

Brief report

# Age and gender differences in depressive symptomatology and comorbidity: an incident sample of psychiatrically admitted children

Merete Juul Sørensen\*, Judith Becker Nissen, Ole Mors, Per Hove Thomsen

*Psychiatric Hospital for Children and Adolescents, Harald Selmersvej 66, 8240 Risskov, Denmark*

Received 11 March 2004; received in revised form 24 September 2004; accepted 27 September 2004

---

## Abstract

*Background:* Studies indicate that major depressive disorder (MDD) is frequent in children but that it may be missed. This study determines the incidence of hospital-treated MDD based on the frequency of MDD in child psychiatric patients, and analyses effects of age and gender on depressive symptoms and psychiatric comorbidity.

*Methods:* One hundred ninety-nine consecutive child psychiatric patients were interviewed using a semi-structured diagnostic interview (K-SADS-PL). Comorbidity and symptoms were compared across age and gender.

*Results:* Current or partly remitted MDD was found in 42 children (21%). Thirty-eight (90%) had comorbid psychiatric disorder(s). Onset of the comorbid disorder was prior to onset of depression in 74% of cases. No significant gender-differences were found, but anhedonia, hypersomnia and decreased ability to concentrate were more frequent in the older age group. In contrast, feelings of worthlessness were more frequent in the younger age group. The number of melancholic symptoms was significantly associated with older age.

*Conclusion:* MDD is frequent in child psychiatric patients aged 8–13 years. Age—but not gender—had significant effects on melancholy score and the prevalence of specific symptoms. Results suggest that MDD may be underdiagnosed in clinical samples unless careful examined with diagnostic interview.

© 2004 Elsevier B.V. All rights reserved.

*Keywords:* Depressive disorder; Symptoms; Development; Child; Melancholia; Comorbidity

---

## 1. Background

### 1.1. Prevalence of depression

Population prevalence rates of depressive disorders in children are between 0.2% to 1.8% and

\* Corresponding author. Tel.: +45 77894153.

E-mail address: mjs@buh.aaa.dk (M.J. Sørensen).

smaller if only major depressive disorder (MDD) is regarded (Cohen et al., 1993; Costello et al., 1996; Ford et al., 2003). One-year incidence rates for adolescents range from 3.3% to 7.1% (Garrison et al., 1997; Lewinsohn et al., 1998; Oldehinkel et al., 1999). No Danish prevalence or incidence data are available, but depressive disorders are rarely diagnosed in Danish children (Ruge et al., in preparation).

### 1.2. Age and gender

Except for a 1:2 male/female ratio postpuberty (Hankin et al., 1998), few gender specific characteristics of depression have been identified (Birmaher et al., 2004; Kovacs, 2001; Kovacs et al., 2003; Lewinsohn et al., 2003; Mitchell et al., 1988; Roberts et al., 1995). In general, symptom rates are similar across development (Lewinsohn et al., 2003; Mitchell et al., 1988), but age-dependent differences have been found in clinical studies (Birmaher et al., 2004; Borchardt and Meller, 1996; Carlson and Kashani, 1988; Masi et al., 2001; Ryan et al., 1987; Weiss et al., 1992; Weiss and Garber, 2003).

### 1.3. Comorbidity

Comorbidity, concurrent and life-time, is frequent in depressed children and adolescents (Angold et al., 1999; Kessler and Walters, 1998; Rohde et al., 1991), onset usually being prior to the onset of depression (Kovacs et al., 1989; Rohde et al., 1991).

## 2. Aim

The aim was to determine the incidence of hospital-treated MDD in the population, based on the frequency of the disorder in a consecutive sample of first-ever admitted child psychiatric patients aged 8 to 13 years, representative of a well-defined geographic area. Further the aim was to analyse the effects of gender and age on depressive symptoms and psychiatric comorbidity in child psychiatric patients with MDD.

## 3. Method

### 3.1. Study population

The sample consisted of 199 first-ever admitted children, aged 8 to 13 years consecutively admitted to the Psychiatric Hospital for Children and Adolescents, Risskov, Denmark in the study period of 1 1/2 year. Twelve children were inpatients, 187 were outpatients. Fourteen boys and eight girls (of 221 eligible children) were not included. The interviewed and not interviewed children were similar with regard to gender ( $\chi^2$ ,  $p=0.31$ ) and age group ( $\chi^2$ ,  $p>0.09$ ).

The hospital is the only clinic covering the county of Aarhus (48,131 children aged 8 to 13 years, total population 644,666, January 1st 2002).

### 3.2. Diagnostic procedures

The children were interviewed with the Schedule for Affective Disorders and Schizophrenia for Children-Present Lifetime version (K-SADS-PL) (Kaufman et al., 1997). Additional questions for selective mutism and attachment disorder were included. The first author performed all interviews. Diagnoses were classified "certain" if DSM-IV criteria for the diagnosis were met at the time of the interview and "probable" if one criterion lacked for a certain diagnosis. If criteria had been met (certain or probable) but symptoms were in remission, the disorder was classified "partly remitted" if there was less than 2 months of complete remission and "past disorder" if there had been at least 2 months of complete remission. Current diagnoses include "certain", "probable" and "partly remitted" diagnoses.

### 3.3. Statistics

For comparison of categorical variables,  $\chi^2$  analysis was applied (Fishers exact test for expected values <5). For reliability measures, Cohen's Kappa was used (Landis and Koch, 1977). The Statistical Package for Social Sciences (SPSS) was used for data analysis (SPSS, 2002).

### 3.4. Reliability

During the study period, 20 interviews were videotaped and re-rated by a second rater. Kappa

values for current disorders were almost perfect (0.81–1) for cyclothymia, psychosis, phobia, obsessive compulsive disorder (OCD), encopresis, anorexia nervosa (AN) and enuresis, substantial (0.61–0.80) for MDD, attention deficit hyperactivity disorder (ADHD), Tourette's syndrome and oppositional defiant disorder (ODD) and moderate (0.41–0.6) for generalized anxiety disorder (GAD) and separation anxiety disorder (SAD). For dysthymia, the kappa value was poor (Landis and Koch, 1977).

Table 1  
Diagnoses in the sample

Diagnosis	Current diagnosis (m/f)
Major depression <sup>a</sup>	42 (23/19)
Depressive disorder NOS	1 (1/0)
Dysthymic disorder	2 (1/1)
Cyclothymia	1 (1/0)
Bipolar disorder	0
Skizofrenia/schizofreniform/schizoaffektive or brief psychotic disorder	0
Psychotic disorder NOS	9 (6/3)
Panic disorder	0
SAD	11 (6/5)
Specific phobias	21 (13/8)
Social anxiety	7 (3/4)
Agoraphobia	0
GAD	24 (17/7)
OCD	21 (12/9)
PTSD	1 (1/0)
Acute stress disorder	0
Adjustment disorder	12 (10/2)
Enuresis	23 (17/6)
Encopresis	12 (10/2)
Anorexia nervosa	8 (0/8)
Bulimia nervosa	0
Attention deficit hyperactivity disorder	88 (78/10)
Conduct disorder	1 (1/0)
Oppositional defiant disorder	50 (42/8)
Tourette	10 (10/0)
Tics	15 (14/1)
Selective mutism	4 (1/3)
Reactive attachment disorder	0
PDD <sup>b</sup>	18 (14/4)
Specific developmental disorders <sup>b</sup>	69 (56/13)
No diagnosis	9 (5/4)
Total number of children	199 (147/52)

<sup>a</sup> 20 cases were certain, 6 were probable, 13 were partly remitted and 3 cases were probable cases, partly remitted.

<sup>b</sup> Clinical diagnoses-not derived from K-SADS.

## 4. Results

### 4.1. Incidence of MDD

A total of 52 girls and 147 boys were interviewed. Forty-two (21%) children, 23 boys and 19 girls, had current MDD (Table 1), yielding an incidence of hospital-treated MDD of 5.8 cases per year/10,000 children (Fig. 1).

### 4.2. Concurrent comorbidity in MDD

MDD was comorbid with GAD, SAD, and AN more often than expected and with ADHD less often than expected (Table 2). At least one comorbid disorder was present in 90% of MDD cases.

Comorbid anorexia (Fisher's Exact Test;  $p=0.005$ ) and specific developmental disorder (Fisher's Exact Test;  $p=0.035$ ) were more common in girls, whereas comorbid tic disorder (Fisher's Exact Test;  $p=0.024$ ) was more common in boys. ODD showed a trend towards being more common in boys ( $\chi^2$ ,  $p=0.053$ ). Comorbid ODD ( $\chi^2$ ,  $p=0.001$ ) and SAD (Fisher's Exact test,  $p=0.024$ ) were more common in the younger group (8 to 11 years).

### 4.3. Onset of disorders

Onset of comorbid disorders preceded onset of MDD in 37 (74%) children with lifetime MDD. In 11 (22%) of the children with MDD, another psychiatric disorder concurred with onset of MDD and 2 (4%) cases had onset of comorbid disorders after onset of MDD.

### 4.4. Gender and age difference in symptom-rates

No significant gender differences were found in rates of depressive symptoms. Anhedonia, hypersomnia, loss of appetite, and decreased ability to concentrate were significantly more frequent in the older age (12 to 13 years) (Table 3), whereas feelings of worthlessness and all three screening symptoms (from K-SADS-PL) of ODD were significantly more frequent in younger group. The frequency of psychomotor retardation in the older group, and agitation, increase in appetite and increase in weight in the younger age group approached significance. Three boys and two

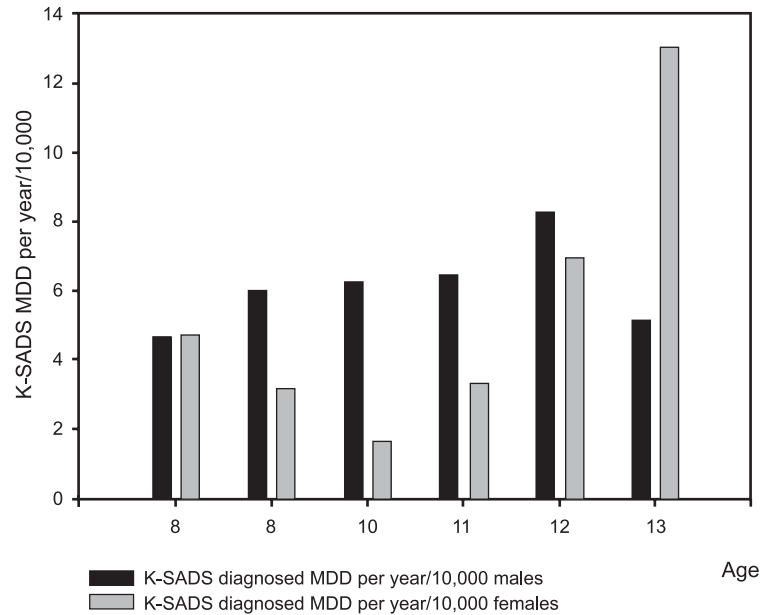


Fig. 1. Incidence of hospital-treated MDD in the population.

girls had symptoms consistent with melancholic features. Four were in the older age group, but this was statistically nonsignificant ( $\chi^2$ ,  $p=0.12$ ). The sum

of melancholic symptoms was significantly correlated with age (Pearson  $r=0.352$ ,  $p=0.022$ ).

Table 2

Comorbid disorders in children with or without major depressive disorder

	MDD, $n=42$	Non-MDD, $n=157$	$P$
ODD	13	37	0.327
ADHD	11	77	0.008*
Generalized anxiety	9	15	0.036*
OCD	7	14	0.161
Anorexia	6	2	0.001*
Tics	9	6	0.093
Enuresis	6	17	0.587
Separation anxiety	6	5	0.005*
Phobia	5	16	0.778
Social anxiety	3	4	0.164
Psychotic disorder NOS	2	7	1
Encopresis	2	10	1
Tourette	0	10	0.124
PDD	4	14	1
Specific developmental disorders	4	65	0.000*

Only disorders occurring in more than five patients shown in the table.

\* Indicates significance on a 5% level.

## 5. Discussion

### 5.1. Diagnosis

We found more children with MDD according to standardized semi-structured interview in this study than in a prior register study analysing clinical diagnoses of affective disorders (Sørensen et al., submitted for publication). Semistructured interview with both parent and child is an efficient way of diagnosing depressive disorders. The incidence of hospital-treated MDD is low compared with known population prevalence rates, suggesting that only a fraction of children with MDD receive hospital-based treatment.

### 5.2. Comorbidity

Consistent with prior epidemiological and clinical studies (Kessler et al., 1996; Kovacs et al., 1984; Rohde et al., 1991), MDD was highly comorbid with

Table 3  
Symptom rates according to age group

Symptoms present at some point during present episode of depression	Major depression 8–11 years ( <i>n</i> =23) (%)	Major depression 12–13 years ( <i>n</i> =19) (%)	<i>P</i>
Depressive mood	19 (82.6)	18 (94.7)	0.356
Irritability	21 (91.3)	16 (84.2)	0.644
Anhedonia	10 (43.5)	14 (73.7)	0.049*
Thoughts of death	16 (69.6)	13 (68.4)	0.936
Thoughts of suicide	7 (30.4)	6 (31.6)	0.936
Acts of suicide	0	1 (5.3)	0.452
Non-suicidal acts of self-mutilation	1 (4.3)	2 (10.5)	0.581
Non reactivity of mood	4 (17.4)	2 (10.5)	0.673
Quality of mood different from grief ( <i>n</i> =23) <sup>a</sup>	4 (36.4)	8 (66.7)	0.146
Diurnal variation	3 (13.0)	4 (21.1)	0.682
Disturbance of sleep			
- Initial insomnia	12 (52.1)	10 (52.6)	0.976
- Secondary insomnia	6 (26.1)	4 (21.1)	1
- Early morning awakening	3 (13.0)	1 (5.3)	0.613
- Change of diurnal rhythm	0	1 (5.3)	0.452
- Non-restitution sleep	9 (39.1)	7 (36.8)	0.871
- Hypersomnia	3 (13.0)	8 (42.1)	0.043*
Exhaustion	12 (52.1)	15 (78.9)	0.071
Decrease in ability to concentrate	13 (56.5)	17 (89.5)	0.019*
Indecisiveness	8 (34.8)	7 (36.8)	0.890
Loss of appetite ( <i>n</i> =36) <sup>a</sup>	7 (33.3)	10 (66.7)	0.048*
Loss of weight ( <i>n</i> =30) <sup>a</sup>	2 (11.8)	2 (15.4)	1
Increase of appetite ( <i>n</i> =36) <sup>a</sup>	5 (23.8)	0	0.062
Increase in weight ( <i>n</i> =36) <sup>a</sup>	5 (23.8)	0	0.062
Agitation	9 (39.1)	2 (10.5)	0.075
Psychomotor retardation	0	3 (15.8)	0.084
Feelings of worthlessness	20 (87.0)	11 (57.9)	0.043*
Feelings of guilt	4 (17.4)	6 (31.6)	0.289
Feelings of hopelessness	11 (47.8)	13 (68.4)	0.233
Sensitivity to rejection	5 (21.7)	5 (26.3)	0.729
Loss of control <sup>b</sup>	15 (62.2)	4 (21.1)	0.006*
Fighting <sup>b</sup>	14 (60.9)	3 (15.8)	0.003*
Oppositional <sup>b</sup>	12 (52.2)	2 (10.5)	0.004*
Somatic complaints <sup>b</sup>	16 (69.6)	10 (52.6)	0.261
Total number of symptoms/child	9.5 <sup>c</sup>	10.8 <sup>c</sup>	0.11

\* Indicates significance on a 5% level.

<sup>a</sup> *n* <42 due to non-responders.

<sup>b</sup> Not depressive symptoms in K-SADS.

<sup>c</sup> Only including K-SADS symptoms.

other child psychiatric disorders, especially with AN and anxiety disorders. In children referred for these conditions, careful examination of depressive symptoms is essential.

### 5.3. Age differences

Differences in symptoms between age groups are few yet important. The higher prevalence of anhedonia and hypersomnia in the older group is consistent

with most literature in the area, including a recent meta-analysis (Weiss and Garber, 2003). Also consistent with Weiss et al.'s analysis of clinical studies, we found higher levels of appetite loss in the older group. Findings on concentration difficulties are inconsistent probably because studies using structured interviews or checklists cannot distinguish concentration difficulties due to pre-existing ADHD or young age and concentration difficulties as part of MDD.

Four of five children with melancholic features belonged to the older group. Albeit not significant this is consistent with recent findings from Birmaher et al. (2004). This trend is supported by the positive correlation of the melancholy score with increasing age.

The predominance of oppositional symptoms in the younger group may be explained by the prevalence of ODD in young boys.

Low self-esteem was found more frequently in the younger group consistent with Weiss et al.'s findings in clinical populations. Their finding in normal populations went in the opposite direction. This may be caused by referral bias. Alternatively the findings in normal populations reflect a developmental trend independent of depression, whereas findings in diagnosed populations, likely to represent severe forms of the disorder, reflect true developmental changes.

This study thus supports prior findings of developmental differences in the symptoms of MDD rising the question whether these are merely age-dependent expressions of the same underlying construct or expressions of different aetiology. Evidence suggests that MDD may differ between adolescents and children regarding heritability (Scourfield et al., 2003), recurrence rate (Weissman et al., 1999a,b), and risk factors (Harrington et al., 1997). Such differences may have implications for treatment strategies and prevention.

### Acknowledgements

The authors would like to thank Professor Anne-Liis Von Knorring for valuable advice regarding the design and methods of the study.

The project has been funded by The Danish Medical Research Council, the Pool for Psychiatric Research, The Psychiatric Research Fund, Mrs. C. Hermansens Memorial Fund, Beatrice Suroval Haskell Fund for Child Mental Health Research of Copenhagen, Senior Consultant D.M. Sci. Einar Geert-Jørgensen and wife Ellen Geert-Jørgensens Research Fund, The Fund for Psychiatric Basic Research, The Danish Psychiatric Research Fund, The Fund for Promotion of Medical Science, Eli Lilly's Psychiatric Research Fund, The Fund for Research in Mental Illness, Pfizer, The Fund of 1967.

### References

- Angold, A., Costello, E.J., Erkanli, A., 1999. Comorbidity. *J. Child Psychol. Psychiatry* 40 (1), 57–87.
- Birmaher, B., Williamson, D.E., Dahl, R.E., Axelson, D.A., Kaufman, J., Dorn, L.D., Ryan, N.D., 2004. Clinical presentation and course of depression in youth: does onset in childhood differ from onset in adolescence? *J. Am. Acad. Child Adolesc. Psych.* 43 (1), 63–70.
- Borchardt, C.M., Meller, W.H., 1996. Symptoms of affective disorder in pre-adolescent vs. adolescent inpatients. *J. Adolesc.* 19 (2), 155–161.
- Carlson, G.A., Kashani, J.H., 1988. Phenomenology of major depression from childhood through adulthood: analysis of three studies. *Am. J. Psychiatry* 145 (10), 1222–1225.
- Cohen, P., Cohen, J., Kasen, S., Velez, C.N., Hartmark, C., Johnson, J., Rojas, M., Brook, J., Streuning, E.L., 1993. An epidemiological study of disorders in late childhood and adolescence: I. Age- and gender-specific prevalence. *J. Child Psychol. Psychiatry* 34 (6), 851–867.
- Costello, E.J., Angold, A., Burns, B.J., Stangl, D.K., Tweed, D.L., Erkanli, A., Worthman, C.M., 1996. The great smoky mountains study of youth. Goals, design, methods, and the prevalence of DSM-III-R disorders. *Arch. Gen. Psychiatry* 53 (12), 1129–1136.
- Ford, T., Goodman, R., Meltzer, H., 2003. The British child and adolescent mental health survey 1999: the prevalence of DSM-IV disorders. *J. Am. Acad. Child Adolesc. Psych.* 42 (10), 1203–1211.
- Garrison, C.Z., Waller, J.L., Cuffe, S.P., McKeown, R.E., Addy, C.L., Jackson, K.L., 1997. Incidence of major depressive disorder and dysthymia in young adolescents. *J. Am. Acad. Child Adolesc. Psych.* 36 (4), 458–465.
- Hankin, B.L., Abramson, L.Y., Moffitt, T.E., Silva, P.A., McGee, R., Angell, K.E., 1998. Development of depression from preadolescence to young adulthood: emerging gender differences in a 10-year longitudinal study. *J. Abnorm. Psychology* 107 (1), 128–140.
- Harrington, R., Rutter, M., Weissman, M., Fudge, H., Groothues, C., Bredenkamp, D., Pickles, A., Rende, R., Wickramaratne, P., 1997. Psychiatric disorders in the relatives of depressed probands: I. Comparison of prepubertal, adolescent and early adult onset cases. *J. Affect. Disord.* 42 (1), 9–22.
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., Williamson, D., Ryan, N., 1997. Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): initial reliability and validity data. *J. Am. Acad. Child Adolesc. Psych.* 36 (7), 980–988.
- Kessler, R.C., Walters, E.E., 1998. Epidemiology of DSM-III-R major depression and minor depression among adolescents and young adults in the National Comorbidity Survey. *Depress. Anxiety* 7 (1), 3–14.
- Kessler, R.C., Nelson, C.B., McGonagle, K.A., Liu, J., Swartz, M., Blazer, D.G., 1996. Comorbidity of DSM-III-R major depressive disorder in the general population: results from the US National Comorbidity Survey. *Br. J. Psychiatr., Suppl.* (30), 17–30.

- Kovacs, M., 2001. Gender and the course of major depressive disorder through adolescence in clinically referred youngsters. *J. Am. Acad. Child Adolesc. Psych.* 40 (9), 1079–1085.
- Kovacs, M., Feinberg, T.L., Crouse-Novak, M.A., Paulauskas, S.L., Finkelstein, R., 1984. Depressive disorders in childhood: I. A longitudinal prospective study of characteristics and recovery. *Arch. Gen. Psychiatry* 41 (3), 229–237.
- Kovacs, M., Gatsonis, C., Paulauskas, S.L., Richards, C., 1989. Depressive disorders in childhood: IV. A longitudinal study of comorbidity with and risk for anxiety disorders. *Arch. Gen. Psychiatry* 46 (9), 776–782.
- Kovacs, M., Obrosky, D.S., Sherrill, J., 2003. Developmental changes in the phenomenology of depression in girls compared to boys from childhood onward. *J. Affect. Disord.* 74 (1), 33–48.
- Landis, J.R., Koch, G.G., 1977. The measurement of observer agreement for categorical data. *Biometrics* 33 (1), 159–174.
- Lewinsohn, P.M., Rohde, P., Seeley, J.R., 1998. Major depressive disorder in older adolescents: prevalence, risk factors, and clinical implications. *Clin. Psychol. Rev.* 18 (7), 765–794.
- Lewinsohn, P.M., Pettit, J.W., Joiner Jr., T.E., Seeley, J.R., 2003. The symptomatic expression of major depressive disorder in adolescents and young adults. *J. Abnorm. Psychology* 112 (2), 244–252.
- Masi, G., Favilla, L., Mucci, M., Poli, P., Romano, R., 2001. Depressive symptoms in children and adolescents with dysthymic disorder. *Psychopathology* 34 (1), 29–35.
- Mitchell, J., McCauley, E., Burke, P.M., Moss, S.J., 1988. Phenomenology of depression in children and adolescents. *J. Am. Acad. Child Adolesc. Psych.* 27 (1), 12–20.
- Oldehinkel, A.J., Wittchen, H.U., Schuster, P., 1999. Prevalence, 20-month incidence and outcome of unipolar depressive disorders in a community sample of adolescents. *Psychol. Med.* 29 (3), 655–668.
- Roberts, R.E., Chen, Y.W., Solovitz, B.L., 1995. Symptoms of DSM-III-R major depression among Anglo, African and Mexican American adolescents. *J. Affect. Disord.* 36 (1–2), 1–9.
- Rohde, P., Lewinsohn, P.M., Seeley, J.R., 1991. Comorbidity of unipolar depression: II. Comorbidity with other mental disorders in adolescents and adults. *J. Abnorm. Psychology* 100 (2), 214–222.
- Ryan, N.D., Puig-Antich, J., Ambrosini, P., Rabinovich, H., Robinson, D., Nelson, B., Iyengar, S., Twomey, J., 1987. The clinical picture of major depression in children and adolescents. *Arch. Gen. Psychiatry* 44 (10), 854–861.
- Scourfield, J., Rice, F., Thapar, A., Harold, G.T., Martin, N., McGuffin, P., 2003. Depressive symptoms in children and adolescents: changing aetiological influences with development. *J. Child Psychol. Psychiatry* 44 (7), 968–976.
- SPSS. Statistical Package for the Social Sciences, 2002. Chicago, SPSS 1989. Ref Type: Computer Program.
- Weiss, B., Garber, J., 2003. Developmental differences in the phenomenology of depression. *Dev. Psychopathol.* 15 (2), 403–430.
- Weiss, B., Weisz, J.R., Politano, M., Carey, M., Nelson, W.M., Finch, A.J., 1992. Relations among self-reported depressive symptoms in clinic-referred children versus adolescents. *J. Abnorm. Psychol.* 101 (3), 391–397.
- Weissman, M.M., Wolk, S., Goldstein, R.B., Moreau, D., Adams, P., Greenwald, S., Klier, C.M., Ryan, N.D., Dahl, R.E., Wickramaratne, P., 1999a. Depressed adolescents grown up. *JAMA* 281 (18), 1707–1713.
- Weissman, M.M., Wolk, S., Wickramaratne, P., Goldstein, R.B., Adams, P., Greenwald, S., Ryan, N.D., Dahl, R.E., Steinberg, D., 1999b. Children with prepubertal-onset major depressive disorder and anxiety grown up. *Arch. Gen. Psychiatry* 56 (9), 794–801.