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Misuse of prescription opioid analgesics among adolescents in Greece: The importance of peer use and past prescriptions

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***Aims*: The study explored the prevalence and correlates of the non-prescribed use (misuse) of prescription opioid analgesics in a nationally representative sample of adolescent students in Greece.**
***Methods*: Cross-sectional data were collected through anonymous questionnaires administered to a random stratified sample of 676 high schools involving 23,279 students aged 15–19 in 2011.**
***Findings*: About 16.2% reported lifetime misuse, 6.3% repeated misuse at least three times – most of them to alleviate pain. Results of multivariate logistic regression showed that among the strongest correlates of repeated misuse were peer misuse (Odds ratio [OR] = 4.10, 99% Confidence Interval [CI] = 3.11–5.42), past prescription of opioid analgesics (OR = 3.19, 99% CI = 2.28–4.48 in males, OR = 2.38, 99% CI = 1.78–3.19 in females), lifetime misuse of tranquilisers/sedatives (OR = 3.16, 99% CI = 2.22–4.48), and frequent use of over-the-counter analgesics (OR = 2.37, 99% CI = 1.92–2.92). Other correlates included: female gender, daily smoking (by girls), frequent alcohol use, antisocial behaviour, physical or emotional maltreatment, and past prescription of tranquilisers/sedatives. Illicit drug use failed to explain opioid analgesics misuse.**
***Conclusions*: Misuse of prescription analgesics is common among adolescents in Greece and seems to emerge within a self-treating rather than a mood-altering context of use.**

INTRODUCTION

There are many reasons to prescribe opioid analgesics to adolescents: unintentional injuries are common (Sleet, Ballesteros, & Borse, 2010) and so is severe acute or chronic, post-operative or musculoskeletal pain (King et al., 2011; Perquin et al., 2000). Adolescents also report in high proportions psychosomatic health complaints including abdominal pain, headache and backache (Gobina et al., 2011; Ravens-Sieberer et al., 2009).

When appropriately prescribed and taken as indicated, analgesics improve quality of life (United Nations Office on Drugs and Crime [UNODC], 2011). However, their repeated misuse may have negative health consequences such as liver damage, hormonal and immune system effects, tolerance, hyperalgesia, addiction and unintentional overdose death (Gilson & Kreis, 2009; Holmes, 2012; Manchikanti & Singh, 2008; Zacny et al., 2003). Among all the types of prescription drugs that may be abused (including tranquilisers, sedatives, and stimulants), analgesics deserve special attention because they are the most commonly abused (Johnston, O'Malley, Bachman, & Schulenberg, 2012), and furthermore their abuse may be an important gateway to the use of heroin (Lankenau et al., 2012).

Adolescent misuse of prescription analgesics has been rising in several countries, most notably in the U.S. (Friedman, 2006; International Narcotics Control Board [INCB], 2011; Manchikanti & Singh, 2008; Miech, Bohnert, Heard, & Boardman, 2013; Sung, Richter, Vaughan, Johnson, & Thom, 2005; UNODC, 2011; Zacny et al., 2003). Increases have occurred in parallel with improvements in pharmaceutical research, scaling-up in prescribing (Gilson & Kreis, 2009), and increases in their availability (Friedman, 2006; Miech et al., 2013; Sung et al., 2005) and their prescribed use (INCB, 2011; Sung et al., 2005). The adoption of more

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lenient attitudes towards self-care in many societies, coupled with the perceived lack of risk from their use (Friedman, 2006) and the increased availability of websites offering access to prescription medications (Forman, Woody, McLellan, & Lynch, 2006), may also account for the observed increases. Especially in the U.S., increases paralleled decreases in the use of traditional street drugs (Friedman, 2006; Johnston et al., 2012).

The situation in Europe is less clear: the available studies involving adolescents do not distinguish prescribed from non-prescribed use and prescription analgesics from analgesics available over-the-counter (OTC) (Casati, Sedefov, & Pfeiffer-Gerschel, 2012; Du & Knopf, 2009; Gobina et al., 2011; Zacny & Lichtor, 2008). The scarcity up until now of studies and reports on the misuse of prescription analgesics in adolescents may indicate that it is a minor problem in Europe or that there is little public health interest in this matter. However, data on 15 year olds show that the level of use of medicines for headache in several European countries is comparable to the 52% reported in the U.S. (e.g. France, Scotland) or even higher (e.g. Finland, Romania) (Gobina et al., 2011). In addition, recent data from Europe put lifetime misuse of tranquilisers/sedatives among 16 year olds at 6% – comparable to the 7% reported in the USA (Hibell et al., 2012). Taking all these together, evidence from indirect sources suggests that misuse of prescription analgesics may also be common in Europe.

Depending on the motives, misuse of prescription analgesics may take place in different contexts, not mutually exclusive: Misuse may be intentional or unintentional; it may aim at experiencing the therapeutic virtues of the drug (therapeutic use) or its mood-altering virtues (sensation seeking) (McCabe, Boyd, Cranford, & Teter, 2009; McCabe, Boyd, & Teter, 2009; Zacny & Lichtor, 2008).

Irrespective of the motives, studies have identified a number of factors that are associated with prescription opioid misuse (Young, Glover, & Havens, 2012): individual characteristics such as older age (Boyd, McCabe, & Teter, 2006; Fleary, Heffer, & McKyer, 2011; Ford, 2008b; Simoni-Wastila, Yang, & Lawler, 2008; Wu, Pilowsky, & Patkar, 2008), female (Boyd et al., 2006; Boyd, McCabe, Cranford, & Young, 2007; Fleary et al., 2011; Wu et al., 2008) and male gender (Boyd et al., 2006; Catalano, White, Fleming, & Haggerty, 2011; Ford, 2008b; McCabe, Boyd, & Teter, 2005; Simoni-Wastila et al., 2008; Sung et al., 2005), personality, psychological and physical health characteristics (Fleary et al., 2011; Ford, 2008a; McCauley et al., 2010; Schepis & McCabe, 2012; Young, Grey, Boyd, & McCabe, 2011), use of OTC and prescribed use of opioid analgesics and misuse of other psychotropic medicines (e.g. tranquilisers/sedatives, stimulants, etc.) (Sung et al., 2005), substance use and other high-risk behaviours (Boyd et al., 2006; Boyd, Young, Grey, & McCabe, 2009; Fleary et al., 2011; Ford, 2008b; McCabe et al., 2005; McCabe, Boyd, & Young, 2007; McCabe et al., 2011, McCauley et al., 2010; Simoni-Wastila et al., 2008; Sung et al., 2005; Wu et al., 2008), as well as familial (Ford, 2008b, 2009; Simoni-Wastila et al., 2008; Sung et al., 2005; Wu et al., 2008), peer (Boyd et al., 2006; Fleary et al., 2011; Ford, 2008b) and school-related (McCabe et al., 2005; Simoni-Wastila et al., 2008; Wu et al., 2008) factors.

The public health risks from the misuse of prescription analgesics are manifested in high prevalence, emergency department visits due to adverse consequences and other societal costs such as high pharmaceutical and treatment spending (Gilson & Kreis, 2009; Holmes, 2012). The burden may be greater for countries which rank high in drug expenditure and drug utilization: Greece has the highest pharmaceutical expenditure in Europe (OECD, 2010) and heavy pharmaceutical consumption (Pappa, Kontodimopoulos, Papadopoulos, Tountas, & Niakas, 2011), while also falling among the countries with the highest prevalence of self-reported multiple health complaints among adolescents (Currie et al., 2012; Ravens-Sieberer et al., 2009).

The present study aims to explore the prevalence and the factors associated with the misuse of prescription analgesics in a representative sample of adolescent students in Greece. A number of different terms with varying meanings have been used to describe misuse of psychoactive medications (Barrett, Meisner, & Stewart, 2008; Young et al., 2012; Zacny & Lichtor, 2008). ''Misuse'' here refers either to the use of a prescription-type opioid analgesic that has been prescribed for someone else and/or to its use in a way that it is intentionally or unintentionally incompatible with the physician's prescription. The term therefore covers excessive dosing or contraindicated use, use for self-management of minor, self-limiting illnesses, and use for recreation (mood-altering) purposes. The definition excludes the misuse of OTC analgesics.

METHODS

Study population and procedure

The data presented here were collected within the 2011 Greek Nationwide School Survey on Substance Use conducted by the University Mental Health Research Institute. Its main scope is substance use among adolescents and its methodology is fully compatible with the European School Survey Project on Alcohol and Other Drugs (ESPAD) (Hibell et al., 2012). The study involved a nationwide probability sample of 37,040 students attending all six grades of high school (grades 7–12). The sampling unit was the school class and the sampling frame consisted of the official school registry of the Ministry of Education. Schools were stratified by prefecture and by school type. Sampling was proportionate between school types within prefectures but not between prefectures. About 9% of the selected schools refused to participate, mainly because of lack of available time. The study protocol was

approved by the Ethics Committee of the Ministry of Education. School authorities, parents and students were all informed about the aims of the study, its procedures, the protection of their anonymity, and the importance of the study's findings for prevention and health promotion. Student participation was subject to personal and parental informed consent. All students enrolled in the selected classes and present on the day of the survey were asked to fill in an anonymous questionnaire administered by research assistants in the school class. No repetition of the survey for absentees was foreseen in the study design.

Participants

Only students from grades 9 to 12 were asked about prescription analgesics ($n = 24{,}006$, from 1345 classes). The response rate was 86.4%. Ten percent of the students were absent on the day of the survey – 2.1% due to illness. Another 3.6% refused to participate (including parental refusal). Following quality control, 23,279 students remained in the database – 50.5% males; aged chiefly 15–18 years (4.7% were 19 year olds).

Measures

Misuse of prescription analgesics was measured by the following item ''*Have you ever taken without a doctor's prescription any of the following analgesics for which a doctor's prescription is required?*'' Response categories were: *''Never'', ''1–2 times'', ''3–5 times'', ''6–9 times'', ''10–19 times'', ''20–39 times'', and ''40 times or more''*. The following prescription opioid analgesics were given as examples in the questionnaire item (ATC codes in brackets): Lonarid N® (N02AA59), Lonalgal® (N02AA59), Romidon® (N02AC04), and Durogesic® (N02AB03). The outcome measure of the present study was misuse at least three times in lifetime. A stricter cut-off for misuse was employed in order to focus on the characteristics of those who have repeatedly misused prescription analgesics.

Based on the literature, covariates were grouped into the nine thematic domains presented in Table I. Sociodemographics included: gender; age; geographical stratum; educational status of mother/father; employment status of mother/father; perceived economic status; family structure; country of birth; and nationality of parents. Misuse of prescription medications by peers and siblings included: peers misusing prescription analgesics; peers misusing prescription tranquilisers/sedatives; siblings misusing prescription analgesics; and siblings misusing prescription tranquilisers/sedatives. The use of other medications included own use of OTC analgesics in the last 12 months; medical use of prescription analgesics; prescribed use of tranquilisers/sedatives; and misuse of tranquilisers/sedatives. The psychological health domain included seven items: two on self-harm thoughts and emotional or sexual maltreatment; and five scales measuring depressive mood, self-esteem, anomic attitude, antisocial behaviour (Kokkevi & Fotiou, 2009) and internet abuse (Young, 1996). The physical health domain included two items: self-reported quality of physical health; and visiting a doctor for somatic illness in the last 12 months. Two measures were included in the domain satisfaction with relationships: satisfaction with relationships with parents and with peers. School domain included the variables of truancy in the last 30 d; academic achievement; and satisfaction with school. Leisure activities included two variables: playing computer games and active participation in sports, athletics or exercising. Finally, five items were included in the substance use domain: current smoking; current alcohol use; current binge drinking; current drunkenness; and lifetime use of cannabis. As indicated

Table I. Variables and response categories used in the analyses, by thematic domain. Square brackets indicate collapsing of categories for the bivariate and multivariate analyses.

Domain/Variables[a]	Response categories
Sociodemographics	
Gender	[Male]; [Female]
Age	Year of birth: [Scale]
Geographical stratum[b]	School location identifier: [Athens]; [Thessaloniki]; [Other areas]
Mother's/father's educational status	[Completed primary school or less; some secondary school; completed secondary school; some college or university]; [completed college or university]; [don't know; does not apply]
Mother's/father's employment status	[Unemployed]; [Employed; retired not seeking job]; [don't have, don't know]
Perceived economic status	[Very much better off; much better off; better off; about the same]; [less well off; much less well off; very much less well off]
Family structure	Father; mother; Stepfather; stepmother; brother(s); sister(s); grandparent(s); other relative(s); non-relative(s); I live alone. [Father and mother = Intact]; [No father or/and no mother = non-intact]
Greece, country of birth[b]	[Yes]; [No]

(*continued*)

Table I. Continued.

Domain/Variables[a]	Response categories
Mother/father Greek[b]	Yes; No. [At least one non-Greek]; [Both Greek]
Physical health	
Quality of own somatic health (compared to others)[b]	[Much better; better; about the same]; [worse; much worse]
Doctor visit for somatic illness in the last 12 months[b]	[Never]; [Once; twice; 3–5 times; 6–9 times; 10 times or more]
Use of medications	
Misuse of prescription analgesics (lifetime)[b]	[Never; 1–2 times]; [3–5 times; 6–9 times; 10–19 times; 20–39 times; 40 times or more]
Use of OTC analgesics in the last 12 months[b]	[Never; 1–2 times; 3–5 times; 6–9 times]; [10–19 times; 20–39 times; 40 times or more]
Medical use of prescription analgesics[b]	[Never]; [1–2 times; 3–5 times; 6–9 times; 10–19 times; 20–39 times; 40 times or more]
Medical use of tranquilisers/sedatives	[Never]; [Yes, but for less than 3 weeks; Yes, for 3 weeks or more]
Misuse of tranquilisers/sedatives	[Never]; [1–2 times; 3–5 times; 6–9 times; 10–19 times; 20–39 times; 40 times or more]
Psychological health	
Self-harm thoughts	[Never]; [Once; twice; 3 times; 4 times; 5 times or more]
Emotional or sexual maltreatment	[Mother; father; siblings; other relative; other known person; other unknown person]; [None]
Depressive mood	Rarely or never; sometimes; often; most of the times: [Scale]
Self-esteem	Agree; rather agree; rather disagree; disagree: [Scale]
Anomie	Agree; rather agree; neither agree nor disagree; rather disagree; disagree: [Scale]
Antisocial behaviour	Never; once; twice; 3 times; 4 times; 5 times or more: [Scale]
Internet addiction[c]	Yes; No: [Scale]
Misuse of prescription drugs by peers and siblings	
Peers misuse prescription analgesics[b]	[None]; [A few; some; most; all]
Peers misuse prescription tranquilisers/sedatives	[None]; [A few; some; most; all]
Siblings misuse prescription analgesics[b]	[Yes]; [No]; [Don't know; don't have]
Siblings misuse prescription tranquilisers/sedatives	[Yes]; [No]; [Don't know; don't have]
Substance use	
Tobacco use in the last 30 d	[Not at all; less than 1 cigarette per week; less than 1 cigarette per day]; [1–5 cigarettes per day; 6–10 cigarettes per day; 11–20 cigarettes per day; more than 20 cigarettes per day]
Alcohol use in the last 30 d	[Never; 1–2 times; 3–5 times; 6–9 times]; [10–19 times; 20–39 times; 40 times or more]
Binge drunk in the last 30 d	[None]; [Once; twice; 3–5 times; 6–9 times; 10 times or more]
Drunkenness in the last 30 d	[Never]; [1–2 times; 3–5 times; 6–9 times; 10–19 times; 20–39 times; 40 times or more]
Cannabis use in lifetime	[Never]; [1–2 times; 3–5 times; 6–9 times; 10–19 times; 20–39 times; 40 times or more]
Relationships	
Satisfaction with relationship with mother/father	[Very satisfied; satisfied; neither satisfied nor dissatisfied]; [Not so satisfied; not at all satisfied]; [there is no such person]
Satisfaction with relationship with peers	[Very satisfied; satisfied; neither satisfied nor dissatisfied]; [Not so satisfied; not at all satisfied; don't have]
School	
Truancy in the last 30 d	[Never; 1 day]; [2 d; 3–4 d; 5–6 d; 7 d or more]
School term academic achievement (grades)	A; B; C: [Scale]
Satisfaction with school[b]	[Very satisfied; satisfied; neither satisfied nor dissatisfied]; [Not so satisfied; not at all satisfied]
Leisure activities	
Play computer games	[Never; a few times a year; 1–2 a month; a least once a week]; [Almost every day]
Actively participate in sports, athletics of exercising	[Never; a few times a year; 1–2 a month; a least once a week]; [Almost every day]

[a]Except where indicated, questions are taken from the European School Survey Project on Alcohol and Other Drugs 1995, 1999, 2003, 2007, 2011 (Hibell et al., 2012).
[b]Based on question used in the Greek Nationwide School Surveys on Substance Use conducted by Athens University in 1984, 1988 and 1993, and by the University Mental Health Research Institute in 1998, 2003, 2007 and 2011.
[c]Based on Young, 1996.

in Table I most variables have been used in recent waves of the ESPAD survey (Hibell et al., 2012; Kokkevi & Fotiou, 2009).

Statistical analysis

Standard descriptive analyses were first conducted for the whole sample as a preliminary. The main analysis consisted of a series of logistic regression analyses in which the dependent variable was always the repeated ($\geq$3 times in lifetime) misuse of prescription analgesics. In the first step, bivariate logistic regressions were conducted to examine the relation of misuse of prescription analgesics to each of the other variables separately. In the second step, nine multiple logistic regression models corresponding to the nine domain groups of variables were fitted. Every variable appeared as a covariate in the appropriate one of these models, which also controlled for the effects of gender and age. In addition, to allow for the possibility that the associations of other variables with the misuse of prescription analgesics could differ between the genders, all models (except that for sociodemographics) included the interactions of other variables with gender. The third step comprised a single logistic regression model covering all domains; this included only those variables which were significantly associated with misuse at an alpha level of 0.01 in the previous step. In the fourth and last step, significant variables from the third step were included in the final logistic regression model. Because of limitations of space, results are shown only for the first and final steps. Results for the second and third steps are available from the authors on request. At every step, the analysis was limited to the subset of students who responded to the misuse item (dependent variable) and all the covariates (independent variables), $n = 20{,}285$ in the final model. For presentation of the interaction terms, in place of the usual dummy variables for the factor and the interaction, two dummy variables were created – one for the effect of the factor in boys and the other for its effect in girls. Because of the non-proportionate sampling, a design weight was incorporated into all the statistical analyses. All analyses were corrected for the effect of clustering of students within the same schools and classes. IBM SPSS (v. 19.0, IBM Corp., Armonk, NY) was used for the analyses.

RESULTS

Sample characteristics ($n = 23{,}279$) are presented in Table II. One in five students (20.6%) reported past medical use of prescription analgesics, 16.2% reported lifetime misuse and 6.3% reported misuse at least three times.

Separate analyses of motives for misuse showed that the main reason was for treating pain (73.1%), higher among females compared to males (Figure 1). More male misusers than females reported motives other than treating pain, including sensation seeking. Regarding sources, ''parents'' (53.8%) and the ''home medicine cabinet'' (47.9%) were reported most commonly by misusers, especially by females (Figure 2). Male misusers, in contrast, reported in higher proportions ''internet'', ''peers'' and ''others''.

Table II. Sociodemographic characteristics of the sample ($n = 23{,}279$).

	Sample characteristics	
	n	%
Gender		
Male	11,661	50.1
Female	11,618	49.9
School grades		
9th	6417	27.6
10th	6180	26.5
11th	5952	25.6
12th	4730	20.3
Age		
15 year olds	5816	25.0
16 year olds	5912	25.4
17 year olds	5854	25.1
18 year olds	4599	19.8
19 year olds	1098	4.7
Parents' nationality status		
Both parents Greek	19,603	85.8
A least one parent non-Greek	3243	14.2
Family structure		
Intact	19,465	84.2
Not intact	3653	15.8
Family's economic status (perceived)		
Better than average	9702	42.5
Average	11,548	50.5
Worse than average	1609	7.0
Father's educational level		
University degree or higher	7416	31.9
Upper secondary education or lower	13,602	58.4
Don't know/no father	1804	7.7
Mother's educational level		
University degree or higher	8461	36.9
Upper secondary education or lower	13,166	57.4
Don't know/no mother	1293	5.6
Father's employment status		
Father unemployed	1026	4.5
Father employed or other status	20,894	91.3
Don't know/no father	976	4.3
Mother's employment status		
Mother unemployed	5248	23.0
Mother employed or other status	17,297	75.7
Don't know/no mother	296	1.3

Results of the unadjusted, bivariate analyses (step one of the main analysis) are shown in Table III. Significant associations were found between misuse of prescription analgesics and most of the variables of interest. Exceptions were: geographical stratum, mother's educational level, country of birth and academic achievement.

Table IV displays the results from the final model predicting misuse of prescription analgesics $\geq$3 times

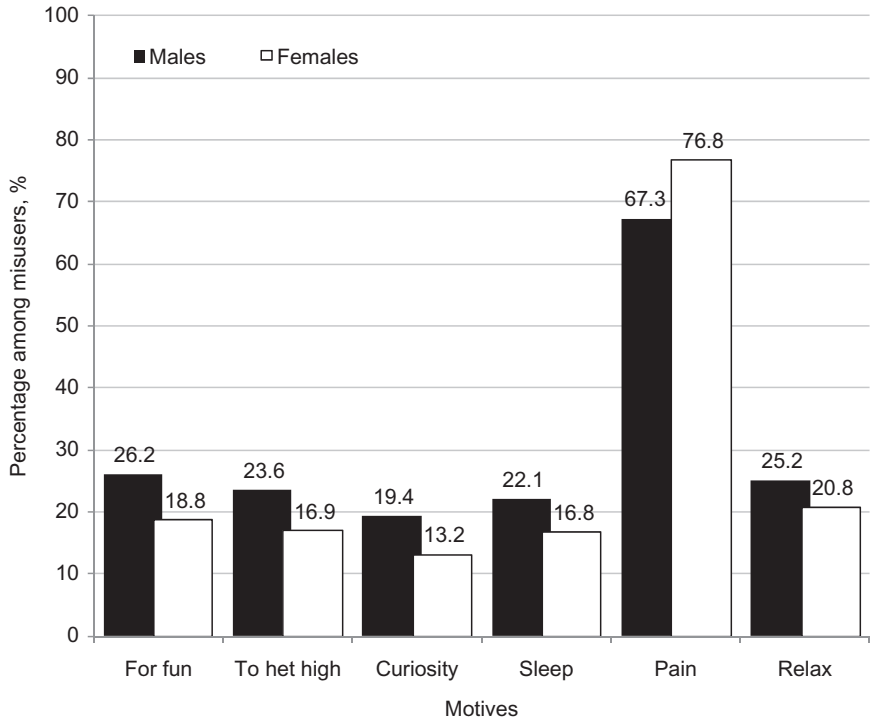

Figure 1. Motives for use of prescription opioid analgesics among misusers, by gender ($n = 1515$). Response options were pre-defined. Aggregate exceeds 100% as multiple responses were permitted.

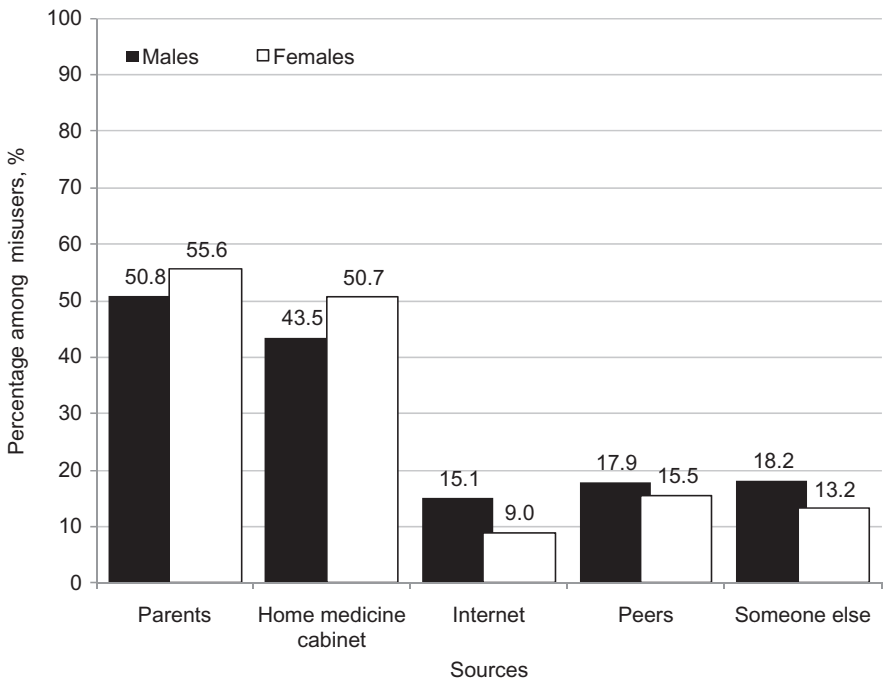

Figure 2. Sources for prescription opioid analgesics among misusers, by gender ($n = 1515$). Response options were pre-defined. Aggregate exceeds 100% as multiple responses were permitted.

in lifetime including those covariates and interactions of covariates with gender that were statistically significant in the second and third steps of analysis described in the Statistical Analysis section above. Among the strongest correlates were misuse of prescription analgesics by peers (OR = 4.10, 99% CI = 3.11–5.42), having a past prescription for analgesics, especially by males (OR = 3.19, 99% CI = 2.28–4.48 and OR = 2.38, 99% CI = 1.78–3.19 in males and in females, respectively), past misuse of tranquilisers/sedatives (OR = 3.16, 99% CI = 2.22–4.48), and frequent use of OTC analgesics in the last 12 months (OR = 2.37, 99% CI = 1.92–2.92). There was a significant interaction of gender with past

Table III. Bivariate comparisons between misuse of prescription analgesics ≥3 times in lifetime and <3 times or never across demographic, psychological, substance use and other measures.

	Misuse of prescription analgesics		
	≥3 times in lifetime ($n = 1515$) % [M][a]	OR[b] [99% CI]	p Value
Sociodemographics			
Gender			
Male	5.0	1	
Female	7.6	1.6 [1.3, 1.9]	**<0.001**
Age			
Mean age (years)	[16.6]	1.2 [1.1, 1.4]	**<0.001**
15 year olds	4.5		
16 year olds	5.9		
17 year olds	5.3		
18 year olds	8.3		
19 year olds	10.9		
Geographical stratum			
Athens	6.2	1	
Thessaloniki	7.7	1.3 [0.9, 1.9]	0.128
Other areas	6.1	1.0 [0.8, 1.2]	0.824
Father's educational level			
University degree or higher	5.6	1	
Upper secondary education or lower	6.6	1.2 [1.0, 1.4]	**0.044**
Don't know/no father	7.7	1.4 [1.0, 2.0]	**0.012**
Mother's educational level			
University degree or higher	6.0	1	
Upper secondary education or lower	6.4	1.1 [0.9, 1.3]	0.364
Don't know/no mother	8.2	1.4 [0.9, 2.1]	**0.042**
Family's economic status (perceived)			
Better than average/average	6.0	1	
Worse than average	10.3	1.8 [1.3, 2.4]	**<0.001**
Family structure			
Intact	5.8	1	
Not intact	8.7	1.5 [1.2, 2.0]	**<0.001**
Country of birth			
Greece	6.2	1	
Country other than Greece	6.5	1.1 [0.8, 1.4]	0.667
Parents' nationality status			
Both parents Greek	6.1	1	
At least one parent non-Greek	7.6	1.3 [1.0, 1.6]	**0.012**
Father's employment status			
Father employed or other status	6.1	1	
Father unemployed	7.7	1.3 [0.8, 2.0]	0.134
Don't know/no father	9.6	1.6 [1.1, 2.4]	**0.001**
Mother's employment status			
Mother employed or other status	6.1	1	
Mother unemployed	6.8	1.1 [0.9, 1.4]	0.130
Don't know/no mother	12.7	2.3 [1.3, 3.9]	**<0.001**
Physical health			
Health status (perceived)			
Better than/same as average	5.5	1	
Worse than average	11.4	2.2 [1.8, 2.8]	**<0.001**
Doctor visit			
Never in the last 12 months	4.7	1	
≥1 time in the last 12 months	7.5	1.6 [1.3, 2.0]	**<0.001**
Use of medications			
OTC analgesics			
<10 times in the last 12 months	3.4	1	
≥10 times in the last 12 months	11.8	3.8 [3.2, 4.5]	**<0.001**

(*continued*)

Table III. Continued.

	Misuse of prescription analgesics		
	≥3 times in lifetime ($n = 1515$) % [M][a]	OR[b] [99% CI]	p Value
Prescription analgesics (prescribed use)			
Never used	3.8	1	
≥1 times in lifetime	16.1	4.9 [4.1, 5.9]	**<0.001**
Tranquilisers/sedatives (prescribed use)			
Never used	5.5	1	
≥1 time in lifetime	21.8	4.8 [3.8, 6.1]	**<0.001**
Tranquilisers/sedatives (misuse)			
Never used	5.0	1	
≥1 time in lifetime	29.5	8.0 [6.1, 10.4]	**<0.001**
Psychological health			
Maltreated (emotional, sexual)			
Never been maltreated	4.1	1	
Ever been maltreated	9.6	2.4 [2.0, 3.0]	**<0.001**
Self-harm			
Never thought of harming self	4.3	1	
Ever thought of harming self	11.1	2.8 [2.3, 3.4]	**<0.001**
Self-esteem (scale)	[2.9]	0.5 [0.5, 0.6]	**<0.001**
Depressive mood (scale)	[2.1]	2.2 [2.0, 2.5]	**<0.001**
Anomic attitude (scale)	[2.1]	0.7 [0.7, 0.8]	**<0.001**
Antisocial behaviour (scale)	[1.4]	2.0 [1.8, 2.3]	**<0.001**
Internet addiction (scale)	[2.8]	1.2 [1.1, 1.2]	**<0.001**
Misuse by peers and siblings			
Peers misuse tranquilisers/sedatives			
None	4.7	1	
At least some	14.6	3.5 [2.9, 4.2]	**<0.001**
Peers misuse prescription analgesics			
None	2.3	1	
At least some	12.4	6.0 [4.7, 7.5]	**<0.001**
Siblings misuse tranquilisers/sedatives			
No	5.6	1	
Yes	19.7	4.1 [3.0, 5.7]	**<0.001**
Don't know/don't have siblings	6.2	1.0 [0.9, 1.4]	0.198
Siblings misuse prescription analgesics			
No	3.7		
Yes	14.8	4.6 [3.6, 5.8]	**<0.001**
Don't know/don't have siblings	6.2	1.7 [1.4, 2.2]	**<0.001**
Substance use			
Tobacco			
No daily smoking in the last 30 d	5.1	1	
Daily smoking in the last 30 d	11.3	2.4 [2.0, 2.9]	**<0.001**
Alcohol			
Alcohol <10 times in the last 30 d	5.3	1	
Alcohol ≥10 times in the last 30 d	11.6	2.3 [1.9, 2.9]	**<0.001**
Binge drunk			
No binge drunk in the last 30 d	4.3	1	
Binge drunk ≥1 times in the last 30 d	8.7	2.1 [1.7, 2.7]	**<0.001**
Drunkenness			
No drunkenness in the last 30 d	5.5	1	
Drunkenness ≥1 times in the last 30 d	11.5	2.2 [1.8, 2.7]	**<0.001**
Cannabis			
Never used cannabis	5.3	1	
Cannabis use ≥1 times in lifetime	12.5	2.5 [2.0, 3.2]	**<0.001**
Satisfaction with relationships			
Satisfaction with mother			
Satisfied/so-and-so	5.9	1	
Dissatisfied	11.7	2.1 [1.5, 2.7]	**<0.001**
Don't have a mother	9.5	1.7 [0.8, 3.5]	**0.008**

(*continued*)

Table III. Continued.

	Misuse of prescription analgesics		
	≥3 times in lifetime ($n = 1515$) % [M][a]	OR[b] [99% CI]	p Value
Satisfaction with father			
Satisfied/so-and-so	5.6	1	
Dissatisfied	10.9	2.1[1.6, 2.6]	**<0.001**
Don't have a father	8.8	1.6 [1.0, 2.6]	**0.009**
Satisfaction with peers			
Satisfied/so-and-so	6.1	1	
Dissatisfied	10.6	1.8 [1.3, 2.5]	**<0.001**
Don't have	5.8	0.9 [0.3, 2.5]	0.780
School			
Satisfaction with school			
Satisfied/so-and-so	5.7	1	
Dissatisfied	8.0	1.5 [1.2, 1.8]	**<0.001**
Truancy			
Truancy 0–1 times in the last 30 d	5.1	1	
Truancy ≥2 times in the last 30 d	9.1	1.9 [1.5, 2.3]	**<0.001**
Academic achievement			
Mean grade	[2.2]	0.8 [0.7, 0.9]	**<0.001**
Low grade	8.0		
Average grade	6.4		
High grade	5.2		
Leisure			
Computer games			
Play computer games less frequently	5.8	1	
Play computer games almost every day	7.2	1.3 [1.0, 1.5]	**0.004**
Sports activity			
Sports less frequently	6.9	1	
Sports almost every day	5.5	0.8 [0.6, 0.9]	**0.001**

Statistically significant results are shown in bold.
[a]Numbers in brackets indicate mean values for continuous measures.
[b]Odds Ratios (OR) are shown with 99% Confidence Intervals [CI] in brackets.

Table IV. Multiple logistic regression analysis (with simultaneous entry of variables) identifying correlates of misuse of prescription analgesics ($n = 20,285$).

		99% CI[b]	
	OR[a]	Lower	Upper
Female (versus male)	1.40	1.02	1.92
Peers misuse prescription analgesics (versus none)	4.10	3.11	5.42
Prescribed use of tranquilisers/sedatives (versus never)	1.49	1.03	2.15
Use of OTC analgesics ≥10 times in the last 12 months (versus fewer times)	2.37	1.92	2.92
Prescribed use of prescription analgesics by males (versus never use)	3.19	2.28	4.48
Prescribed use of prescription analgesics by females (versus never use)	2.38	1.78	3.19
Misuse of tranquilisers/sedatives (versus never)	3.16	2.22	4.48
Physically or emotionally maltreated (versus never)	1.54	1.23	1.92
Smoking daily *by* females (versus no use)	1.78	1.27	2.48
Alcohol use ≥10 times in the last 30 d (versus fewer times/no)	1.42	1.10	1.84
Antisocial behaviour (scale)	1.55	1.26	1.92

Final model. All coefficients have $p < 0.001$ except for gender ($p = 0.006$) and prescribed use of tranquilisers/sedatives ($p = 0.005$).
[a]OR = odds ratio.
[b]CI = confidence interval.

prescription (higher effect in males) and with daily smoking (females).

DISCUSSION

We used data from a large national representative sample of adolescent high school students in Greece in order to explore the misuse of prescription analgesics and its associations with socio-demographic, psychosocial and behavioural characteristics. Our study found higher lifetime prevalence of misuse than reported in national representative samples of students of comparable age in the U.S. (Wu et al., 2008; Young et al., 2012), but similar to those based on smaller regional samples (Boyd et al., 2006, 2009; McCabe et al., 2011). Higher prevalence in Greece could be attributable to differences in definitions and survey methodologies. It could nonetheless reflect actual epidemiological trends related to factors which are discussed below and which may be unique to the Greek society.

Females often use analgesics to moderate pain from menstrual cramps, and also from migraines which they suffer earlier in their lives and more often than boys (Bakoula, Kapi, Veltsista, Kavadias, & Kolaitis, 2006; Chambers, Reid, McGrath, & Finley, 1997; Gobina et al., 2011; Mitka, 2004). Misuse of prescription analgesics was higher among girls than boys in our study – being female increased the odds of reporting misuse by 40%. This finding corroborates those from other studies, showing that girls use medicines in higher proportions than boys and that female gender is a strong correlate of prescription analgesic abuse and dependence (Boyd et al., 2006, 2007; Simoni-Wastila et al., 2008; Stoelben, Krappweis, Rossler, & Kirch, 2000). In Greece, gender differences have also been noted in samples of the general population (Athanasopoulos, Pitychoutis, Messari, Lionis, & Papadopoulou-Daifoti, 2012; Kokkevi, Fotiou, & Richardson, 2007; Pappa et al., 2011), while in another study female gender predicted misuse of tranquilisers/sedatives among Greek adolescent students (Kokkevi et al., 2008). The emergence of female gender as a correlate of misuse of prescription analgesics in the present study coupled with the fact that girls in Greece report drug use in significantly lower proportions than boys (Hibell et al., 2012) suggests that prescription analgesic misuse is more likely to be associated with self-treating than recreational motives.

Past medical use of prescription analgesics was among the strongest predictors of prescription analgesic misuse – stronger among males than females. Several studies have highlighted possible pathways from medical use to misuse of prescription medicines, especially in the context of self-treatment (Boyd et al., 2006; McCabe et al., 2011). McCabe and associates found that adolescent students who reported medical use had greater odds of misusing prescription medications compared to nonusers (McCabe et al., 2011). Similarly, Boyd and associates found that students who had been given a prescription were ten times more likely to report misuse as well (Boyd et al., 2006).

This association with past prescriptions suggests that adolescents, especially males, may overmedicate, i.e. make excessive use of their own leftover prescription medications. This, taken together with the finding in our study that the misuse of prescription analgesics was also independently associated with the frequent use of OTC analgesics, suggests that misuse possibly emerges as a stage in a sequence of events starting with experiencing a symptom to attending to that symptom by taking a prescription analgesic in a manner that may or may not be medically appropriate. In a US study conducted in 2005 in 1086 adolescent students, four in every five adolescents who reported misuse of prescription analgesics did so to relieve pain (Boyd et al., 2006), a similar proportion to that reported in our study. However, as emphasized below, the cross-sectional nature of the data cannot tell us which type of use (OTC, prescribed, misuse) precedes the other.

The independent associations between the misuse of prescription analgesics and tobacco and frequent alcohol use found in our study have been extensively reported in the literature (Boyd et al., 2006, 2009; Fleary et al., 2011; Ford, 2008b; McCabe et al., 2005). What is of note, nonetheless, is that unlike most studies (Catalano et al., 2011; McCabe et al., 2011), our multivariate analyses showed no associations between the misuse of prescription analgesics and the use of cannabis – substance with the highest prevalence among adolescents in Greece (Hibell et al., 2012). Instead, strong independent associations were found between the misuse of prescription analgesics and misuse of tranquilisers/sedatives.

Taken together, these findings suggest at least three things: First, misuse of prescription analgesics may be socially accepted as much as smoking and drinking which, unlike illicit drug use, are both common and to some extent also normalized in the Greek society. Second, misuse of prescription analgesics seems not obviously to be part of a broader behavioural pattern which would typically also include the use of illicit substances – a hypothesis that has been supported by findings in a number of studies elsewhere (Catalano et al., 2011; McCabe et al., 2005, 2007, 2011), and also in Greece in the case of tranquilisers/sedatives (Kokkevi et al., 2008). Third, although purposeful mood-altering motives cannot be excluded, the fact that illicit substances did not emerge as predictors of misuse suggests that the latter is driven by self-treating rather than sensation-seeking motives. Additional analyses exploring factors associated with misuse of prescription analgesics by motive of use could validate this hypothesis.

Notably, peer misuse of prescription analgesics was the strongest predictor of one's own misuse in our study. Its role as a risk factor has been reported extensively (Boyd et al., 2006; Ford, 2008b). Not only are peers a role model for misusing medications, but

they also play an important role in their diversion, especially among girls (Boyd et al., 2007). Peer influence points to a socialization pathway, or social learning effect (Ford, 2008b, 2009) according to which attitudes and routines pertinent to the use of medications within adolescents' social networks (i.e. parents, siblings, peers) influence their attitudes and behaviours.

We also found that antisocial behaviour and a history of physical and emotional maltreatment gave about 50% higher odds of reporting misuse of prescription analgesics. These findings corroborate those from other studies that have found strong associations between the misuse of prescription analgesics, antisocial behaviour and victimization (Catalano et al., 2011; Ford, 2008a; McCauley et al., 2010; Young et al., 2011). In a study of female students in the US, sexual victimization increased the likelihood of misuse of opioid analgesics (Young et al., 2011) while another study in adolescents aged 12–17 found that witnessing violence doubled the odds of reporting lifetime misuse (McCauley et al., 2010). Personal traumatic events that are also possibly stigmatizing for the adolescent-villain or -victim may dissuade these adolescents from seeking professional help and increase the risk of misusing prescription analgesics.

Our study has important implications for prevention and health policy. Longitudinal studies show that misuse of prescription medicines commences and peaks during high school years (Catalano et al., 2011), the period when self-treatment also starts (Chambers et al., 1997). The high prevalence rate reported in our study and the factors predicting misuse suggest that effective preventative interventions in this area require a multilevel approach, i.e. intervening to simultaneously influence individual (knowledge, awareness, beliefs, skills, etc.), proximal (parents, peers, school, physicians, pharmacists, etc.), and societal (pharmaceutical market, laws, public debate, media, etc.) factors. Although beyond the scope of the present study, other research has shown that there are serious knowledge gaps among adolescents concerning the side effects, risks and interactions of analgesics (Stoelben et al., 2000). Preventative interventions should therefore focus on alerting adolescents to health risks involved in their misuse. Also, the fact that peer use emerged as an important correlate in our study points to the need to invest in developing adolescents' life skills for and resistance to peer influence.

Given that many adolescents take analgesics without their parents' knowledge (Chambers et al., 1997; Mitka, 2004) and, as the present study suggested, most diversion involves the home medicine cabinet and occurs between family members and between peers, the key target-settings in prevention interventions should equally be family and schools. Interventions should target normative beliefs held by parents on the lack of harms involved in adolescents' autonomy in self-care, and in sharing and misusing prescription medicines. In the absence of a health professional in the public school system in Greece, training teachers could additionally increase knowledge and help reduce students' proneness to use or share medicines in school. Physicians and pharmacists should also be urged to stress to both parents and adolescents the health risks involved in misuse. Stricter control should also be considered to reduce possible overprescribing.

Our study has several limitations. First, its cross-sectional design cannot capture the complex relationships between the misuse of prescription analgesics and correlates. Second, other factors not explored here may be important, including parental use or misuse of prescription analgesics, parental attitudes towards medicines, parental symptomatology, and the parallel misuse of antibiotics and other medications. Importantly, it is not known whether the decision to misuse medicines was taken by adolescents alone or it was driven by parents. Moreover, the present study was exploratory and future analysis of this dataset could examine differences in the characteristics of misusers by motives of use (recreational, self-treatment or both). Third, self-reports on misuse may lack validity. Although the relevant items in the survey made explicit reference to the brand names of all prescription analgesics widely available and used in Greece, high rates of misuse might suggest possible misreporting (i.e. misunderstanding between OTC, prescribed use and misuse). A qualitative investigation into the ways young participants understand and respond to questions on prescription drugs could shed some light into this issue. A Norwegian study assessing the validity of questionnaire items on prescription analgesics found nonetheless that the validity of the measurement of this class of medication can be high (Skurtveit, Selmer, Tverdal, & Furu, 2008).

This study is the first empirical study to describe the scope of prescription analgesic misuse among adolescents in Greece and to inform the development of youth appropriate interventions. Our study suggests that misuse of prescription analgesics is common among adolescents. Misuse, whether it is for self-treatment or sensation seeking, increases the health risks and the burden to the Greek society especially with regard to health care expenditures. Preventive interventions should be designed to highlight the risks involved in misuse irrespective of motives. Follow-up studies are necessary to monitor changes over time while the inclusion of measures on misuse in other health surveys could help to validate our results. Qualitative work is, finally, necessary to explore adolescents' and parents' perceptions about medicine use, misuse and the related harm.

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