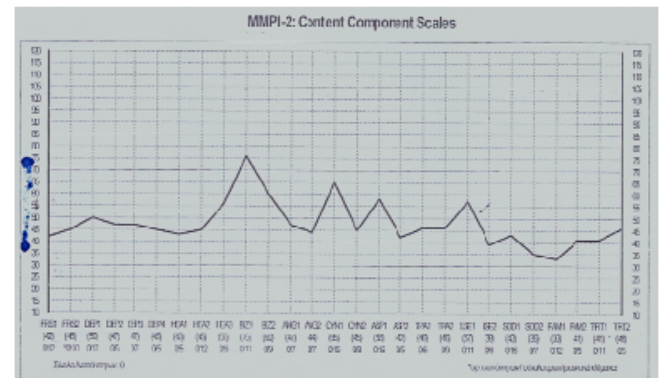


Figure 6. Diagram of Content Component Scales

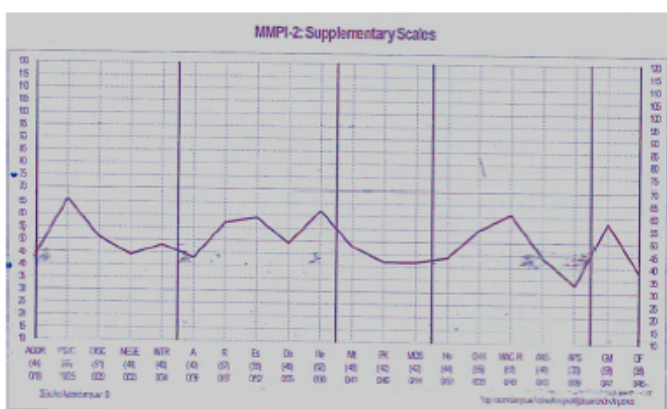


Figure 7. Diagram of Personality and Supplementary Scales

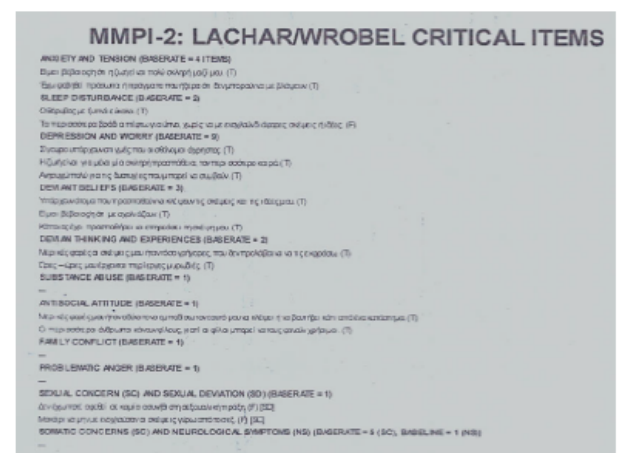


Figure 8. Diagram of Lachar/Wrobel Critical Items

few friends and with a rather suspicious and cautious approach to others. Concerning Supplementary Scales there is not any particular trait of her personality or behavior that may be evaluated as significant clinical symptom.

LACHAR / WROBEL CRITICAL QUESTIONS (CRITICAL ITEMS)

The number of Critical Questions is limited, which means that their clinical notability is low. The only evidence that can be evaluated as significant, is the smaller number of strange responses in the fields of views and experiences that are somewhat divergent.

GENERAL ASSESSMENTS OF THE RESULTS OF PSYCHOMETRIC EVALUATION

VALIDITY ASSESSMENT: In the Validity Scales of the evaluation, there was a somewhat excessive expression of any of her anxiety traits, as well as an obvious defense, traits which, however, are relatively expected and are in a limited context. Therefore, at large, the evaluation is considered valid.

PSYCHOPATHOLOGY ASSESSMENT: From the overall picture of the measurements as well as from the clinical interview of the «Critical Questions», there are no obvious signs of a current psychopathology, which can substantially affect the functionality of the examinee.

ASSESSMENT OF PERSONALITY AND BEHAVIOR: The examinee seems to have traits of defense and observance of a parsimonious attitude towards others, as well as some traits of suspicion towards certain people around her. The above traits, however, are identified to a limited extent, do not seem to structure pathological signs in her behavior and in addition, do not seem to disturb her personality on a pathological level.

In conclusion, as it is indicated from the psychometric assessment based on the MMPI-2, during the current period, the examinee does not show signs of psychopathology nor a generally problematic behavior.

Discussion

The use of MMPI-2 can significantly contribute to the assessment of parental suitability and ability for parents to provide protection to their children, thus is

used worldwide. In Greece the use of such an assessment at the court is still limited as it is not mandatory for the judicial procedure, thus there is not yet statutory legislation. Although, the number of lawyers request for this kind of evaluation has grown significantly last decade.

However, it is important to mention some limitations. Unfortunately, in Greece there is no yet adequate study of the importance of use in forensic assessment of MMPI-2. The MMPI-2 cannot predict with precision a person's behavior in the future, as somebody may follow a therapeutic plan or may be under medication. Furthermore, psychopathological traits are not stable as they can be affected by external life factors. Thus, the use of MMPI-2 may be crucial, but it can be reinforced using additional inventories or structured interview.

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Resilience in Children and Adolescents during the Covid-19 pandemic

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ABSTRACT

Purpose: The coronavirus pandemic has affected people's lives. Children and adolescents are a group affected by the consequences of the pandemic. The purpose of this study was to investigate the levels of resilience in children and adolescents in relation to school grade, gender and school performance during the Covid-19 pandemic.

Methods: In the present study 836 primary and secondary school students completed an online questionnaire on resilience during the second and third wave of the pandemic Covid-19 in Greece.

Results: Primary school students reported higher levels of resilience as compared to junior high school and high school students. Furthermore, resilience levels were higher for primary and high school girls, while the reverse was true only for high school students. School performance positively correlated with resilience.

Conclusion: It appears that children are better able to cope with challenges and stress demonstrating a capacity to recover from stress, adversity, failure, challenge, or even trauma. The results have implications about the design and the implementation of primary and secondary prevention of social emotional programs in the school community.

Keywords: *children and adolescent resilience; Covid-19; lockdown*

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Introduction

The coronavirus pandemic in 2019 (COVID-19) has affected the lives of millions of people, including children and adolescents. It is expected that the impact on the behavior and mental health of students will be significantly affected, as a result of major changes in their daily program. This occurred due to school closure, measures and restrictions that were imposed by the state in order to limit the spread of the virus in the community [1]. Zhou and colleagues reported that Chinese adolescents have experienced very high rates of anxiety and depression during the COVID-19 outbreak [2]. In particular, studies have shown that children and adolescents demonstrated insecure attachment, irritability, distraction, sleep disorders, hyperactivity, reduced appetite, general psychological distress, and fear of infecting a family member [3, 4]. Previous epidemiological studies have claimed that children are vulnerable to behavioral and emotional difficulties in the pandemic disasters [5, 6, 7]. Also, psychological services around the world are concerned about the long-term effects of the pandemic on students' mental health due to the coronavirus disease and quarantine. Thus, the rates of post-traumatic stress disorder are increased in populations experiencing the traumatic effects of the pandemic [8,9,10].

However, certain variables such as age, personality, developmental level, cognitive and emotional abilities, coping strategies and resilience can affect children's reactions to disaster [11, 12]. Especially during potentially traumatic events, some people may experience adverse conditions, reacting mildly and without being greatly affected. The resilience which they have developed depends on the quality of the individual's interactions with the environment, which allows individuals to maintain their psychological, social, and physical well-being [13]. The family and the school are two fundamental systems that influence the behavior and mental health of young people. Cooperation, between these two, should be strengthened to help the young deal with the difficulties created by home quarantine, limitations of transportations, social distance, and contact with the peers. With direct and close communication between these two systems, the problems are identified early and the child or adole-

-scent receives targeted psychological services that reduce the symptoms [14]. Masten and Motti-Stefanidi report that resilience in disaster is a multisystem challenge, requiring the collaboration and insights of people from many systems and disciplines [15]. Family, school environment and school performance, learning motivation, individual traits, skills and abilities and the community's attitude towards young people's well-being can contribute to the coping of adverse conditions, such as a pandemic disease [16, 17].

Recent studies have found that children are more resilient than adolescents despite adverse conditions [18]. Gender differences have been noted in favor of girls [19, 20], while a positive correlation between high school performance and resilience has been found [21, 22]. However, few studies have been conducted so far taking into account children's and adolescents' perceptions of resilience, especially amidst the pandemic. The purpose of this study was to investigate resilience among primary and secondary school students, as well as, how these vary in terms of gender, family characteristics and school performance during the second and third quarantine period in Greece. Based on the review of the literature, it is expected that there will be differences between students in terms of school grade, gender and school performance in relation to the variable of resilience.

Material and Method

Sample - Measures

The sample consisted of 836 students, children and adolescents, aged 9-18 years, 362 (43.3%) boys and 474 (56.7%) girls. Specifically, 187 (22.4%) were 5th and 6th-grade primary school students, 217 (26.0%) junior high school students, and 432 (51.7%) high school students. All students were enrolled in Greek public schools. The majority of students reported that their last year's school performance was "very good" (43.3%) and "excellent" (27.9%) and they had high grades (18-20). 81.1% answered that they have at least one sibling, and most of them lived with both parents (60.6%) and 16% were single parents families. Students who lived with two parents and an

elderly person were 8% of the sample and 15.3% were students who lived with one parent and an elderly person.

The Child and Youth Resilience Measure (CYRM-12) [24] was used to measure resilience in children and adolescents. The short form of the CYRM questionnaire included twelve items measured in a 3-point Likert scale ranging from 1-3 and students responded whether they applied to them (yes, sometimes or no). The short form is measured by a single score and according to the manual as yet no subscales have been identified. Higher scores indicate higher levels of characteristics associated with resilience. The original questionnaire included three subscales i.e., individual characteristics, relationships with primary caregivers, and sense of belonging. The scale was translated into Greek by the method of back translation by the researchers. Cronbach's alpha was calculated at .840.

In addition, students were asked to complete a few demographical questions with regard to gender, age, school performance, parental occupation, the persons with whom the child resides, hobbies and activities during home quarantine and two questions related to Covid-19.

Procedure

The study was conducted between December 2020 and May 2021 during the Covid-19 pandemic in Greece. For this study, an online questionnaire using google forms was sent to the e-mails of parents of children and adolescents. Informed parental consent was granted in order for the participants to fill out the questionnaires online.

Statistical Analyses

Statistical analysis was performed using SPSS software version 25 for Windows. The categorical data were described using absolute (n) and relative

frequency (%). For the quantitative data, they were described either by mean (M) and standard deviation (SD). The regularity of the data was tested by asymmetry and kurtosis, Kolmogorof-Smirnov and Shapiro-Wilks test. For the investigation of differences between the two groups the t-test was used and the Levene's test was tested, while in variables with more than 3 levels an analysis of variance (ANOVA) was performed with post-hoc analyses Bonferroni. Two-way ANOVA was used to investigate the effects of different variables when differences were found in the single-factor analyses. The level of statistical significance was set at $p < .05$.

Results

In terms of grade, primary school students reported the highest resilience ($M=32.32$, $S.D.=5.04$) both compared to junior high school students ($M=30.79$, $S.D.=4.57$) as well as with high school students ($M=30.87$, $S.D.=4.90$) (Table 1). No differences were found between junior high school and high school.

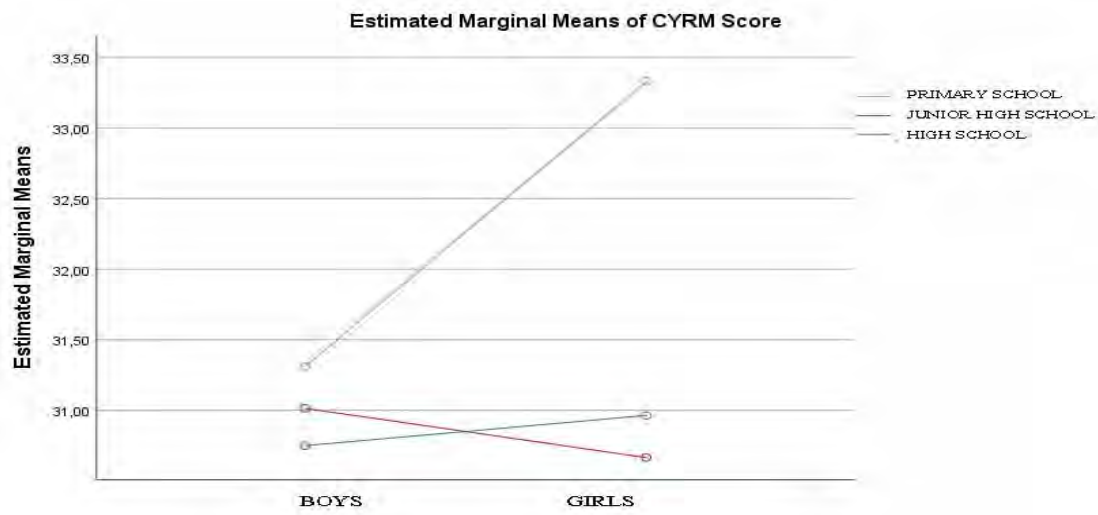
As differences in school grades were found, a two-way analysis of variance was performed with gender and school grade as independent variable and resilience as dependent variable. An interaction between gender and school grade was found [$F=3,276$, $p=.038$]. More specifically, primary school girls reported higher levels of resilience than primary school boys. The same occurred to a lesser extent with high school girls while for junior high school girls the reverse pattern was observed (Graph 1).

In terms of academic performance, results showed that there was an interaction between the school grade and academic performance in Resilience ($p < .001$), meaning that very good and excellent

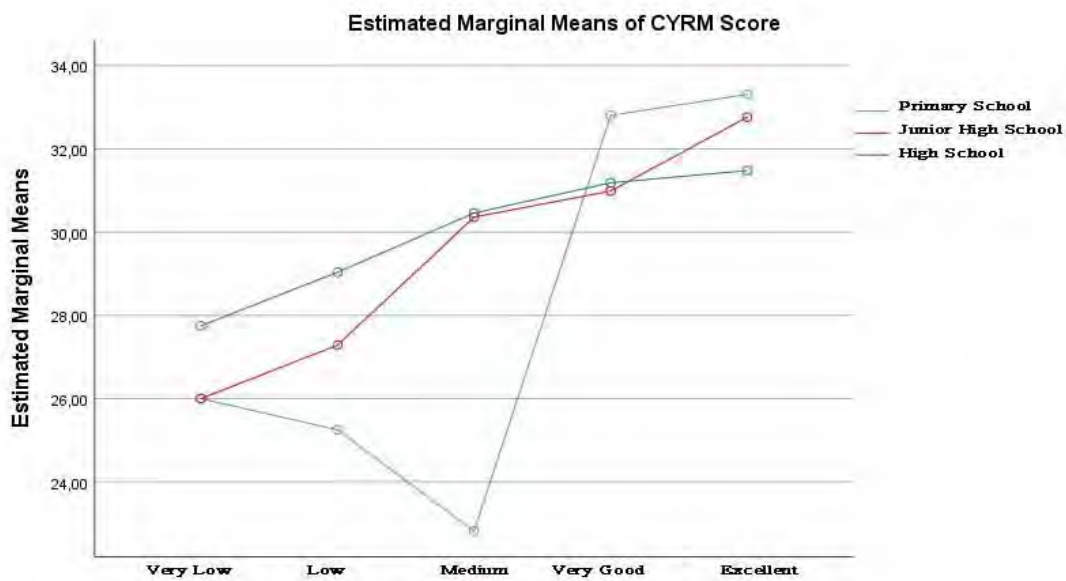
Table 1

Mean comparisons for Resilience (CYRM) in terms of School Grades

	Primary School (n = 187)	Junior High School (n = 217)	High School (n = 432)	F	p
Resilience (CYRM) ^{α,β}	32.32	30.79	30.87	6.721	.001



Graph 1 *Interaction between gender and school grade on resilience*



Graph 2 *Interaction between school grade and academic performance on resilience*

self reported academic performance meant high levels of resilience while very low and low academic performance was reported by low resilience for primary school students.

Examining the individuals with whom the students lived, no main effect was found on resilience ($p = 0.914$). However, the levels of resilience were elevated in children living with both parents ($M = 31.61, S.D. = 4.33$) compared to those living with a single parent ($M = 30.21, S.D. = 5.82$). No significant differences were found in resilience in terms of number of siblings ($p = 0.0259$).

Regarding whether someone in the family has been infected with COVID-19, the levels of resilience were higher in children who did not have a family history of COVID-19 ($M = 31.42, S.D. = 4.52$) as compared to those who have ($M = 29.64, S.D. = 6.52$). As to whether someone in the family belongs to a vulnerable group, no main effect was found in resilience ($p = 0.244$).

Discussion

The results of the present study showed that Greek students of all school levels who participated in the study reported higher levels of resilience confirming similar findings from other countries [23]. Studies confirm that resilience is a protective factor against acute stress symptoms in students. The majority of students in the literature are shown to adapt to the new daily life after the imposition of restrictive measures and followed the guidelines [18, 25]. In terms of age differences, results showed that primary school students scored high in resilience than junior high school and high school students [27]. This finding is in line with other evidence claiming that children are not so much affected as adolescents by the crisis partly because they have not developed full cognitively and do not realize the degree of difficulty and risk of the condition caused by a virus [23]. Bhatia cites a number of studies that suggest that adolescents perceived changes due to quarantine more quickly and appeared to be more vulnerable and had more stressful and depressive symptoms than children [26].

Moreover, looking at the gender differences, it appeared

that girls in primary and high school reported higher levels of resilience than boys, with the opposite being the case in junior high school. The difference in resilience levels between boys and girls disagrees with previous findings that generally show that girls report more frequent symptoms of depression, anxiety and stress [28, 30]. However, empirical evidence with Greek data demonstrated no differences in gender between students [21]. Similar findings to the present study are presented by Sánchez-Teruel, Robles-Bello and Valencia-Naranjo in high school students where girls reported higher levels of resilience because they showed adaptive behavior to the new context, which is also associated with high self-efficacy and engaged in activities that acted as protective factors for them [29]. Girls in high school felt an additional weakness due to biological and psychological and emotional changes but also because they show greater introversion than boys' external reactions [30, 31]. Activities and characteristics of families and parent-adolescent relationships may illustrate this difference [32].

Regarding the academic performance of students of all school grades, it is noted that students with reportedly higher grade point average were more resilient to difficulties. It seems that during the quarantine students had more time to deal with the lessons and avoided thoughts that would cause them stress, anxiety and fear [34] and distance learning offered opportunities to young people who often struggle in a traditional school environment, to achieve an individual rate of learning, to enhance their self-efficacy, self-esteem, perceptual ability, flexibility and perseverance [33]. There were no statistically significant differences in terms of the people whom students live (types of families and presence of elderly) and with the presence of siblings, but generally students who lived with two parents showed higher scores of resilience than single parent family students. Nevertheless, students who did not have a family member who had been infected by Covid-19 reported higher levels of resilience. It appears that the experience of the quarantine of a member of the family, the

concern for their state of health, and the fear of transmission to other members may explain this result. Anxious and stressed were the students when a family member fell ill with COVID-19 and in Research by Saurabh and Ranja [35].

The present study has a number of limitations. It is a descriptive correlational study that cannot identify causal relationships. Whilst data were collected amidst the pandemic, one cannot argue that the findings on resilience were due to the pandemic. Second, only a few studies were so far conducted on resilience with samples of children and adolescents using self-reports of students themselves. Most surveys were answered by parents reporting about their children's mental health [8, 23, 32]. Third, no information was taken about children's locale therefore we could not take into account possible differences in the epidemiological situation in the area and in the measures taken by the state in relation to the students' self-reported resilience.

A replication of the present study is proposed at a later time in order to identify trends and future directions. As the epidemiological map of the country changes daily, future research can examine levels of resilience and how these are associated with increased numbers of children's vaccination. Identifying the correlates of resilience will provide valuable input about the psychological impact of the pandemic and help design effective prevention and intervention programs in order to strengthen children and adolescents when dealing with adversities.

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Dysfunctional Internet Use by Adolescents in an Urban Environment: A Case-Control Study

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ABSTRACT

Background: Dysfunctional internet use (DIU), or Internet Addiction Disorder, refers to excessive engagement with internet use which results in significant impairment of the individual's ability to function in various fields of life, for an extended period of time. This multifactorial phenomenon concerns every society throughout the contemporary world. The present study examines personal, familial and social factors associated with DIU in adolescents who grew up in an urban environment during a period of severe economic crisis.

Materials and methods: DIU cases were matched 1:1 by age and gender to controls in a retrospective case-control study. The clinical sample consisted of adolescents who had been referred to the Adolescent Health Unit of the 2nd Department of Pediatrics, National and Kapodistrian University of Athens, and diagnosed as "Internet Addicted". Adolescents in the control group had been referred to the same Department for reasons other than DIU. Analysis was by conditional logistic regression with the presence of DIU as dependent variable.

Results: In multivariate analysis, family status (the adolescent not living with both parents) was a statistically significant risk factor for DIU (odds ratio 5.03, 95% confidence interval 1.20 – 21.0). Protective factors were participation in physical activity (odds ratio 0.05, 0.01 – 0.19) and antisocial behavior (odds ratio 0.10, 0.04 – 0.25).

Conclusions: Our findings indicate factors strongly associated with adolescent DIU in an urban setting during the economic crisis and complement other studies which have largely been based on self-report school surveys.

Key words: *Dysfunctional Internet Use; adolescents; risk factors; economic crisis.*

Introduction

Excessive use and dysfunctional (or compulsive or problematic) use of the internet is a new and growing social issue that is of great concern to the international scientific community. The characteristics and dimensions of this problem are continuously changing, in parallel with the increasingly widespread use of computers and other devices for accessing the internet [1]. The worldwide web offers convenient facilities for many human activities; thus the way that people communicate with each other, work, obtain entertainment, and manage their daily lives has changed dramatically. A vulnerable person may use the internet for prolonged periods of time, possibly resulting in social isolation and distance from others [2]. Dysfunctional internet users tend to be devoted to the internet and indifferent to more significant parts of life [3].

Adolescence, which we take to be the period from 11 to 18 years old, is very important since at this stage of life individuals try to find their own identity, to achieve acceptance from their environment and to act independently. This period is often accompanied by personal crisis and conflicts with adults, which may lead the adolescent to develop several defensive mechanisms. These conditions may facilitate the adoption of various behaviours as a form of psychological release, including excessive use of the internet [4]. Today's adolescents belong to one of the first generations that has grown up in a world where computers are widely available and make this outlet available.

The constant evolution of electronic devices creates a new environment and the continuous connectivity that seemed impossible a few years ago is now a fact. New terms are emerging to describe the effects of these new possibilities, especially on the behaviour of young people such as the Fear of Missing Out (FOMO) [5]. While dysfunctional internet use (DIU) is an evolving phenomenon, and therefore difficult to identify, it has, like all addictive behaviours, features that have been widely studied. The development of such behaviours in adolescence is a multifactorial phenomenon: the risk factors that have been identified include family history, individual personality and psychopathology [6,7]. There is currently clear evidence linking addictive behaviours with the environment and the

quality of interactions within it. Therefore, adolescents' dysfunctional behaviours are a symptom of the functioning of a living system [8,9].

There are so far only limited data in Greece concerning risk factors that may predispose adolescents towards developing DIU. Therefore, the aim of the present study was to identify possible risk factors of DIU among Greek adolescents during the financial crisis of recent years. The consequences of this crisis were most noticeable in Athens [10] and affected directly the lives of the adults who were responsible for the care of adolescents, possibly impinging upon their ability to exercise this parental role. In this way, the financial crisis significantly influenced the environment in which these teenagers have grown up, at societal and family level. The data of the present study were collected in a healthcare environment and take the form of a case-control study. This is in contrast to most previous studies in Greece which were based on self-report questionnaires administered to adolescents in cross-sectional school-based surveys (see, for example, [11]).

Methods

Study design and participants

A retrospective case-control study design was employed to examine the research questions of this study concerning characteristics of the environment and adolescents' relationship with it. The data from the case group were retrieved from the records of adolescents who attended the Adolescent Health Unit of the 2nd Department of Pediatrics of the University of Athens Medical School in order to receive therapy for their problematic use of the internet. The control group consisted of adolescents with characteristics similar to the case group who had been referred to the same Department for reasons which were not linked to DIU. Cases and controls were matched one-to-one by age and gender. The final sample consisted of 198 cases and 198 controls.

Dysfunctional internet use

The diagnosis of DIU was based on the Internet Addiction Test (IAT) [12,13]. This widely-used instrument consists of 20 questions concerning behavi-

-or related to use of the internet, such as “How often do you find that you stay online longer than you intended?” and “How often do you choose to spend more time online over going out with others?”. Each item is answered on a five-point scale from “Rarely” to “Always”, with the response “Does not apply” also available. The IAT score ranges from 0 to 100, with higher scores indicating a more severe level of internet addiction. The classification of internet addiction is as follows: participants with a score from 0 to 30 points are classified as normal internet users; with a score between 31 and 49 as having mild level of addiction; with a score between 50 and 79 as having moderate level; and with a score from 80 to 100 as having severe internet addiction [12]. Adolescents falling in the last of these categories comprised the cases in our study.

Demographic, psychological, and social factors

The participants in this study had also completed the HEEADSSS Adolescent Psychosocial Assessment [14], part of the Achenbach Questionnaire [15] and part of the Family Crisis Oriented Personal Scales Questionnaire (F-COPES) [16]. These instruments were employed to evaluate demographic, social, and psychological parameters as well as to adjust for possible confounders.

Statistical analysis

Continuous variables are represented as means ($\pm$ SD) and categorical variables as number and percentage of participants. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test, as well as qualitatively using histograms. The association between each factor and the outcome variable was tested using both univariate and multivariable models. The univariate models included simple conditional logistic regression, where DIU was the dependent variable, and McNemar's test. The multivariable model was multiple conditional logistic regression with DIU as the dependent variable and the independent variables those that had been found to have significant correlation with DIU in the univariate model. Statistical analysis was performed with IBM SPSS for Windows, Version 25.0. Armonk, NY: IBM Corp. and the level of statistical significance was set at 0.05.

Results

The final sample consisted of 338 males (85.4%) and 58 females (14.6%). The distribution of demographic,

social and psychological characteristics in cases and controls is shown in Table 1. Almost all the factors that were considered showed substantial differences between the two groups of adolescents. Regarding the sociodemographic characteristics, the cases significantly more often than the controls were not living with both parents, had no siblings, had no friends, and had a poor school mark ($p < 0.001$). There were also statistically significant relationships between parents' occupations and group ($p < 0.001$). In particular, both the fathers (13%) and mothers (12%) of cases were more likely to belong to professional occupations than the parents of controls (3% and 4%, respectively), but also were more likely to be unemployed (9% of cases vs. 2% of controls, for both parents). Correspondingly fewer mothers and fathers of cases than controls were private-sector employees.

Over 90% of the adolescents in the control group took part in physical activity, virtually double the corresponding figure (49%) among the cases ($p < 0.001$). On the other hand, antisocial behavior was recorded for a much lower percentage of cases than controls (21% vs. 71%, $p < 0.001$).

Regarding psychological characteristics, differences between the two groups were smaller than for the social and demographic variables, although still statistically significant (Table 1), Anger, anxiety and sadness were all noted more often in cases than in controls. On the other hand, phobias were recorded more often in controls (25%) than in cases, amongst whom they were relatively rare (9%).

The results from the multiple conditional logistic regression (Table 2) showed that parents' marital status, participation in physical activities and antisocial behaviour were independent significant predictors of DIU. Not living with both parents greatly increased the risk of DIU. Participation in physical activities and antisocial behaviour both strongly reduced the risk of DIU. This analysis did not include parental occupations and school mark, because of missing data.

Discussion

Dysfunctional or addictive use of the internet is of increasing interest to the scientific community and has been the subject of many international studies in recent years. It is indicative that the number of articles published

Table 1. Demographic, social and psychological characteristics compared between cases and controls. Each percentage is calculated based on the number of adolescents for whom the relevant information was recorded.

Characteristic	Frequency (%) in cases (n=198)	Frequency (%) in controls (n=198)	p
Father's occupation			<0.001
<i>Private sector employee</i>	29.1	41.1	
<i>Public sector employee</i>	13.9	19.5	
<i>Self-employed</i>	25.8	23.4	
<i>Professional</i>	13.2	3.2	
<i>Other*</i>	8.6	7.0	
<i>Unemployed</i>	9.3	2.1	
Mother's occupation			<0.001
<i>Private sector employee</i>	23.7	34.2	
<i>Public sector employee</i>	25.7	23.0	
<i>Self-employed</i>	8.6	8.0	
<i>Professional</i>	11.8	4.3	
<i>Other*</i>	21.1	28.3	
<i>Unemployed</i>	9.2	2.1	
Living with both parents (yes vs. no)	72.9	89.6	<0.001
Has siblings (yes vs. no)	69.7	83.8	<0.001
School mark $\geq 15/20$ (vs. <15)	58.5	92.5	<0.001
Has friends (yes vs. no)	76.2	96.1	<0.001
Physical activity (yes vs. no)	49.2	95.0	<0.001
Antisocial behaviour (yes vs. no)	20.8	71.3	<0.001
Anger (yes vs. no)	51.6	38.3	0.11
Anxiety (yes vs. no)	56.3	48.5	0.005
Sadness (yes vs. no)	34.0	21.1	<0.001
Phobias (yes vs. no)	8.8	25.3	<0.001

* Retired or not economically active

Table 2. Multiple conditional logistic regression with the presence of dysfunctional internet behaviour as dependent variable.

Variable	Adjusted odds ratio	95% CI*	p value
Not living with both parents	5.03	1.20 – 21.0	0.027
Physical activities	0.05	0.01 – 0.19	<0.001
Antisocial behaviour	0.10	0.04 – 0.25	<0.001

*Confidence interval

in PubMed with reference to Internet Addiction increased from 32 in 2005 to 296 in 2015 and 396 in the following year.

DIU is a multifactorial phenomenon. The present case-control study aimed to contribute to the identification of factors related to DIU among adolescents who grew up in an urban environment during the recent economic crisis in Greece. This timing is one factor that differentiates it from other studies, since the economic crisis formed a new context affecting Greek society at all levels, but particularly at the family level which plays a decisive role in the manifestation of dysfunctional behaviours by adolescents.

The results of our study indicate that parents' marital status was strongly associated with DIU. The role of the parental system in the manifestation of dysfunctional behaviours in adolescence has been confirmed by a large number of studies. Ozer and colleagues [17] demonstrated the correlation of the demarcated family framework with better school performance and reduced vulnerability to high-risk behaviors. The presence of only a single parent at home may significantly affect the ability to set limits, thus forming a more flexible environment which presents less of an obstacle to the emergence of dysfunctional behaviours.

Our results showed that participation in physical activities acts as a protective factor. Stavropoulos and colleagues, referring to the characteristics of dependent adolescents, described enjoyment and responsibility as "protective counterweights" in the development of DIU [18]. An interesting finding is that the adoption of antisocial behaviour is another protective factor, in the sense that it is associated with a reduced probability of DIU. Young [12] pointed out that addicts are characterized by introversion. Antisocial behaviour, like externalizing internal tensions, relaxes and relieves. The hypothesis that DIU would be associated with the parental occupations most affected by the financial crisis, self-employed and private sector employees - who were more common among the parents of the case group - could not be tested in the multivariable analysis. In univariate analysis, one finding that concerned us was the increased percentages (although relatively low) of unemployed parents and parents engaged in the professions in the case group. Uncertainty caused by unemployment among adults who have experienced it has been shown to affect the psycho-emotional development of children, while an increase in mental and

social problems has been recorded in children due to the economic crisis [19].

At the same time, high financial and educational level of parents have been linked with the development of DIU by adolescent children [20,21]. Tsitsika and Tzavela [22] discuss the phenomenon of "hyperparenting" observed in the middle and upper economic strata. The parents do not leave initiatives to the teenager and take responsibility for his or her own choices, projecting their own desires. Teenagers react by choosing the internet as a way out and a means of opposing their parents' attempt to control their lives. Our thinking, which would be a suggestion for further research, is that the high level of education may be associated with uncertainty or embarrassment in the exercise of parental role, an indication of a shift from traditional methods of practising this role.

In our research, the school performance of the controls was significantly higher than that of the case group. The excessive use of the internet has been linked to problems in academic performance [23]. Orientation to school seems to reflect a more general level of adolescent functionality.

The present study is not free of limitations. In particular the way that the information was collected limited its effectiveness since it was not designed for the purposes of this study. Some variables of interest had missing values and certain other interesting data, such as smoking, were not recorded. Furthermore, the control group does not constitute a representative sample of the general adolescent population of Athens. Nonetheless, the present study adds valuable information to the existing literature on dysfunctional use of the internet in Greece, which previously had largely been obtained from self-reports collected in school-based studies.

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High-risk internet behaviors and psychosocial well-being among Greek preadolescents

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ABSTRACT

INTRODUCTION: Nowadays the Internet has become an integral part of adolescents' lives. The purpose of this study is to investigate the relationship between compulsive Internet use of pre-adolescents in Greece and their psychosocial well-being.

MATERIALS - METHODS: A cross-sectional study design was applied. The study population (N=655) consisted of a random sample of adolescents attending Years 5 and 6 in primary schools located in Athens, Greece. Self-completed questionnaires were distributed, pertaining to internet access characteristics based on the Compulsive Internet Use Scale (CIUS). Also, socio-demographic variables were applied. Furthermore, teachers completed the Strengths and Difficulties Questionnaire (SDQ) related to their students' psychosocial well-being.

RESULTS: The results presented that 6th graders, boys and adolescents, who were not born in Greece, had significantly higher CIUS scores. On the other hand, greater CIUS scores were observed in students who had started using the Internet in a younger age, were members of SNS and played games online. Overall, compulsive Internet Use was positively correlated with emotional and conduct problems of preadolescences along with hyperactivity scores on the SDQ.

DISCUSSION: The results have implications about an association between Compulsive Internet Use of preadolescences in Greece and psychosocial difficulties. The results appear to suggest the importance of formulating early preventive public health policies that concentrate on enhancing students' communication skills, self-regulation and healthy life habits.

Key words: *Compulsive Internet Use Scale – CIUS; Strengths and Difficulties Questionnaire – SDQ; preadolescents; psychosocial difficulties; Digital skills education.*

Introduction

The prevalence of Internet use in young children and adolescents has increased vastly in the last decade [1-5] due to the expansion of Internet connectivity, online gaming and use of related applications through all kind of mobile devices. Many researchers have investigated students' addictive behavior, which can affect their emotional development and relationships with their family and peers. Such behaviors have a negative impact on their academic performance, too [1,6-11]. Although research on Internet addictive use started almost two decades ago, Young (1998)[12] was one of the first to focus primarily on Internet addictive behavior and examine the extent of problems. He developed the Internet Addiction Test (IAT) by modifying the DSM-IV criteria of Pathological Gambling, in order to produce a screening instrument for addictive Internet behavior. Since then, different sets of criteria have been used and Internet Gaming Disorder has been included in the DSM-5, not as an "official" disorder, but as a "Condition for Further Study" [13].

Taking into account the internationally increasing rates of Internet addiction at an early stage of adolescence and our observation data through clinical practice within the Adolescent Health Unit of the University Pediatric Hospital, it was considered useful to examine this issue in younger children who are on the threshold of getting into adolescence. Relevant studies in Greece are few and far between as far as preadolescence children are concerned.

Compulsive Internet Use

Apart from the term "Internet Addiction Disorder", other terms, such as "Pathological Internet Use", "Problematic Internet Use", "Excessive Internet Use" and "Compulsive Internet Use" have been introduced, revealing the researchers' difficulty to agree on a definition of the phenomenon since there are basic conceptual distinctions [14]. Compulsive Internet use includes excessive loss of control, preoccupation that makes the person neglect other important aspects of life and addictive behavior, such as coping/mood modification, withdrawal symptoms and conflict [15].

The prevalence rate of CIU among adolescents ranges vastly, depending on the definition and the measures used. It varies from 1% to 3.9% in European countries

[9,16-20] and from 1.6% to 20.8% in Asian countries [1,3,4,6,10,11,21-24]. Greece has shown similar prevalence rates, ranging from 1% [25] to 8.2% [26]. In addition, males seem to have higher rates of CIU compared to their female peers[2-9,11,17,18,21,24,26].

The Compulsive Internet Scale based on DSM criteria for substance abuse, pathological gambling and behavioral addictions, and used interviews of self-declared "Internet addicts" was developed by Meerkerk, et al. (2009)[15]. Originally, it consists of 14 items and has been proved a credible measurement for adolescents [2,18,21,27]. Its psychometric properties have been established in numerous countries, such as Germany [20,28-30], France [5], the Netherlands [15,18], Australia [27], India [21], Turkey [31] and Taiwan [2].

Compulsive Internet Use and psychosocial difficulties

Internet addiction can lead to many psychosocial and mental difficulties affecting all levels of human activity that is personal, family and even academic or occupational when it concerns adults. Students suffer severely on the academic level, since they may lose track of time and surf web sites aimlessly, chat with friends online or engage in interactive games, at the cost of productive study [11,12]. A considerable proportion of adolescents with CIU have unauthorized school absences, frequently skip important school or social activities, may cease attending school altogether, show poor academic performance and engage less in extracurricular activities, compared to their non- peers [2,8,21,23].

Relationships are also affected by CIU, since compulsive users gradually isolate themselves and spend less time with people in the real world. Adolescents with CIU may neglect other hobbies and social contacts, which further impair their communication skills [9]. They may ignore daily obligations and household chores, argue with their parents about the hours they spend online, become even physically aggressive when their parents try to take away their Smartphone or Internet privileges [6], thus disrupting the family interactions [20]. Low emotional stability and low agreeableness, which may correspond to aggression, have been found to increase the risk of CIU among adolescents [18-32].

Moreover, comorbid psychiatric problems, such as depression and suicide ideation [3,4,8,12,22-24,33-35], social anxiety [24,35], obsessive/compulsive symptoms [4,33], hostility or conduct problems [1,7,23,24,34,35], high-risk behaviors [8,23,34] and ADHD [1,7,24,35] are often detected, with depression being the most significant discriminating variable between adolescents with Internet addiction and those without.

The aim of the present study was to increase awareness and knowledge of the growing problem of Internet addiction in Greece. Previous research [7,8,25,26] has focused on Internet addiction among adolescent students. Therefore, our main purpose was to examine the prevalence of CIU in younger students, specifically preadolescents attending Years 5 and 6 in primary school, and identify possible associations with psychosocial difficulties.

MATERIALS AND METHODS

Participants

The sample for the present study consisted of 645 students randomly selected from 10 schools of Primary Education located in the Northern departments of the capital. There were children of preadolescent age, attending Years 5 and 6 in Greek state comprehensive schools in the year 2015-16. Schools were chosen by simple random sampling. All students were invited to participate in the study (N = 645 including 350 boys and 295 girls). No exclusion criteria for participation were applied with respect to ethnicity or socioeconomic status of participants. All socioeconomic levels were represented in the study sample.

The sample characteristics are presented in Table 1. More than half of the participants (55.7%) were 6th graders. Also, 54.3% of the students were boys, 95.3% were born in Greece and 97.7% were living with both parents. Father's mean age was 47.6 years (SD = 5.0 years) whereas mother's mean age was 43.2 years (SD = 4.2 years). Additionally, 85.2% of the students had a parent who had obtained a university degree.

Instruments

Internet and social networking site use: Questions derived from the questionnaires of the European Network for Adolescent Addictive Behaviour (EU NET ADB) survey (www.eunetadb.eu) [9] and EUKids Online

II study were selected to examine students' Internet use and relevant behavior. Information was gathered concerning students' Internet use (e.g. age at first use, SNS membership and time spent on SNS, frequency of Internet use, parental control) and students' behavior on the Internet, such as online gaming, frequency and hours spent on online gaming, having seen something that upset them or having been treated in a bad way online.

Compulsive Internet Use Scale.

In order to measure compulsive Internet use, a shortened version of the Compulsive Internet Use Scale [15] was used, after it had been translated and adapted in the Greek language. This short form consists of 10 items identifying the three core features of compulsive Internet use: (a) preoccupation or intense, unlimited desire (e.g., "How often do you look forward to your next Internet session?"), (b) loss of control (e.g., "How often do you skip sleep because of the Internet?"), and (c) continued use of the Internet despite the intention to stop (e.g., "How often have you unsuccessfully tried to spend less time on the Internet?"). The students answered on a 5-point Likert scale, ranging from 1 = never to 5 = very often, with higher scores indicating higher levels of compulsive Internet use.

Strengths and Difficulties Questionnaire

The Greek version [36] of the Strengths and Difficulties Questionnaire (SDQ)[37,38] was used in order to assess children's emotional and psychosocial characteristics. Teachers responded whether they thought that a child had a problem in the specific areas and if it caused distress and social impairment. It consists of 25 items and 5 subscales, with 5 items each: (a) Emotional Symptoms (e.g., "Many worries, often seems worried"), (b) Conduct Problems (e.g., "Often fights with other children or bullies them"), (c) Hyperactivity/Inattention (e.g., "Constantly fidgeting or squirming"), (d) Peer Relationship Problems (e.g., "Rather solitary, prefers to play alone"), and (e) Prosocial Behavior (e.g., "Considerate of other people's feelings"). It is scored on a 3-point Likert scale, ranging from 0 = Not True to 2 = Absolutely True, with higher scores on each subscale indicating greater difficulties in the specific domain. It also produces a Total Difficulties Score, by excluding the Prosocial Scale and summing the four remaining subscores. Teachers' answers can classify a child into three levels of behavior: normal, borderline and abnormal.

Socio-demographic variables

Participating students were asked to give personal information such as gender, school grade they were attending, place of birth and information about their parents' age and level of education. Parental education (highest qualification obtained by either parent) was used as a proxy measure of socioeconomic status (SES).

Procedure

The research took place in November 2015. The parents or legal guardians of all participants were informed about the study objectives and were asked for their written consent prior to the initiation of the investigation. The eligible participants were administered in groups in the classroom after they were informed about the purpose of the study and were assured about maintaining their anonymity. The study proposal was approved by the Ethics Review Board of both the P. & A. Kyriakou Children's Hospital in Athens, Greece, and the Hellenic Ministry of Education and Religious Affairs. Response rate measured approximately 89%.

Data analysis

Normal distributed variables are expressed as mean (standard deviation), while variables with skewed distribution are expressed as median (interquartile range). Qualitative variables were expressed as absolute and relative frequencies. Student's t-tests and analysis of variance (ANOVA) were computed for the comparison of mean values. Bonferroni correction was used in order to control for type I error. Pearson or Spearman correlations coefficients were used to explore the association of two continuous variables. Correlation coefficient between 0.1 and 0.3 were considered low, between 0.31 and 0.5 moderate and those over 0.5 were considered high. All reported p values are two-tailed. Statistical significance was set at $p < 0.05$ and analyses were conducted using SPSS statistical software (version 19.0).

Table 1 Sample characteristics

	N (%)
Grade	
5th	290 (44.3)
6th	365 (55.7)
Gender	
Males	350 (54.3)
Females	295 (45.7)
Born in Greece	
Yes	615 (95.3)
No	30 (4.7)
Living with	
Both parents	630 (97.7)
Mother	10 (1.6)
Father	5 (0.8)
Father's age, mean (SD)	47.6 (5.0)
Mother's age, mean (SD)	43.2 (4.2)
Parental educational level	
High school	10 (1.6)
After high school	25 (3.9)
Technical school	60 (9.4)
University	545 (85.2)

Table 2 Characteristics regarding students' Internet use

	N (%)
Age at first use of the Internet, mean (SD)	6.2 (1.3)
Member of SNS	
Yes	330 (51.2)
No	315 (48.8)
Daily use of SNS on a school day	
None	55 (16.9)
Less than 1 hour	115 (35.4)
1-2 hours	95 (29.2)
More than 2 hours	60 (18.5)
Daily use of SNS on the weekend	
None	25 (7.8)
Less than 1 hour	85 (26.6)
1-2 hours	95 (29.7)
More than 2 hours	115 (35.9)
My parents allow me to visit every site I want	
Never	285 (44.5)
Rarely	85 (13.3)
Sometimes	130 (20.3)
Often	70 (10.9)
Very often	70 (10.9)
During the last month, how many days did you use the Internet?	
1 day/week	30 (4.7)
2 days/week	75 (11.7)
3 days/week	90 (14.1)
4 days/week	80 (12.5)
5 days/week	80 (12.5)
6 days/week	45 (7.0)
7 days/week	100 (15.6)
I use it but not every week	140 (21.9)

RESULTS

Mean age at first Internet use was 6.2 years (SD = 1.3 years) (Table 2). Almost half of the participants (51.2%) were members of SNS. During a school day, 35.4% of the students used SNS for less than an hour while on weekends the majority (35.9%) used SNS for more than 2 hours. Additionally, 44.5% of the students were not always allowed to visit every site they wanted. At the same time, 21.9% of the students used the Internet in the last month but not on a weekly basis. Most common ways of accessing the Internet was through a portable handset (iPad or similar device), a mobile phone or a PC shared with other family members (65.9%, 36.5% and 34.9%, respectively).

Regarding to students' behavior on the Internet is presented in Table 3. Median number of hours playing games on the computer was 1.0 (0.0 - 2.0) for a school day and 1.5 (0.5 - 3.0) for the weekend. Also, 86.8% of the participants had played games on the Internet and 26.2% were playing 3-4 times per week. Furthermore, 28.7% of the participants had seen something on the Internet that upset them and 10.9% had been treated in a bad way while they were on line.

Furthermore, students' attitudes regarding their misuse of the Internet are presented in Table 4. Firstly, 19.5% of students believe often / very often that they should be using the Internet less. Also, 15.7% of the participants were often / very often told by others that they should be using the Internet less. Finally, 12.5% of the students catch themselves often / very often feeling anxious to get back on line.

Also, the CIUS scores associated with student's characteristics are presented in Table 5. Mean of the CIUS score was 1.84 (SD = 0.70). The 6th graders had significantly greater CIUS score than the 5th graders. Also, boys and students who were not born in Greece had significantly greater CIUS score. After Bonferroni correction, it was found that students, whose parents had a middle education level background (high school / after high school graduates), had significantly greater CIUS score compared to those whose parents were university alumni ($p = 0.001$). Students who started using the Internet in a younger age had significantly greater CIUS score. Moreover, significantly greater CIUS score was found in those who were members of SNS and those who played games on the Internet. Greater daily use of SNS (on a school day or on the weekend) was positively associated with the CIUS score. Additionally, another considerable finding was that 7% of the respondents

had answered very often in > 5 questions in the Compulsive Internet Use Scale (CIUS).

Finally, greater emotional and conduct problems seemed to be associated with a greater CIUS score (Table 6). Also, greater hyperactivity seemed to be associated with greater CIUS score.

Table 3 Information regarding students' behavior on the Internet

	N (%)
Hours of playing games on the computer on a school day, median (IQR)	1.0 (0.0 - 2.0)
Hours of playing games on the computer on the weekend, median (IQR)	1.5 (0.5 - 3.0)
Ever played games on the Internet	
Yes	560 (86.8)
No	85 (13.2)
If yes, how often	
Every day or almost every day	40 (7.5)
3-4 times/week	140 (26.2)
1-2 times/week	135 (25.2)
Fewtimes/ month	95 (17.8)
Lessoften	125 (23.4)
In the last month, have you seen anything on the Internet that upset you?	
Yes	185 (28.7)
No	460 (71.3)
If yes, how often	
Every day or almost every day	5 (2.6)
3-4 times/week	35 (17.9)
1-2 times/week	10 (5.1)
Fewtimes/ month	35 (17.9)
Lessoften	110 (56.4)
In the last month, have you been treated in a bad way while you were online?	
Yes	70 (10.9)
No	575 (89.1)
If yes, how often	
Every day or almost every day	5 (7.1)
3-4 times/week	5 (7.1)
1-2 times/week	15 (21.4)
Fewtimes/ month	15 (21.4)
Lessoften	30 (42.9)

Table 4 CIUS items

	Never N (%)	Rarely N (%)	Sometimes N (%)	Often N (%)	Very often N (%)	Often/ Very often (%)
How often do you continue to use the Internet, despite your intention to stop?	320 (50.0)	155 (24.2)	95 (14.8)	45 (7.0)	25 (3.9)	10.9
How often do you find it difficult to stop using the Internet, when you are online?	395 (61.7)	145 (22.7)	35 (5.5)	50 (7.8)	15 (2.3)	10.1
How often are you short of sleep because of the Internet?	465 (72.7)	85 (13.3)	45 (7.0)	20 (3.1)	25 (3.9)	7.0
How often do you think you should use the Internet less often?	200 (31.3)	200 (31.3)	115 (18.0)	55 (8.6)	70 (10.9)	19.5
How often do others say you should use the Internet less?	250 (39.1)	150 (23.4)	140 (21.9)	60 (9.4)	40 (6.3)	15.7
How often do you prefer to use the Internet instead of spending time with others?	445 (69.5)	140 (21.9)	25 (3.9)	20 (3.1)	10 (1.6)	4.7
How often have you unsuccessfully tried to spend less time on the Internet?	415 (64.8)	120 (18.8)	55 (8.6)	20 (3.1)	30 (4.7)	7.8
How often do you look forward to your next Internet session?	265 (41.4)	190 (29.7)	105 (16.4)	55 (8.6)	25 (3.9)	12.5
How often do you think about the Internet, even when not online?	310 (48.4)	210 (32.8)	60 (9.4)	50 (7.8)	10 (1.6)	9.4
How often do you feel restless, frustrated or irritated when you cannot use the Internet?	335 (52.3)	185 (28.9)	65 (10.2)	25 (3.9)	30 (4.7)	8.6

DISCUSSION

The main purpose of the present study was to examine Compulsive Internet Use in a sample of pre-adolescents and its possible connection to psychosocial problems. Students in our research reported that they first used the Internet when they were approximately 6 years old. One-fifth of them used the Internet in the last month, but not every week, while a large percent (44.5%) said they were not allowed by their parents to visit every site they wanted. The latter could be attributed to the younger age of our sample; therefore, parents are still able to monitor their children's Internet use and set boundaries. Half of the participating students were members of SNS, with the majority of them using such sites less than one hour on weekdays, but more than two hours on the weekends. Students mainly used mobile devices to access the Internet, such as tablets and mobile phones, or a PC shared with other family members. For the pre-adolescents of our sample, the use of a shared PC may explain why they reported being restricted by their parents in the sites they wanted to visit.

Moreover, 86.8% of our sample stated that they had played games online, half of them between one to four times per week. During school days they spent 1 hour playing games on the PC, which was increased to 1.5 hours during the weekend, according to their own reports. Examining the data, it is important to keep in mind the potential reporting or recall bias of young adolescents. Nearly one-third of the students said that they had seen something on the Internet that had upset them, while almost 11% declared that they had been mistreated while they were online.

The mean CIUS score was 1.84 (the scale ranges from 1 to 5). Higher CIUS scores were associated to the 6th graders, to boys and to students who were born in countries other than Greece. It has been proven in other studies that male students have higher rates of CIU compared to female students [2-4,6-9,17,19,21,34], perhaps due to the differential frequency of Internet utilization: adolescent boys tend to use the Internet more frequently and excessively.

Students whose parents had a middle education level background had significantly greater CIUS scores compared to those whose parents had a university degree. Although in a recent study [9] parents' lower educational level contributed to the dysfunctional Internet behavior of their children, it remains a subject for further investigation.

Table 5 CIUS scores associated with student's characteristics

	CIUS		
	Mean	SD	P
Total sample	1.84	0.70	-
Grade			
5th	1.76	0.77	0.009 ⁺
6th	1.90	0.63	
Gender			
Males	2.01	0.69	<0.001 ⁺
Females	1.65	0.66	
Born in Greece			
Yes	1.82	0.69	<0.001 ⁺
No	2.28	0.61	
Parental highest educational level			
High school/ After high school	2.26	0.77	<0.001 ⁺⁺
Technical school	1.97	0.51	
University	1.80	0.70	
Age at first use of the Internet, r [*]	-0.33		<0.001
Member of SNS			
Yes	1.99	0.66	<0.001 ⁺
No	1.69	0.70	
Daily use of SNS on a school day, r ^{**}	0.46		<0.001
Daily use of SNS in the weekend, r ^{**}	0.36		<0.001
Ever played games on the Internet			
Yes	1.88	0.71	<0.001 ⁺
No	1.55	0.52	

⁺Student's t-test; ⁺⁺ANOVA; ^{*}Pearson's correlation coefficient; ^{**}Spearman's correlation coefficient

Table 6 Pearson's correlation coefficients between CIUS scores and SDQ subscales

		CIUS
Emotional Symptoms	r	0.22
	P	0.001
Conduct Problems	r	0.16
	P	0.015
Hyperactivity/Inattention	r	0.14
	P	0.045
Peer Relationship Problems	r	0.05
	P	0.466
Prosocial Behavior	r	-0.11
	P	0.119
Total Difficulties Score	r	0.06
	P	0.380

Furthermore, significantly higher CIUS scores were found in preadolescents who started using the Internet in a younger age and played games online. Playing games on the Internet has emerged as a significant predictor of problematic Internet use in Greece [7,26] and in other European countries [9,39]. Membership of SNS and greater daily use of such sites (on a school day or on the weekend) were positively associated with high CIUS scores, replicating similar findings that socializing activities, such as chatting or email, and longer Internet use per day are significantly linked to Internet addiction [4,6,9,39].

The results also indicated that emotional symptoms and conduct problems correlated positively, although at low levels, with higher CIUS scores. This is consistent with previous research suggesting that adolescents with CIU display low emotional stability and agreeableness [18,32] and may suffer from loneliness, emotional and social adaptation problems [6], even depression and social phobia [3,8,12,22,23,35,24]. Consequently, they may become argumentative and disruptive and exhibit conduct problems [1,7,23,24,34,35]. Lastly, hyperactivity was associated with greater CIUS scores, which has also been found in another sample of Greek adolescents and in Asian countries [1,7,24,35]. Although the present study did not distinguish cause and effect, there is strong evidence that CIU and psychosocial difficulties are interconnected, whether CIU adds a deteriorating effect on preexisting maladjustment or it precedes the appearance of such problems.

Limitations

The design of the study was cross-sectional and the direction of the relationship between CIU and psychosocial difficulties cannot be defined. Other important aspects, such as parental forms of upbringing, the establishment of internet use limits in the family or peer relationships and status, were not examined due to the limitation of the questionnaires. Finally, with the exception of the SDQ, all the other measures relied on self-report data, thus preventing the accurate assessment of CIU.

Conclusion

The aim of this research is to be added to the rest of the recent Greek studies on the matter of Internet addiction, enriching the existing sample of student(pre-adolescent) population, as it focused on

younger ages. The results reveal that constant and problematic Internet use can occur even in pre-adolescents and should not be overlooked. Future research should examine students at even younger ages, since nowadays more younger ages tend to use constantly the Internet through laptops and mobile devices at growing rates. Also longitudinal research could be used to explore causal relationships between CIU and emotional and behavioral problems.

On the other hand, state policies should focus, firstly, on the awareness and training of educators, so that they will be able to identify and refer concerning cases to the relevant health services. Secondly, prevention and early intervention programs should be established nationwide, concentrating on enhancing students' communication skills, self-regulation and healthy life habits. New technologies, with the appropriate mediation of the teacher, are a tool for students to learn, resolve problems and develop critical thinking and creativity. The lack of full-scale digital education accentuates a variety of high-risk online behaviors (for example, abuse, addiction, and cyber bullying).

Overall, education is necessary to prepare students early and on a permanent basis so that they can actively contribute to shaping a growing and evolving digital world. It is important students to learn to use the means for their own education and information. Digital literacy means much more than simple learning how to use the new technology. It requires a creative media interaction. Nevertheless, in order to protect the adolescents from the network danger, technical solutions are not enough. Training and practicing skills, through the proper use of the media is the best way to guarantee the safe use of the Internet and thus the protection of children and young people. In modern information-knowledge age, the ability to use media, digital literacy, is the new key-skill to completely educate young people and to their successful beginning of the adult life. Particularly young children need help and support in order to be able to co-operate on their own responsibility with the multiple aspects of the media.

An integrated digital education should also extend to the protection and promotion of digital rights and psychosocial health and adaptability at the level of people-users, thus the resilience at society level, which includes the development of social communication skills diffused in all areas of everyday life, as well as the

the increase of innovation both in productivity and participation in all social structures.

It is vital to consider that the current global state of the COVID-19 pandemic makes the subject of our research even more relevant, as students around the world, from pre-school age have been forced to spend many hours in front of computers connected to the internet. Unfortunately, distance learning was the only way to get educated during lockdown periods. This was necessary in order to limit the rapid transmission of the virus to the society as a whole [30,40]. This condition employs educators, psychologists and pediatricians, enriching the scientific dialogue with new data, assessments and reflections, on the consequences that the long-term use of the internet may have on the psychosomatic and social development of school-age children.

During the stressful period of lockdown, many children might feel anxious or isolated. Thus, parents all over the world rely on digital solutions, so that their children have the chance to get educated, be entertained even socialize from a safer environment that is provided from home. More and more institutions, governments and international companies launch and share useful advice on how to protect young people from the high-risk internet use, such as cyber bullying effects, hate speech or addiction caused from unlimited online activities [30,40].

IMPLICATIONS FOR SCHOOL HEALTH

The use of the internet is a necessity for the modern society. In fact, in the context of the special conditions of today's global pandemic, through which a large volume of social, economic and educational functions is carried out, that use is not only a necessity, but also an obligation. In Greek educational system the Information and Communication Technologies (ICT) course has been introduced in the Curriculum of the primary school in all grades for 1 hour per week. Given the current educational needs, the teaching time should be increased and the contents of the course should be modified.

Our proposal, therefore, is to introduce the use of the New Technologies (N.T.) as a cognitive tool in every subject of the primary school, in parallel with the use and utilization of traditional educational tools and materials, in order to increase the familiarity of students with their use in different functions (educational software, internet, etc.). This "1 hour per week" that specializes in the teaching of the course of Informatics should be dedicated to preventive practices of good use

of the N.T. and especially the internet. Particularly:

- *Given the fact that the students in our research reported that they first used the Internet when they were about 6 years old, it is important from the first grades of basic education (1st -2nd) to support students in getting acquainted with safe surfing practices, such as not to open ads, to create a secure username and password and of course, to learn which personal information can be safely shared on the internet.*
- *According to the review of the international literature, the cyberbullying usually starts at the age of 8 and in some cases it increases, taking uncontrollable aspects, it is crucial in the next grades (3rd -4th) that the students are guided correctly, first of all not to intimidate their peers and then how to deal with such risks.*
- *Finally, given that the vast majority (86.8%) of our sample (preadolescents) stated that they were playing online games, half of which range from one to four times a week, as well as the fact that online games are highly correlated with the Compulsive Internet Use, it is essential during the last grades of primary school (5th-6th) students to be trained in life skills, with emphasis on the prevention of high-risk behaviors, with specialized educational materials.*

All of the above proposals do not require any financial cost and are mainly an issue of educational policy decisions. The only expense that would be necessary for the option of reviewing the curricula of the primary school concerns the training of teachers and the production of appropriate educational materials. This budget can be adapted to the financial data of each school unit, since a large part of both training and educational materials is done at a low cost, utilizing the internet itself.

Abbreviations

CIUS (Compulsive Internet Use Scale)

CIU (Compulsive Internet Use)

SDQ (Strengths and Difficulties Questionnaire)

SNS (Social Network Sites)

SES (Socioeconomic Status)

Human Subjects Approval was granted by the Ethical committee of the Second Dept. of Pediatrics of the P. & A. Kyriakou Children's Hospital of the National and Kapodistrian University of Athens and the Hellenic Ministry of Education and Religious Affairs. The parents or legal guardians of all participants were informed about the study objectives and were asked for their written consent

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