Prevalence of DSM-5 depressive disorders and comorbidity in Spanish early adolescents: Has there been an increase in the last 20 years?

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Highlights

- The estimated current prevalence of Major Depressive Disorder (MDD) in school children is of 1.6% (95% CI: 0.9-2.2) and is similar to those found 20 years ago at the same place (1.5%; 95% CI: 0.4 - 2.5).
- The prevalence of PDD was 2.9% (95% CI: 2.1-3.8)
- No significant differences between gender were found in either of the two periods studied.
- In the 80% of cases of MDD, an anxiety diagnosis was also made.
- In relation to related factors, to belong to a single parent family (OR: 2.7; IC95%:1.9-3.9) and to be born out of Spain (OR: 1.7; 95%IC:1.1–3.9) increased the risk of having depressive symptoms.

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Prevalence of DSM-5 depressive disorders and comorbidity in Spanish early adolescents: Has there been an increase in the last 20 years?

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The aim of the study was to investigate the current prevalence of DSM-5 Depressive Disorders (DD) among Spanish school children and compare it with data obtained 20 years ago from the same place. We assessed comorbidity, severity and sociodemographic related factors. With a double-phase design, a sample of 1,514 students participated in the 1st phase and 562 students (175 at risk of depression) were assessed in the 2nd phase with the *Mini- International Neuropsychiatric Interview for Kids*. The estimated current prevalence of Major Depressive Disorder (MDD) was 1.6%, similar to the 1.5% found 20 years ago. A total of 3.4% were diagnosed with some form of DD (MDD or Persistent Depressive Disorder (PDD)). No significant differences between gender were found in either of the two periods studied. The rate of depressive symptoms (11.6%) was not significantly different from that of previous data (9.4%). 80% and 71.9% of the children diagnosed with MDD and PDD respectively also had an anxiety disorder. In conclusion, we have not found an increase in depression among Spanish early adolescents. However, the data on the prevalence of DD, the comorbidity, and the impairment all highlight the need to design and implement appropriate preventive interventions in schools.

Keywords: Major Depressive Disorder, Persistent Depressive Disorder, prevalence, school children

1. Introduction

Depression is considered by the WHO to be the leading cause of ill health and disability worldwide, and has increased by more than 18% between 2005 and 2015 (WHO, 2017). Empirical evidence shows that the onset of depression during adolescence is a risk factor of chronicity and can lead to functional impairment in both the short and long term. Currently, depression is recognized by some authors (Hankin, 2015) as a neurodevelopmental disorder which, although it has a modal onset of the first episodes (commonly in the middle to late adolescence), may begin much earlier. Several biological and environmental risk factors dynamically interact over time and confer risk for the increasing rates of depression in adolescence (Hankin, 2015). However, as in adults, many children and adolescents with depression are not referred to clinical services and do not receive treatment. In spite of this, among mental health problems, depressive disorders (DD) are considered to be the most severe and recurrent, and have both higher lifetime prevalence and morbid risk (Avenevoli et al., 2015; Coughlan et al., 2014; Frigerio et al., 2009; Kessler et al., 2012; Wittchen, 2012). Receiving adequate access to treatment services at an earlier stages of life would reduce the associated morbidity and risk of the disorder continuing into adulthood. For all these reasons, it is important to detect depression and provide estimates of the rates of this disorder in children and adolescents in population-based samples. Despite this, there are few epidemiological studies quantifying the prevalence and associated risk factors of depressive disorders in ages prone to greater risk, such as those in early adolescence.

More than a decade ago, Costello et al. published a meta-analysis for examining if there is currently an epidemic of child or adolescent depression based on concerns about empirical evidence (Costello et al., 2006). They did not find an increased prevalence of depression in children born between 1965 and 1996 when the epidemiological studies

used structured interviews to make formal diagnoses (DSM and ICD). The prevalence estimates for children under 13 years of age was 2.8% and 5.6% for teens between 13 and 18 years old. Recently, other authors in Canada raised the same concern and determined whether evidence supports an epidemic of Major Depression (MD) (Wiens et al., 2017). Their findings also did not support an epidemic from 2000 to 2014 in adolescents, but more individuals had reported diagnoses by a health professional. However, trends in 12-month prevalence of MD in US adolescents obtained from the National Surveys on Drug Use and Health between 2005 and 2014 showed a significant increase from 8.7% to 11.3% (Mojtabai et al., 2016). These trends in prevalence suggest that, in the context of the limited changes in mental health services, there may be a growing number of young people with untreated depression. Nonetheless, a fairly recent meta-analysis of the worldwide prevalence of mental disorders in children and adolescents found a prevalence for any DD similar to that of Costello et al. (2006), 2.6% (CI 95% 1.7-3-9) (Polanczyk et al., 2015). Their estimates did not vary in relation to the geographic location of the studies or year of data collection. In the US, the National Comorbidity Survey Replication Adolescent Supplement (NCS-A) found that the 12 month and 30-day prevalence of DD (including Major Depressive Disorder -MDD- and dysthymia) was 8.2% and 2.6% respectively. The studies were obtained using DSM-IV criteria and the Composite International Interview (CIDI) (Kessler et al., 2012; Merikangas et al., 2010) with a representative sample of adolescents aged from 13 to 18 years old. Specifically, for MDD, the NCS-A (Avenevoli et al., 2015) reported 11% and 7.5% for lifetime and 12-month prevalence, respectively, showing an increase in older ages and among females. The National Health and Nutrition Examination Survey (NHANES) from the Centers for Disease Control and Prevention examined the rates of mood disorders among children who are slightly younger than those in the

NCS-A, from 8 to 15 years old, and obtained a prevalence estimate of 3.7 %, which was higher among girls (4.9% vs 2.5%) and older children (4.8% for 12-15 year olds vs 2.8 for 8-11 year olds). In Europe, Coughlan et al. studied a representative sample of 212 Irish adolescents from 11 to 13 years old and found a MDD past month and lifetime prevalence of 1.3% and 6.8% respectively, and a dysthymia prevalence of 0.4% (Coughlan et al., 2014). In Turkish children from 6 to 14 years old, the prevalence rates of present MD and dysthymic disorder were 2.6% and 0.2% respectively, without significant differences between genders. In Latin America, the MDD 12-month prevalence was 3.4% for Chilean children aged 4 to 11 and 6.9% for adolescents aged 12 to 18, but dysthymia was almost inexistent (0.04% and 0.1%) (Vicente et al., 2012).

Most cases of MDD have been associated with psychiatric comorbidity (Avenevoli et al., 2015) and, is most frequently associated with anxiety and studied in the clinical population (Melton et al., 2016; Wolk et al., 2016; Zavaglia and Bergeron, 2017). Three distinct anxiety-depression pathways have been posited: one pathway that includes youths with a diathesis for anxiety which increases the risk of depression; a second pathway with a shared anxiety-depression diathesis; and a third pathway that includes diathesis for depression and consequent anxiety resulting from depression-related impairment (Cummings et al., 2014). While traditionally these pathways of comorbidity have been described depending on the specific anxiety disorder, recent evidence from epidemiological studies (Davies et al., 2016) supports the relationship between a previous Generalized Anxiety Disorder (GAD) and subsequent depression; however, no relationship was found between Social Phobia (SP) and later depressive disorders or between, Separation Anxiety Disorder (SAD) and later depressive disorders (Wolk et al., 2016). On the other hand, depression is a common comorbidity in children with Attention-Deficit/Hyperactivity Disorder (ADHD). While for most of these cases,

the depression may be explained subsequently by mechanisms such as emotion dysregulation and poor frustration tolerance (Seymour and Miller, 2017), other patients with comorbid diagnoses of MD and ADHD have an increased risk of conversion to bipolar disorder (Chen et al., 2015). In addition, a recent review suggests that comorbidity of depression with other psychiatric disorders may differ across clinical and community studies and also according to age and sex (Zavaglia and Bergeron, 2017). These authors have indicated the presence of high comorbidity rates between either anxiety or disruptive disorders and depression in adolescent girls.

The present study was conducted with the objective of determining the current (one-month) prevalence of depression in early adolescents from Spain and exploring whether there has been an increase in the last 20 years in the same age and city. Therefore, we present current prevalence data on depressive disorders (DSM-5 criteria) and the rate of depressive symptoms in early adolescence and compare this with the data from 1995 (Canals et al., 1995). We also provide the comorbidity rates and related sociodemographic factors.

2. Method

2.1. Study design

The present results were obtained from the *Children Depression and Anxiety Epidemiological Research Project* (DeprAns), carried out in Reus (a Spanish Mediterranean town of 100,000 habitants). This project was a two-phase epidemiological study aimed at determining the prevalence of emotional disorders in school children (Voltas et al., 2013). The study includes a screening procedure (1st phase) and an individual assessment (2nd phase) for the diagnoses. To select a representative sample of subjects, cluster sampling was conducted by randomly selecting a set of 13 schools (6 state-subsidized private schools and 7 state schools)

from a total of 26 schools from all five representative areas of the city (total population from the 4th, 5th, and 6th grades = 3225). The 13 school boards were then contacted and all agreed to participate. In the 1st phase, depressive, anxiety, and obsessive-compulsive symptoms were assessed in those children who provided written informed consent from their parents. Children who were at risk of any emotional disorder were asked to participate in the 2nd phase the following school year together with a sample of not-at-risk controls (paired by age, gender and school type). All parents received a report from their children and were phoned to gather additional information in case of possible diagnosis and recommend specialized care if necessary.

Data from the present study will be compared with previous results reported in 1995 by the same research group from school population of Reus (n=534; 311 males) (Canals et al 1995). The 1995 study assessed depressive disorders in children from 11 (girls) and 12 (boys) years of age over three consecutive years. Moreover, the influence of age, gender and pubertal stage have also been examined. The age difference of one year between genders was chosen in order to achieve a closer developmental equality. For the present study, we have compared data from 11-12 years. Figure 1 summarizes the design of both studies.

2.2. Participants

A total of 2,023 students from the 4th, 5th, and 6th grades of 13 primary schools of Reus were invited to participate, of which 1,514 students participated in the 1st phase (720 boys) (mean age of 10.2; *SD* = 1.2). The sample represents 46.9% of the total number of children between the 4th and 6th grades registered in all schools. Of the children that participated in the study, 39.5% belonged to families with a low socioeconomic status, 42.5% had a middle socioeconomic status, and 18% had a high socioeconomic status. 87.5% of the children that made up the sample were born in Spain, and 85.9% belonged

to a nuclear family. 562 students (175 at risk of depression) participated in the 2nd phase of the study, with a mean age of 11.3 (*SD* = 1.0). There were no significant differences between the risk and control group subjects for gender (χ^2 = .076, p = .782), birthplace (χ^2 = .075, p = .784), socioeconomic status (SES) (χ^2 = 4.837, p = .089), or age (t = .852, p = .536).

2.3. Instruments

The children answered the *Children's Depression Inventory* (CDI) (Kovacs, 1992) in the 1st and 2nd phases to assess whether they had depressive symptoms. The CDI is composed of 27 items scored in a 3-point Likert scale and has shown good reliability rates in the Spanish community (α = 0.81–0.85) (Figueras et al., 2010). A score of 17 is considered to be the best cut-off for detecting depressive symptoms in school children (Canals et al., 1995).

The *Mini-International Neuropsychiatric Interview for Kids* (MINI-Kid) (Sheehan et al., 2010, 1998) was applied in the 2nd phase to assess psychopathological diagnosis categories. The MINI-Kid is a structured interview for children aged between 6 and 17 years old based on DSM-IV and ICD-10 criteria for diagnosing 23 axis I disorders in a current episode. For this study, the depressive disorders and other disorders were diagnosed by adapting the information collected from this interview to DSM-5 criteria. The following categories were considered: MDD, Persistent Depressive Disorder (PDD), GAD, SAD, SP, Panic Disorder (PD) and agoraphobia, Obsessive Compulsive Disorder (OCD) and behavioral disorders such as ADHD, Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). The MINI-Kid has proven its reliability and criterion-referenced validity (Sheehan et al., 2010). The MINI-Kid was individually applied by a trained child psychiatrist and two trained clinical child psychologists, and

the agreement between their findings was almost perfect. The interviewers were blind to the screening test results.

The *Children's Global Assessment Scale* (CGAS) (Ezpeleta et al., 1999; Shaffer et al., 1983) is a tool applied by the interviewer, based on information from the diagnostic interview, which measures the global functional impairment of the subjects. The score ranges from 1 (maximum level of impairment) to 100 (normal level of functioning). Scores between 61 and 70 indicate difficulties in at least one area of the subject's life, and scores above 70 indicate normal adaptation. The researchers determined the CGAS score after the MINI-Kid had been applied.

Sociodemographic data were collected with a questionnaire designed for this study in which the children were asked about their parents' jobs, family structure, and place and date of birth. Parents also gave information about their jobs, regardless of the data given by the children. The family's socioeconomic level was estimated according to Hollingshead (Hollingshead, 2011).

2.4. Case definition of depressive disorders

In relation to MDD, MINI-Kid only assess A criteria (clinical symptoms) of the DSM-IV MD Episode. Taking into account DSM-5 criteria, we considered that a MDD was present when the subject: 1) met the criteria for the current MD Episode from Mini-Kid, 2) had a CGAS score lower than 70, which corresponds to the interference criteria, 3) did not meet the criteria for substance abuse, psychotic disorders, nor current and past (hypo)maniac episodes.

In relation to PDD, MINI-Kid assess Dysthymia A (duration of symptoms), B (clinical symptoms) and C (interference) DSM-IV criteria. We considered that a DSM-5 PDD was present when the subject: 1) met the criteria for the MINI-Kid Dysthymic Disorder

and 2) did not meet the criteria for substance abuse, psychotic disorders and did not have any history of current or past hypo/maniac episode.

Although MINI-Kid was applied without the parents being present we obtained additional information from the parents via telephone and through psychopathological testing (Children Symptom Inventory-4 (Gadow and Sprafkin, 1998)) .

2.5. Statistical analysis

Statistical analyses were performed with IBM SPSS 23 and EPIDAT 4.1.

Descriptive statistics were used to provide mean scores or frequencies of the children's demographic and psychological characteristics.

The prevalence of MD and PDD was estimated by weighting the cases that emerged in the control group. Logistic regression analysis using a stepwise method was performed to assess sociodemographic factors related to depressive symptoms, MDD and PDD. The candidate variables that were entered in the models were: gender (1: boys; 2: girls), age (years), family type (1: nuclear; 2: single parent), place of birth (1: Spain; 2: outside Spain), and family socioeconomic status. Logistic regressions were also performed to study the risk of having other psychopathological diagnostics if a DD was present.

3. Results

3.1. Prevalence rates of depressive disorders and depressive symptoms; severity level and sociodemographic related factors

Table 1 shows the rate of depressive symptoms and the MDD and PDD estimated (weighted) prevalence of the present study considering gender differences. The estimated current prevalence of MDD was 1.6% (95% CI: 0.9-2.2) without significant differences between genders [1.3% (95% CI: 0.5-2.1) in girls and 1.8% (95% CI: 0.8-2.8) in boys; X^2= 1.02, p=0.472]. The current weighted prevalence of PDD was 2.9%

(95% CI: 2.1-3.8) in the total sample, 3.3% (95% CI: 2.1-4.6) in girls and 2.5% (95% CI: 1.4-3.6) in boys. No significant differences were found between genders for PDD (X^2= 0.186, p=0.666). Taking into account both two diagnoses (MDD or PDD), the total prevalence of DD was 3.4% (95% CI: 2.5-4.3); 3.6% (95% CI: 2.3-4.9) in girls and 3.2% (95% CI: 1.9-4.5) in boys. 40.6% of the children diagnosed with PDD were also diagnosed with MDD (clinical concept of double depression). The prevalence of depressive symptoms in the 1st phase (n= 1514) was 11.6% (95% CI: 10.0-13.3), without significant differences (X^2= 0.0762, p=0.782) between girls (11.8%) and boys (11.3%). Of these cases, 37.4% (95% IC: 29.8–45.7) also had depressive symptoms in the second phase. We compare the current data with the previous prevalence from 20 years ago found in the same geographical area and similar age-group. As Table 1 shows, the previous prevalence of depressive symptoms was lower (9.4%; 95% CI: 6.8-11.8) but is not significantly different from the prevalence found in the present study. The prevalence of MD was not significantly different between the two periods (1.6% versus 1.5%). In relation to gender, although there were no significant differences in or between either of the studies, the current prevalence of MD tended to be lower in girls and higher in boys. The prevalence of PDD was higher than that of dysthymia (2.9% versus 0.9; p=0.002), and in both studies the prevalence of PDD/dysthymia tended to be higher among girls.

The CGAS score was used to assess the interference that the diagnoses caused in the children's lives. Of the subjects with MDD and PDD, 100% and 90.6%, respectively, showed serious difficulties in at least one area of their life according to the CGAS score. In fact, the mean CGAS score of subjects diagnosed with MDD was 56.5 (SD: 7.5), and for subjects diagnosed with PDD it was 63.4 (SD: 10.0). For the children with double depression, the mean CGAS score was 56.9 (SD: 7.5).

We found that 35% and 46.9% of the participants diagnosed with MDD and PDD, respectively, had sought professional mental health help.

Logistic regression analyses were performed to assess sociodemographic factors related to depressive symptoms, MDD, and PDD. None of the variables included (gender, age, family type, place of birth or family socioeconomic status) were related to MDD or PDD; however, to belong to a single parent family (OR: 2.7; IC 95%: 1.9-3.9) and to be born out of Spain (OR: 1.7; 95% IC: 1.1 – 3.9) increased the risk of having depressive symptoms by 2.7 and 1.7 times, respectively (r_2 Nagelkerke * 100= 4.1; p=0.001).

3.2. Comorbidity of Major and Persistent Depressive Disorder

Table 2 shows the comorbidity rates of MDD and PDD with DSM-5 anxiety disorders (AD), OCD and behavioral disorders (ADHD, ODD, CD) and assesses the risk of having any of these disorders in the presence of a MDD or PDD diagnosis.

Of the children diagnosed with MDD and PDD, 80% (58.4% - 91.9%) and 71.9% (58.4% - 91.9%) respectively have an AD. At the risk probability level, having MDD implies a 14.2 times greater risk of having an AD. The most comorbid AD diagnosis was GAD, which is present in 65% (IC 95%: 43.3%-81.9) of the MDD cases and in 46.9 % (IC 95%: 30.9%-63.6%) of the PDD cases. The second most comorbid diagnosis was a behavioral disorder, ODD, which was present in 45% (IC 95%: 25.8%-65.8%) and 37.5 % (IC 95%: 22.9%-54.6%) of the MDD and PDD cases respectively. However, the risk of having OCD is the highest (OR: 21.9; IC 95%: 7.5-63.8) if a MDD was present, followed by a GAD (OR: 13.4; IC 95%: 5.2-34.7). Considering gender, the logistic regression models showed that being female (OR: 1.5; IC 95%: 1.0-2.3) significantly increased the probability of having a MDD and an AD (OR: 15.22; IC 95%: 4.9-46.7). In relation to PDD, being male significantly increased the probability of also having ODD (OR: 8.2; IC 95%: 3.6-18.2).

The mean CGAS score when MDD was comorbid with an AD was 55.6 (SD: 7.2). The comorbidity with most dysfunctionality according to the CGAS score was agoraphobia (50, SD: 0), followed by panic disorder (52.5, SD: 5.0) and OCD (52.8, SD: 4.8). The mean CGAS score when PDD was comorbid with any AD was slightly lower (60.8, SD: 9.4) than for PDD without considering comorbidity. For PDD, the comorbid disorder that led to the highest dysfunctionality was OCD (CGAS mean: 53.3, SD: 5.1).

4. Discussion

This study reports data on the current prevalence estimates of depressive disorders in Spanish early adolescents, as well as comorbidity and associated sociodemographic factors. The data can be compared with previous data obtained 20 years ago for the same age group and population (Canals et al., 1995). We found a MD prevalence of 1.6% (95% IC 0.9-2.2) (mean age of 11.3), which agrees with 1.5% found at the age of 11-12 in the preceding study. Thus, the results do not support an increase in the prevalence of MD in Spanish school children. This report coincides with the one conducted by Costello et al. (Costello et al., 2006) in a 30-year period based on the review and meta-analysis of epidemiological studies. However, our data contrast with the increase in MD found by Mojtabai et al. for 2005 to 2014 (Mojtabai et al., 2016). These differences may be due to several factors: first, our data does not reach 2014; second, the sample of the present study is of younger adolescents than those in the National Surveys on Drug Use and Health (aged 12 to 17) (Mojtabai et al., 2016); third, they included a large national sample; and fourth, sociocultural factors should be taken into account for the different populations. Wiens et al. also did not find data supporting an epidemic of MD or changes in the trends according to sex or age from 2000 to 2014 in Canadian adolescents (Wiens et al., 2017).

We found higher rates of depressive symptoms (11.6%) than in the preceding study (9.4%) (Canals et al., 1995). In females, the present data (11.8%) are similar to the data previously found 12 and 13 years of age (11.2% and 11.1%, respectively). However, our rates are lower than those reported in older Greek adolescents (17.43 %) (Magklara et al., 2015) and also lower than rates reported by Wang et al. in western China, in which the CDI (with a cut-off point of 19 and not of 17 as in our study) found 19.8% depressive symptoms between the ages of 10 and 12 (Wang et al., 2016). We did not find gender differences, but other studies in different countries (Larsson et al., 2016; McLaughlin and King, 2014; Wang et al., 2016) have shown a positive relationship in girls between age and depressive symptoms, from 13 years. This age coincides with puberty in females and may explain the change in the female/male ratio both for depressive symptoms and disorders (Breslau et al., 2017; Rutter, 2003; Sequeira et al., 2017). In our previous study, the prevalence of MD was significantly higher in females than in 13-year-old males. This change of ratio between gender in relation to the current study may have several explanations. On the one hand, MDD in females could emerge later in view of the higher figures of current dysthymia, which could be a precursor factor. On the other hand, it can be interpreted as a current increase of depression in males.

Otherwise, the current annual persistence rate of depressive symptoms (37.4%) is very similar to previous data presented for the same age group (40.7%) (Canals et al., 1995), which supports the chronic course of depressive symptomatology.

When we compare the rates of MD found in the present study with the current prevalence of other populations according to both standardized criteria (DSM-IV and DSM-IV-R) and methods, our data (1.6%) are similar to those reported by Coughlan et al. in Irish adolescents aged 11-13 years (1.3%) (Coughlan et al., 2014). However they

are lower than the 2.6% found by Ercan et al. in Turkish school-age children and the 2.8% reported in the USA NHANES study for children between the ages of 8 and 11 (Ercan et al., 2016). A much lower current prevalence (0.44%) was found earlier by Ford et al. in Great Britain for a population of 11-12 year olds (Ford et al., 2003). So far, no data on DSM-5 prevalence of MD have been provided as we have done here in the present study. However, the new DSM criteria cannot explain prevalence differences because they do not affect the clinical manifestations between MD episodes (DSM-IV-TR) and MDD (DSM-5). On the other hand, although different structured clinical interviews have been used in several studies, Costello et al. did not find any effect on the depression epidemiology in relation to the interview used (Costello et al., 2006). In older adolescents, the USA NCS-A (Kessler et al., 2012) indicated a current prevalence of depression (including MDD and dysthymia) of 2.6%, but other studies have reported a higher prevalence of MD episodes; for example, 4.2% was found in Holland (Cuijpers and Smit, 2008), 5.7% in Greece (ICD-10 criteria) (Magklara et al., 2015) and 6.7%, in a more recent nation-wide US study. Most studies find that the median age of onset for mood disorders is between 13-14 years old and that under the age of 13 prevalence is lower and gender has no effect (Canals et al., 1995; Costello et al., 2006; Merikangas et al., 2010; Ormel et al., 2015; Sequeira et al., 2017), which is consistent with the data of our study in early adolescents (mean age of 11.3). We did not find gender differences, and there is even a trend towards a higher prevalence in males (1.8%) with respect to females (1.3%), which has been traditionally described in pre-pubescents (Anderson et al., 1987; Rutter, 2003). Our PDD rates are higher than those found previously in the same city (Canals et al., 1995) and in other studies (Coughlan et al., 2014; Ercan et al., 2016; Vicente et al., 2012). These studies found prevalence lower than 1%. The difference with our earlier study may be because the prospective design of

the current study meant that dysthymia was diagnosed if symptoms had been present for one consecutive year. Moreover, the current study is the first, to date, to provide results in schoolchildren in accordance with DSM-5 criteria. However, the information collected from the MINI-Kid interview did not allow us to obtain data on the presence of major depressive episodes in at least the 2 previous years to be able to offer this specificity in the PDD. On the other hand, like Kessler et al. in adults (Kessler et al., 2005), we found that a considerable percentage of children had double depression (diagnosis of PDD and MDD).

In the present sample, 35% of the participants diagnosed with MDD had sought professional help. This rate is low, but similar to percentages found by other authors in samples of adolescents with emotional problems or other psychological difficulties (Corry and Leavey, 2017; Hintzpeter et al., 2015). However, for PDD, the rate of seeking professional help increased up to 46.9%. This increase is probably due to the greater chronicity of PDD compared to MDD. We could not determine for either of these disorders whether the search for professional help was specific for this disorder or was related to the associated problems.

In our study, low SES was not a related factor for depression. This result contrasts with the increased prevalence of both depression and depressive symptoms for Greek adolescents in families with financial difficulties (Magklara et al., 2015). However, some studies suggest that this factor may increase the risk of later depressive symptoms when children live in low SES environments from early stages (Joinson et al., 2017), and this relationship could be explained by epigenetic factors (Uddin et al., 2017). Other authors have found that conditions such as poor physical health, school performance, and self-confidence might be important mediators in the pathways of low family SES leading to depressive symptoms (Zhou et al., 2018). Otherwise, consistent with Wang et

al., belonging to a single parent family has been related to the presence of depressive symptoms (Wang et al., 2016). These data should be considered in prevention programs.

The highest comorbidity was found for AD, supporting the association most frequently found in the clinical (Peris et al., 2017; Wolk et al., 2016; Zavaglia and Bergeron, 2017) and non-clinical population (Magklara et al., 2015). This comorbidity has been found to be significantly more probable for females, and we agree with Melton et al. that this implies greater severity, as evidenced by the CGAS scores (Melton et al., 2016). Within AD, the GAD was the most comorbid disorder and this is consistent with conceptual pathway 2 in Cumming et al., which supports the simultaneity of GAD and depression from a shared diathesis (Cummings et al., 2014). In the present study, the greatest likelihood of comorbidity was for MDD and OCD, surpassing the six-fold likelihood reported by Peris et al. in adolescents with OCD (Peris et al., 2017). This high association supports data in Bolhuis et al. that showed that OCD and depressive symptoms co-occur primarily due to shared genetic factors (Bolhuis et al., 2014). In relation to the comorbidity depression-ADHD, although several studies with children with ADHD report high rates (12-50%) (Seymour and Miller, 2017), the probability of having ADHD in the adolescents with DD of our study is low. In the present study, depression is not related subsequently to impairment, environmental adversities, or family factors that may contribute to the increased risk of depressive disorders in patients with ADHD (Kita and Inoue, 2017); however, the co-occurrence found between DD and ADHD could be due to the association of the latter with ODD, OCD and AD (Masi and Gignac, 2017), which are frequently comorbid with depression. However, as other authors have found (Boylan et al., 2007), ODD showed a substantial comorbidity with depressive disorders. This relationship has been found to be significant for males

with ODD, a disorder possibly occurring in early life and with depression as a sequential comorbid disorder. Therefore, the externalizing psychopathology is also associated with the development of unipolar depressive disorders in adulthood (Loth et al., 2014).

Our study has several limitations. First, our data does not correspond to a multicenter study nor does it provide the Spanish national prevalence. Second, although we have data on depressive symptoms taken at a one-year follow-up, the depression diagnoses were made in one year and we do not have longitudinal data. Third, the previous data on DD were obtained from different interview (Children's Depression Rating Scale-Revised (Poznanski et al., 1985)) and diagnostic criteria (DSM-III-R) than that in the current study. However, the strengths of the study coincide in both studies and include a two-phase design. Additionally, the information on depressive manifestations has been collected from the child, who is the best informant of emotional disorders. This aspect could have been improved if the family had been present at the interview as they could have provided additional information on some symptoms such as temporary criteria or previous episodes. Also, the fact that the parents were not present in the MINI-Kid could have influenced the lower comorbidity with ADHD and externalizing disorders. Despite these limitations, our study provides epidemiological data on depression in Spanish early adolescents, and the current prevalence has been compared to that previously referred for school children of the same territorial area obtained 20 years ago. We have not found an increase in depression; although the prevalence of PDD is higher than that found in our previous study or by other authors. The prevalence of MD coincides with previous data and is within the range reported by other authors for the same age range in several countries. The high rates of comorbidity and low CGAS

scores suggest the severity of the DD in school children and highlights the importance of detecting and treating these disorders in children.

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Fig 1

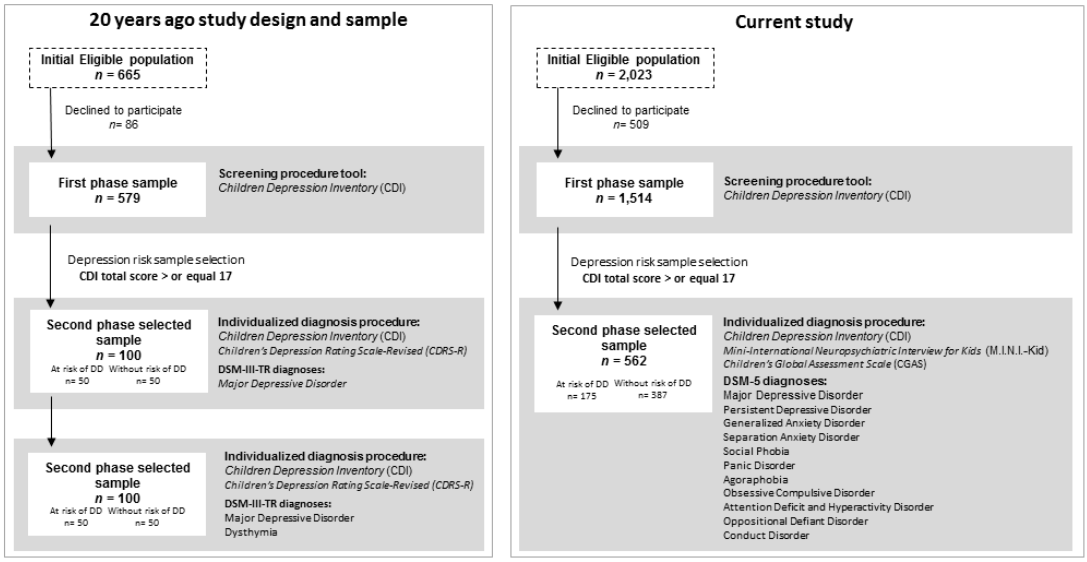

Table 1. Current prevalence (95% confidence interval) of Depressive Symptoms, Major Depressive Disorder and Persistent Depressive Disorder by gender: Comparison with data obtained in the same city 20 years ago

	Current study			**Previous study**		
	Total % (95% CI)	**Girls** % (95% CI)	**Boys** % (95% CI)	**Total** % (95% CI)	**Girls** % (95% CI)	**Boys** % (95% CI)
Depressive Symptoms	11.6 (10.0-13.3)	11.8 (9.6-14.3)	11.3 (9.3-13.7)	9.4 (6.8-11.8)	9,8 (5.9-13.7)	9.0 (5.8-12.1)
Major Depressive Disorder	1.6 (0.9-2.2)	1.3 (0.5-2.1)	1.8 (0.8-2.8)	1,5 (0.4-2.5)	2.2 (0.2-4.1)	0.9 (0.0-1.9)
Persistent Depressive Disorder	2.9 (2.1-3.8)	3.3 (2.1-4.6)	2.5 (1.4-3.6)	0.9 (0.0-1.8)	1.3 (0.0-2.7)	0.6 (0.0-1.4)

CI: confidence interval

Table 2. Comorbidity of Major Depressive Disorder and Persistent Depressive Disorder and risk of having psychopathological disorders in the presence of depressive disorders

	Major Depressive Disorder		**Persistent Depressive Disorder**	
	% (95% CI)	OR (95% CI)	% (95% CI)	OR (95% CI)
Any Anxiety Disorder	80 (58.4-91.9)	14.2*** (4.7 –43.2)	71.9 (54.6-84.4)	9.5*** (4.3 –21.1)
Generalized Anxiety Disorder	65 (43.3-81.9)	13.4*** (5.2 – 34.7)	46.9 (30.9-63.6)	6.4*** (3.1 – 13.5)
Separation Anxiety Disorder	25 (11.2-46.9)	4.7** (1.6 – 13.6)	31.3 (17.9-48.6)	7.3*** (3.2 – 16.8)
Social Phobia	30 (14.5-51.9)	5.4*** (2.0 – 14.7)	18.8 (8.8-35.3)	2.8* (1.1 – 7.3)
Panic Disorder	20 (8.1-41.6)	9.4*** (2.8 – 31.8)	18.8 (8.8-35.3)	9.9*** (3.5 –28.6)
Agoraphobia	10 (2.8-30.1)	4.9* (1.2 – 23.5)	6.3 (1.7-20.1)	2.9 (0.6 – 13.5)
Obsessive Compulsive Disorder	35 (18.1-56.7)	21.9*** (7.5 – 63.8)	18.8 (8.8-35.3)	8.5*** (3.0 –23.9)
Attention Deficit Hyperactivity Disorder	15 (5.2-36.0)	1.6 (0.4 – 5.5)	18.8 (8.8-35.3)	2.1 (0.8-5.4)
Oppositional Defiant Disorder	45 (25.8-65.8)	9.7*** (3.8-24.8)	37.5 (22.9-54.6)	7.5*** (3.4-16.6)
Conduct Disorder	10 (2.8-30.1)	9.9* (1.9-52.6)	6.3 (1.7-20.1)	5.8* (1.1-30.0)

CI: confidence interval; OR: Odds Ratio
*p < .05; **p <.01; *** p < .001