Prevalence and Correlates of Mental Disorders in a School-Survey Sample

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Abstract:

Background: Most of the adult mental disorders have their origins early in life. As the epidemiology of childhood psychiatric disorder in Italy has not been extensively investigated, we have evaluated the prevalence of mental disorders and their association with socio-familiar variables in a representative sample of children aged 6 to 11.

Method: The study was conducted on a school-sample of 1028 children, aged 6 to 11, attending 12 primary schools in Florence (Italy). The diagnoses were made according to DSM IV diagnostic criteria, integrated by the description of each symptom, using specially trained teachers as lay-interviewers. Odds ratios with 95% C.I. chi squares and a stepwise binary logistic analysis have been performed.

Results: Nine hundred ninety nine children (506 males; 493 females) were studied. Of them, 10.5% received a psychiatric diagnosis, with a higher prevalence in males (66.7% vs.33.3, p<0.01). The most prevalent groups of mental disorders were the behavioural/impulse control (7.2%) and anxiety (6.4%) disorders. Attention Deficit with Hyperactivity Disorder was the most represented diagnosis (5.6% of the children). All the other mental disorders were relatively rare, with only separation anxiety and overanxious disorder exceeding 1% prevalence.

Male gender, organic disease, having mother divorced, not present or dead, attending school full-time, cohabitation in the family were associated with an increased risk for any childhood mental disorder.

Conclusions: About one in ten children aged 6-11 suffers from a mental disorder. Male gender, loss of mother and lower socio-economic status are associated with mental disorders in children. Further long-term prospective studies are needed, in order to clarify the epidemiological and psychopathological relationships between childhood and adult mental disorders.

Keywords: Childhood, epidemiology, mental disorder, risk factor.

BACKGROUND

Most of the mental disorders of adulthood have their origins early in life.

Although the disorders typical of childhood tend to recur during adulthood and are associated with substantial difficulties in later life [1], the epidemiology of childhood psychiatric disorder has not been extensively investigated to date [2-6].

Epidemiological studies on children psychopathology show different methodological difficulties. Parents, teachers, and paediatricians can be used as informant [7], but different informants will often disagree [2, 8-10], as parents are too involved and poorly objective [11], while teachers use different parameters [12-15], basically making comparisons with children of similar ages [16-17].

Accordingly, psychiatric disorders in children aged between 1 and 9 have been reported with prevalence rates ranging from 0.1% to 26.4% [5, 18], with remarkable differences between countries [19], independently of the different regions of the world, socio-economic development, and other structural correlates [5].

Most of the childhood-onset disorders show a higher rates of males than females, with a median sex ratio (boys-girls) of 1.6:1 [6, 18, 20-23], and such differences are mainly due to the higher frequency of behavioral disorders in boys [18, 23].

Considering the prevalence rates, Attention Deficit with Hyperactivity Disorder (ADHD) is one of the most prevalent disorder observed in childhood and adolescence, with little differences between countries [24-26]. Anxiety disorders are also common [27-29], with rates of 0.1%-13.3% in boys and 0.4%-28.6% in girls [28]. The most prevalent anxiety disorders are overanxious disorder (0.16%-11.1%) and separation anxiety disorder (0.5%-20.2%), which are specific of childhood [28, 29], whereas specific/simple phobia and social anxiety are both reported with less than 1% prevalence [29, 30].

The prevalence of depressive disorders in prepubertal children is around 1% - 2% [31, 32].

About 1% of children aged 3 to 10 suffer from Intellectual Disability (ID), which is the most common developmen-
tal disorder [33, 34], 0.3-0.5% have an Autism Spectrum Disorder (ASD) [35-37], and 2%- 8% of children suffer from Learning Disabilities (LD), such as speech and language problems, dysgraphia, or dyslexia [38].

Finally, the prevalence of nocturnal enuresis in a school-children is estimated of 13%, with two thirds classified as suffering from primary enuresis [39, 40].

As, to our knowledge, no studies on the prevalence of mental disorders in children have been conducted in Italy to date, a representative sample of children attending primary school in Florence, Italy, were studied.

Teachers specially trained made the observations/diagnoses with the supervision of qualified psychiatrists.

METHODS

The study was conducted on a school-survey sample of 1028 children aged between 6 and 11, attending primary school in the urban area of Florence, Italy.

According to the local regulation, during the primary phase of the compulsory education, children must attend a school located in the same geographic area of their residence. In order to obtain a representative sample of the Florentine children population, 2 primary public schools were selected for each of the 6 districts of the city of Florence. For each school, the number of classes to be examined depended on the population density of the corresponding area. The choice of the classes to be surveyed in each school relied basically on the availability of the teachers. In the present study there were 40 voluntary teachers, 40 classes, totalling 1028 school children. All these children were registered with the local education authority, and the sample closely matched the socioeconomic status of the city of Florence.

After the protocol was approved by the Department of Education of Florence, the study was proposed to the school directors, to the teachers, and finally to the parents. The study was proposed to 44 teachers, and 40 of them accepted to participate. The parents of 29 children refused to provide their consent, so that the final sample consisted of 999 school children, 506 boys and 493 girls, whose parents gave their written informed consent to participate in the study.

Teachers were chosen as lay-interviewers, as they spend much time with children, may observe them in their social context, and should be more objective than the parents [12]. Children in fact share a long time with teachers in their own daily social context, during the first cycle of compulsory education (by the age of 6 to 11 years old).

According to the Italian public school regulations, children had the opportunity to chose between “full-time” (about 8 hours a day, having lunch at school, five days per week), and “regular time” (about 5 hours a day, six days per week); in any case the same teacher was responsible of about 25 children during all the time.

The diagnoses were obtained by means an integration of the DSM IV [41] diagnostic algorithms, and the full description of each symptom (observation of children behaviour, interactions with teachers and peers).

Teachers received a specific and intensive training aimed at recognizing childhood symptoms, with a program that included video training and role play, including clinical scenarios. At the end of the training period, the inter-rater reliability was compared both between different teachers, and between teachers and fully qualified psychiatrists, and was found satisfying (Kappa ranging from 0.83 to 0.97 for the various DSM IV diagnoses). The same procedure was repeated throughout the data collection, with approximately 20% of the accounts from the teachers’ interviews reviewed, and compared with the diagnoses blindly given by a senior psychiatrist.

Most of DSM IV childhood disorders, overanxious disorder and phobias were considered and categorized into three major groups, as previously suggested [4-5, 42, 43]:

1. Behavioural/Impulse Control Disorders: attention-deficit hyperactivity disorder (ADHD), conduct disorder (CD), aggressiveness;
2. Anxiety Disorders: overanxious disorder, separation anxiety, phobias, sensitiveness, lack of self-confidence, avoidance;
3. Neurological Disorders: intellectual disability (ID), autism, stutter, enuresis, language disorders (LD), dyslexia, dysgraphia.

Major depression was also explored.

Lack of self-confidence, sensitiveness, aggressiveness, family, social, and overall functioning were also assessed.

Interviewers did not take into account disorders with expected low prevalence, such as psychotic disorders, substance abuse disorders, gender identity disorder, or childhood-onset bipolar disorder [5, 44, 45], and those disorders which were considered difficult to investigate by teachers (like elective mutism, reactive attachment disorder of infancy or early childhood and stereotypy/habit disorder). Moreover, eating disorders were not investigated because children eating behaviours during breakfast and dinner could not be observed in the school, and during lunch time teachers did not have meal together with the children.

The observation period ranged through the entire scholastic year.

Prevalence figures are reported with 95% confidence limits. Odds ratios with 95% C.I. and chi squares are used for comparisons between groups A stepwise binary logistic analysis with the risk of meeting any psychiatric disorder as dependent variable.

RESULTS

999 children (506 males, 50.6%; 493 females, 49.4%) aged from 6 to 11, attending 12 primary schools of the Municipality of Florence, Central Italy, were investigated; the mean age was 8.88 ± SD 1.33 years (range 6 to 11).

One hundred and four children (10.5%) were reported to have a psychiatric disorder, with a higher prevalence in males (66.7% vs.33.3, p<0.01). This gender difference was mainly due to the high prevalence of the behavioural/impulse control disorders group (7.2% of the sample, 72.2% males), whereas among the anxiety disorders group (6.4% of the sample) the male/female ratio was about 1 (Table I).
Attention-deficit hyperactivity disorder (ADHD) was the most common disorder (5.6% of the whole sample), with a significant higher prevalence in males (69.6% vs. 30.4%, OR = 2.3, CI 95%; 1.3-4.2). All the other psychiatric disorders had prevalence rates < 1%, with the only exceptions of conduct disorder, separation anxiety and overanxious disorder.

Gender, organic diseases, attending school full-time, having a learning support teacher, parents’ marital status, presence of other cohabitants in the familiar context were associated with a higher risk of suffering from any mental disorder (Table 2).

More specifically, among diagnostic groups, the absence of mother was associated with behavioural disorders, whereas the absence of father resulted as risk factor for both behavioural and anxiety disorders. The co-occurrence of organic diseases during the early childhood was associated with all the diagnostic groups. Attending the school full time (as opposed to half a day) was also associated with behavioural and neurological disorders (Table 3).

A binary logistic regression with having a psychiatric disorder as dependent variable (Table 4), confirmed that gender, organic diseases and having mother divorced, not present, or dead were independently and significantly associated with the presence of a mental disorder.

**DISCUSSION AND CONCLUSIONS**

The epidemiology of childhood psychiatric disorders is scarcely investigated, due to the methodological difficulties of assessing mental disorders in children [12]. There are few methods for the assessment of mental status in children [12], since the information provided by children are considered unreliable [17, 46]. In fact, children have poor insight, they often demonstrated a limited ability to recognize and be self-aware of their emotional and cognitive states, and have obvious difficulties to articulate and verbalize their feelings [47].

Furthermore, while parents, teachers, and paediatricians all serve as “gatekeepers” to the diagnosis [7], different informants will disagree about the real mental problem of the child [2, 8-10, 48]. Specifically, even if parents are usually the most important sources of information, as they are familiar with the child’s behaviour across time and in many situations, they are too emotionally involved, so that they can
Table 2. Socio-Familiar Variables and their Association with any Diagnosis

|                                | Frequency in the Total Sample | Frequency in Children Affected by any Psychiatric Disorder | OR (95% CI) |
|--------------------------------|-------------------------------|----------------------------------------------------------|-------------|
| **Gender**                     |                               |                                                          |             |
| Male                           | 50.7%                         | 66.7%                                                    | 2.1* (1.4-3.2) |
| Female                         | 49.3%                         | 33.3%                                                    |             |
| **Organic disease**            | 4.7%                          | 14.3%                                                    | 4.5 (2.3-8.6) |
| **Attending school full-time** | 61.8%                         | 73.3%                                                    | 1.8 (1.1-2.8) |
| **Learning support teacher**   | 2.5%                          | 13.3%                                                    | 12.3 (5.4-28.0) |
| **First-born**                 | 57.8%                         | 54.3%                                                    | 1.2 (0.8-1.7) |
| Presence of at least one brother/sister | 69%                           |                                                          |             |
| 1                              | 54.5%                         | 69.5%                                                    | 1.0 (0.6-1.6) |
| 2                              | 12.4%                         |                                                          |             |
| 3-5                            | 2.9%                          |                                                          |             |
| **Father marital status**      |                               |                                                          |             |
| Married                        | 93.4%                         | 19.0%                                                    | 4.3 (2.4-7.6) |
| Divorced, not present, or dead | 6.6%                          |                                                          |             |
| **Mother marital status**      |                               |                                                          |             |
| Married                        | 98.8%                         | 5.7%                                                     | 8.9 (2.8-28.3) |
| Divorced, not present, or dead | 1.2%                          |                                                          |             |
| **Father’s occupation**        |                               |                                                          |             |
| Employee                       | 34.2%                         | 49.5%                                                    |             |
| Self-employed                  | 33.3%                         | 32.4%                                                    |             |
| Workman                        | 16.4%                         | 13.3%                                                    |             |
| Teacher                        | 4.8%                          | 5.7%                                                     |             |
| Unemployed                     | 0.6%                          | 1.0%                                                     |             |
| **Mother’s occupation**        |                               |                                                          |             |
| Employee                       | 32.5%                         | 34.3%                                                    |             |
| Self-employed                  | 16.2%                         | 21.0%                                                    |             |
| Workman                        | 5.6%                          | 4.8%                                                     |             |
| Teacher                        | 8.7%                          | 5.7%                                                     |             |
| Housewife                      | 29.8%                         | 25.7%                                                    |             |
| **Nr of components of familiar nucleus** |                   |                                                          |             |
| ≤2                             | 27.4%                         | 72.4%                                                    | 0.9** (0.6-1.5) |
| >2                             | 72.6%                         |                                                          |             |
| **Presence of other cohabitants** | 12.6%                        | 22.9%                                                    | 2.3 (1.4-3.8) |

*: the OR is calculated as male/female.
**: the OR is calculated as ≤2/>2

be poorly objective and tend to value the symptoms with greater severity [11]. On the other hand, teachers are more likely than parents to notice emotional problems and describe social and learning problems in children [49]. This is due to the daily relationship between teachers and students, that allow to observe different behaviours outside of the home setting, witness children in situations that provoke strong reactions and that expose them to multiple peers, and make accurate comparisons with children of similar ages [16, 17]. For these reasons, teachers are usually better at identifying children with behavioural problems than children with emotional problems [11, 16, 17]. Nonetheless,
Table 3. Correlations Between Different Variables and Groups of Disorders

|                               | Behavioral Disorders | Anxiety Disorders | Neurological Disorders |
|-------------------------------|----------------------|-------------------|------------------------|
|                               | OR (95% CI)          | OR (95% CI)       | OR (95% CI)            |
| Gender                        |                      |                   |                        |
| 72.2% male                    | 2.7* (1.6-4.6)       | 51.6% male        | 61.9% male             |
| 27.8% female                  |                      | 48.4% female      | 38.1% female           |
| Mother divorced, not present, or dead | 5.6% (1.9-23.0)     | 3.1% (0.6-13.9)   | -                      |
| Father divorced, not present, or dead | 16.7% (1.6-6.4)     | 17.2% (1.6-6.7)   | 23.8% (2.3-10.7)       |
| Other cohabitants             | 16.7% (0.7-2.7)     | 17.2% (1.6-7.3)   | 21.4% (0.9-4.2)        |
| Organic disease               | 11.1% (1.3-6.3)     | 12.5% (1.5-7.3)   | 16.7% (1.9-10.9)       |
| Attending school full-time    | 75.0% (1.1-3.4)     | 60.9% (1.1-3.4)   | 76.2% (1.9-4.2)        |
| Learning support teacher      | 5.6% (0.8-7.6)      | 6.3% (0.9-8.7)    | 19% (5.2-32.2)         |

*: the OR is calculated as male/female.

Table 4. Determinant of Mental Disorders in Childhood at Multivariate Analysis (Binary Logistic Regression)

|                               | Presence of Any Psychiatric Diagnosis |
|-------------------------------|--------------------------------------|
|                               | B | p | OR (95% CI) |
| Step 1                        |   |   |             |
| Gender                        | 0.71 | 0.001 | 2.03 (1.33-3.11) |
| Age                           | -0.034 | 0.955 | 0.97 (0.83-1.12) |
| Step 2                        |   |   |             |
| Gender                        | 0.61 | 0.011 | 1.84 (1.14-2.95) |
| Age                           | 0.07 | 0.37 | 1.07 (0.91-1.27) |
| Attending school full-time    | -0.445 | 0.114 | 0.65 (0.38-1.07) |
| Father divorced, not present, or dead | 0.570 | 0.16 | 1.99 (0.92-4.33) |
| Mother divorced, not present, or dead | 1.504 | 0.041 | 5.84 (1.48-22.99) |
| Other cohabitants             | 0.493 | 0.13 |             |
| Presence of at least one brother/sister | 0.123 | 0.60 | 1.13 (0.71-1.80) |
| Father occupation             | -0.179 | 0.19 | 0.83 (0.63-1.09) |
| Mother occupation             | 0.031 | 0.80 | 1.03 (0.80-1.32) |
| Organic disease               | 1.055 | 0.007 | 2.87 (1.33-6.26) |
| Special school-assistance     | 0.884 | 0.068 | 2.42 (0.93-6.26) |

Statistics: Stepwise Logistic Regression: effect of the socio-demographic characteristics on diagnosis, coded as dummy variables (presence of diagnosis: 1, absence: 0).
teachers are able to notice different aspects of the children and can use different parameters and methods to observe them [12-15].

In spite of our intensive training of the teachers with a program that included video training, role play and supervision of interviewers and the use of specific instructions and decision trees, as recommended and extensively used [1, 7, 47, 50-52], we are aware that children have been evaluated by one of the possible different viewpoints. This could mean that, while the abnormal behaviours are more likely to have been properly assessed, the detection of emotional problems could have caused more difficulties. This could be one of the reasons why the prevalence of behavioural disorders in our study is consistent with the literature, while that of emotional disorders is lower.

Our data about prevalence of psychiatric disorders in childhood generally confirm those reported in the literature [1, 6, 18, 20-26, 44, 53]. Prevalence of psychiatric disorders is 10.5%, with a male/female ratio of 2, due to the higher frequency of behavioural disorders in boys. Furthermore, ADHD is the most frequent diagnosis in our sample (5.6%), followed by separation anxiety disorder (1.9%) and overanxious disorder (1.2%).

Our findings are comparable with the literature as far as Behavioural/impulse control disorders [23, 26] (CD, ADHD and Aggressiveness, with a significantly higher prevalence in males), phobic disorders [29], avoidance, sensitivity and lack of self-confidence [30], mental retardation and autism [34-36], are concerned.

Conversely, anxiety disorders [28, 29], nocturnal enuresis [39], depressive disorders [31] and learning disorders [38] were lower than usually reported.

We have analyzed three main risk factors groups: biological, socio-familiar and psychological ones.

About the first group, children with organic diseases are more prone to develop a psychiatric disorder, even an anxiety disorder, a behavioural disorder, or a neurological one.

Moreover, unlike other data reporting significant correlation between poverty status and developmental problems, or behavioural/conduct problems [18, 54], social class indicators (like living with other cohabitants, parents’ marital status, parents’ occupation, attending school full-time or regular time, etc.) was not found to be a significant risk factor for any mental disorder.

Furthermore, we observed that having a psychiatric disorder is significantly associated with attending school full-time, possibly due to the fact that families having children that need special assistance (like those with neurological disorders), or that are extremely hyperactive (like those with a behavioural disorder), consider the full-time as a better choice that can help them taking care of their children. Obviously, having or having had a learning support teacher is significantly correlated with the presence of a mental disorder in childhood.

About the last group, one of the most interesting finding is that the marital status of parents is correlated to the diagnoses. In fact, living with one only parent seems to be a strong correlate of psychopathology, according to other studies [6]. In particular, our data show that having mother or father divorced, not present, or dead is a risk factor for developing a psychiatric disorder, respectively a behavioural or an anxiety disorder.

This result confirms the findings by Spencer et al. [26], that adverse family-environment variables (chronic family conflict, decreased family cohesion and exposure to parental psychopathology, particularly the maternal one) are more common in ADHD families compared with control families. Furthermore, two recent studies showed that living in a 2-parent household is associated with lower odds of experiencing special health care needs co-occurring with severe headaches, learning disabilities, behavioural/conduct problems, or emotional conditions in school-aged children [18, 54].

Behavioural disorders (CD, ADHD, Aggressiveness) in our sample show a significant higher prevalence in males. Emé [23] hypothesized that some neuropsychological impairments could mediate the risk for behavioural disorders, by causing deficits in executive and cognitive functioning, as deficits in the verbal domain, spatial and memory functions. These could lead to a more physically aggressive behaviour and may explain the higher prevalence of these disorders in male subjects [23].

Further long-term prospective studies are needed, in order to clarify the epidemiological and psychopathological relationships between childhood and adult mental disorders.

AUTHORS’ CONTRIBUTIONS

CF and SP conceived of the study, and participated in its design and coordination and helped to draft the manuscript. CLS, VR and GC have been involved in drafting the manuscript or revising it critically for important intellectual content. CF performed the statistical analysis. All authors read and approved the final manuscript.

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