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Stressful Life Events in a Clinical Sample of Depressed Children in Hungary

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Abstract

Background—There is limited information on the characteristics of stressful life events in depressed pediatric clinical populations and the extent to which sex, age, and their interactions may influence the relations of life events and depression. Using a very large clinical sample of children and adolescents with major depressive disorder (MDD), we therefore examined life events in various ways as well as their relations to age and sex.

Method—The study included a clinic-based sample of 434 children (ages 7–14) with a DSM-IV diagnosis of MDD and their mothers, and a school-based comparison sample of 724 children and their mothers. Life event information was obtained from the mothers.

Results—Children with MDD had twice the number of lifetime stressful events than did the comparison group, with very high levels of stressors by the age of 7–9 that stabilized across adolescence. In contrast, the comparison sample experienced a gradual increase in stressful life events as a function of age up to mid-adolescence. Parental health events, death of close relatives, and intra-familial events were significantly associated with MDD diagnosis. There were significantly stronger associations between parental health- as well as death-event clusters and MDD diagnosis among younger children than adolescents.

Limitations—Geographical differences between the clinical and comparison samples, as well as possible parental reporting biases may affect the generalizability of these findings.

Conclusion—The association between some stressful life events and MDD seems to be moderated by age, underscoring the need to examine specific events, as well as clusters of events. Better understanding of such interactions may facilitate early identification of possible risk factors for pediatric MDD.

Keywords

depression; children; adolescents; childhood depression; stressful life events; age and sex interaction

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Introduction

Depression among adults has been associated with various stressful life events during their childhood years (e.g., Gilman et al., 2003; Hill et al., 2004). Studies of children and adolescents also have reported links between depression and stressful life events (e.g., Franko et al., 2004; Ge et al., 1994; Hetherington & Hagan, 1999; Silberg et al., 1999; Sund et al., 2003). To better understand this relationship, stress events have been examined in various ways, such as total number of events experienced during specified time intervals (e.g., Williamson et al., 1995), event clusters defined on conceptual, clinical, or practical grounds (e.g., Williamson et al., 2005), and specific individual events (e.g., Weller et al., 1991). However, it is not clear whether these different approaches to life events yield comparable or uniquely useful information in the context of pediatric depression.

Researchers have also examined whether the association between life events and pediatric depression is moderated by age and sex. For example, in a 4-year longitudinal study of a community-based sample, Ge et al. (1994) reported that the number of uncontrollable events and depressive symptoms were associated among girls but not boys. Bauma et al. (2008) also found that the association between stressful life events and depressive symptoms was stronger for girls than for boys. Correlations between stressful life events and depression also have been reported during various developmental periods including pre-school (Luby et al., 2006), pre-adolescence (Ge et al., 1994; Williamson et al., 2005), and adolescence (Nolen-Hoeksema et al., 1992; Williamson et al., 1995). Yet, the nature of the interaction of developmental periods (or age) and sex is still unclear. For example, Williamson et al. (2005) found that pre-adolescent, depressed girls experienced more “child independent” life events than did anxious or normal comparison girls, whereas among adolescents the reverse pattern was detected (Williamson et al., 1995). Rudolph and Hammen (1999) found that in a sample of diagnostically heterogeneous, clinically referred youths, the likelihood of child-independent stressful events remained stable from childhood to adolescence, but there was a significant increase in child-dependent events (events that may be caused by the child’s own behavior) during adolescence, especially among girls.

Surprisingly, and despite the ongoing interest in the role of stressful events in depression, there is a scarcity of research with clinical samples of diagnosed depressed youth. We identified only four studies of depressed pediatric samples that compared clinical cases with normal controls (Goodyer et al., 1988; Horesh et al., 2003; Williamson et al., 1995; 2005), and two studies that compared depressed youths and youths with other psychiatric diagnoses (Benfield et al., 1988; Berney et al., 1991). However, these studies have included small samples, which constrain both the interpretation and generalizability of the findings. For example, Williamson et al. (2005) compared 45 depressed children and 11 normal controls and reported that depressed children, and females in particular, were more likely to be exposed to stressful events than were normal controls. However, when Williamson et al. (1995) examined 35 depressed adolescents and 37 controls, they found no across-group differences in total life events during the year prior to the evaluation, although depressed adolescents had experienced significantly more “dependent” life events. Benfield et al. (1988), who compared 17 depressed children and 20 non-depressed psychiatric controls, also found no significant across-group differences in exposure to life events.

In summary, a few studies of depressed youth have examined the relation between life stressors and MDD by looking at total accumulation of events, various event clusters, and specific events, with some indications that these relations may be mediated by age and sex. However, given the small sample sizes in all previous studies of pediatric depression, neither the relative usefulness of the various ways of examining life events nor their associations with sex, age, or their interactions have been well explored. Given the availability of a very large clinical sample

of depressed children and adolescents and a similarly large sample of school-based comparison youths, the present study had two goals: a) to examine stressful life events as total cumulative events, clinically meaningful event clusters, and/or individual events and b) explore whether life events were moderated by age, sex, and their interactions.

Methods

Participants

The clinical sample consists of 434 depressed children who had been participating in a study of genetic and psychosocial risk factors for childhood-onset depression, and were recruited through 23 child psychiatric facilities across Hungary. To be included, children had to be 7.0 years to 14.99 years old, meeting DSM-IV criteria for a mood disorder, and have at least one available biological parent and one biological sibling in a similar age range (not included in the present analysis). The clinical sample included 199 females (mean age 12.1 years) and 235 males (mean age 11.1 years). The mean age of MDD onset for the sample was 10.8 years ($SD = 2.2$). The control sample consists of 724 children from three elementary schools (grades 1 to 8; ages 7 to 14.11) in Szeged, Hungary (population approximately 200,000). The control sample included 399 girls (mean age 10.8 years) and 325 boys (mean age 10.8 years). We excluded subjects with mental retardation or any major systemic medical disorders.

Procedures

Enrollment and assessment procedures for clinical cases have been described in detail previously (Kapornai et al., 2007; Kiss et al., 2007). In brief, psychiatric diagnoses were verified via a 2-part evaluation conducted by different clinicians at approximately 6 weeks apart. The first evaluation included a) the Mood Disorders section of a semi-structured psychiatric interview, the Interview Schedule for Children and Adolescents - Diagnostic Version (ISCA-D), which is an extension of the Interview Schedule for Children and Adolescents (ISCA; Kovacs, 1985; Sherrill & Kovacs, 2000) and b) an extensive demographic data form, the Intake General Information Sheet (IGIS). Children who met DSM-IV criteria for mood disorder at the first evaluation were then assessed further using the complete ISCA-D; independent, trained psychiatric diagnosticians provided the final diagnoses.

We obtained data from the normative sample via parent-completed and child-completed questionnaires. Children in the required age range, attending elementary schools in Szeged, took home a packet of forms that included a consent form, self rating scales, and a short version of IGIS (see below) for parents. We enrolled children whose parent or legal guardian signed the consent form and completed the questionnaires. The forms were returned to the school and were collected in a locked box. Of the 2,033 parents contacted, 1,333 (65.6%) agreed to participate. The present analysis used the IGIS of children who met age criterion for our main study.

Life events were abstracted from the Intake General Information Sheet (IGIS), a fully structured data sheet covering demographics, as well as key events pertaining to the family, the subjects' development, physical health, psychosocial history, and a range of stressful life events, which was completed based on an interview with the parent. In the school-based comparison sample, parents completed on their own an abbreviated version of the IGIS.

The present article considers 26 stressful events. For each, the parent reported whether the child ever experienced the event. In addition to a total score (ranging from 0 to 26) reflecting the number of events experienced, twenty-two of the events could be grouped into 4 clinically meaningful clusters. The 4 event-clusters are: a) "*Parental health*": hospitalization, physical illness, or psychiatric illness of biological or stepparents; b) "*Death of close relatives*": parental,

or other death in the family; c) “*Sociodemographic*”: financial problem, moving, parental unemployment, natural disaster, loss of home; and d) “*Intrafamilial*”: birth, hospitalization, psychiatric illness of sibling, foster care, family arguments, and divorce of biological parents.

Statistical Approach

To examine the association between total events and key demographic variables, we conducted separate ANOVAs for the MDD and comparison samples, with total events as dependent variables, and sex, age, or age-by-sex interactions as independent variables. We examined associations between the four event clusters and MDD diagnosis by means of logistic regression analyses after adjusting for demographic across-group differences. Hierarchical logistic regression models were employed to examine specific events within each cluster (model 1), and their interactions with sex (model 2), age (model 3), and sex by age (model 4), as predictors of MDD diagnosis. We used Likelihood ratio tests (LRT) to compare model fit.

Results

Total Life Events

According to their parents, depressed youngsters experienced twice as many events (6.0 ± 2.8) than did the school-based cohort (2.8 ± 2.0). Age was unrelated to total number stressful events in the depressed sample ($r = 0.05$; $p = 0.29$), while a weak but statistically significant positive correlation was observed in the school-based cohort ($r = 0.15$; $p < 0.01$). Figure 1 depicts the number of life events across age groups for the two samples. As shown, for the depressed sample, comparable total life events were reported across the various ages (5.5 – 6.5 events). However, within the comparison group, we noted an increasing number of stressful events as a function of age, ranging from 2.5 events at age 7 to 3.5 events at age 14.99.

Consistent with the bivariate associations reported above, results of the ANOVA indicated that age and total number of events were significantly associated in the *comparison sample*, $F(1,720) = 17.05$, $p < 0.01$. We did not observe a sex effect, $F(1,720) = 0.01$, $p = 0.92$, or age-by-sex interaction, $F(1,720) = 0.00$, $p = 0.99$, in this sample. In the depressed sample, the number of stressful events reported by parents did not vary by children’s age, $F(1,430) = 1.12$, $p = 0.29$, or sex, $F(1,430) = 1.88$, $p = 0.17$, and there was no age-by-sex interaction, $F(1,430) = 0.08$, $p = 0.78$.

Event Clusters

Adjusting for age and sex, the odds of being in the depressed group significantly increased as a function of three out of four event clusters, namely: parental health, death of close relatives, and intra-familial events; the increases in odds were 61%, 105%, and 107% respectively (see Table 1). Parental health events as well as death of relatives also significantly interacted with age; thus, younger children who experienced these events were more likely to be in the depressed group than were older children who experienced similar events.

Specific Events

Table 2 presents the rate of endorsement and adjusted odds ratio of each specific event based on the final selected hierarchical model within each cluster. Nearly all *parental health events* were associated with an increased risk of MDD ($R^2 = 0.22$, $LRT \chi^2(8) = 150.14$, $p < 0.001$). Adding age interactions to parental health events accounted for significantly more variance ($R^2 = 0.25$, $LRT \chi^2(7) = 26.40$, $p < 0.001$). Specifically, the risk posed by physical illness of biological mother and psychiatric hospitalization of biological father decreased significantly with children’s age. Adding sex or sex-by-age interactions did not significantly improve the model.

Both events in the *death of close relatives* cluster were significantly associated with MDD ($R^2 = 0.136$, LRT $\chi^2(2) = 64.37$, $p < 0.001$). Age interactions also were significant ($R^2 = 0.144$, LRT $\chi^2(2) = 7.23$, $p < 0.027$), suggesting that the risk of being in the MDD group posed by the death of a close relative decreased with age. Additional interactions with sex or the sex-by-age were not significant. All *sociodemographic events* were significantly associated with MDD ($R^2 = 0.14$, LRT $\chi^2(5) = 67.69$, $p < 0.001$). Significant age interactions ($R^2 = 0.15$, LRT $\chi^2(5) = 13.96$, $p = 0.016$) revealed that the association between loss of home and MDD decreased with age. Interactions with sex or the sex-by-age were not significant. *Intrafamilial events* were associated with MDD ($R^2 = 0.29$, LRT $\chi^2(6) = 223.35$, $p < 0.001$); significant age interactions ($R^2 = 0.32$, LRT $\chi^2(5) = 29.98$, $p < 0.001$) indicated that the association between MDD and sibling birth and parental divorce decreased with age. However, interactions with sex-by-age were also significant ($R^2 = 0.34$, LRT $\chi^2(5) = 11.49$, $p = 0.043$). For girls, the risk of MDD posed by sibling psychiatric illness decreased with age, while for boys this risk was relatively constant. Finally, three of the four *miscellaneous events* were significantly associated with MDD ($R^2 = 0.46$, LRT $\chi^2(4) = 419.92$, $p < 0.001$), but showed no significant age, sex, or sex-by-age effects.

Discussion

Based on the largest clinical sample of depressed children and adolescents to date, we found that young patients with MDD experienced about twice as many lifetime negative events than did a school based comparison group. Out of 26 stressful major life events queried, children in the comparison sample experienced an average of 2.8 events during their lives, while our depressed patients reportedly experienced an average of 6.0 events. Notably, the rate of total lifetime stress events in our Hungarian, school-based comparison group is comparable to that in normative USA samples reported by studies that queried a similar number of life events (Franko et al., 2004; Ge et al., 1994).

We also found that different methods of examining stressful life events in a pediatric sample with MDD provide uniquely useful information. For example, our two groups of youths differed in the *rate* of accumulation of *total* stressful events (which was not evident looking at single events): in the school-based sample, older children had accumulated slightly more events than had younger children (regardless of sex), consistent with previous research (Franko et al., 2004; Ge et al., 1994). In our clinical sample, however, age and number of life events were not associated. Therefore, our findings suggest that children with MDD experience a more rapid accumulation of stressful life events and at an earlier age than do comparison peers. Specifically, by 7- to 8-years of age, depressed children reportedly experienced more stressful life events than did 13- to 14-year-old comparison children.

Examination of event clusters as well as specific events revealed that age effects vary depending on the type of event. For example, children's age moderated the impact of parental health and familial death events. Both of these clusters seemed to be strongly associated with major depressive disorder in younger children. However, this association weakened in adolescence, possibly due to increased exposure to parental health and family death events in the comparison group during this developmental period.

Examination of specific life events (in addition to total events or event clusters) revealed that three events were highly associated with MDD. Specifically, 26% of the MDD group had experienced abuse compared to 1.5% of the comparison cases, while 56% of the depressed cases versus 7.5% of the comparison peers had experienced teasing in school. Finally, 3.5% of the MDD group had a history of police contact compared to only 0.3% of the controls. These findings are consistent with reports documenting an association between childhood physical and sexual abuse and major depression in adulthood (Bifulco et al., 1987; Franko et al.,

2004; MacMillan et al., 2001; Vejjola et al., 1998). Similarly, various studies have found that school teasing is associated with childhood anxiety and depression (e.g., Roth et al., 2002; Storch et al., 2004).

Finally, we failed to confirm sex or sex-by-age interaction effects on stressful events, which have been reported in clinically referred pediatric samples. For example, according to Williamson et al. (2005), girls with MDD (but not boys) experienced significantly more stressful events than did non-depressed girls, while Rudolph and Hammen (1999) reported that the number of stressful events was associated with depressive symptoms in girls (but not in boys) among children with miscellaneous psychiatric disorders. In our study, the sex by age interaction effect was limited to one type of life stress, namely a sibling having been diagnosed with psychiatric illness: the association between this event and MDD decreased with age among girls, while this association was not affected by age among boys. The differences between our findings and those of previous studies likely reflect differences in the research designs and sample sizes. For example, Rudolph and Hammen (1999) studied a diagnostically heterogeneous group of clinically referred children and did not have a control group. While Williamson et al. (2005) studied a clinical MDD sample and had a healthy control group, the sample sizes were very small. The samples in the present study were sufficiently large to allow us to detect even small effects of sex (or age) on stressful events, should they exist. We therefore conclude that in the 7- to 14.9-year old age group, there are no sex differences among depressed and non-depressed youth in total lifetime exposure to stressful life events.

Limitations

Our clinical and school-based samples were not well matched geographically because the former group was recruited across Hungary through multiple sites, whereas the latter group was recruited from schools in one mid-size city. Because mothers provided retrospective information about life events experienced by their children, there is a possibility of faulty or biased recall. The control sample consisted of families who agreed to participate in the study in response to a written invitation. This raises the possibility of unknown self-selection bias within this sample. However, the clinical sample likewise included self-selected families willing to participate. Data ascertainment format (i.e., face-to-face interview versus mail-in questionnaire) also may have introduced some bias in the responses. A further limitation of our study is that each life event was coded as having (or not having) occurred, and thus multiple occurrences of a given event carried as much weight as a single occurrence. This approach is likely to have obscured more nuanced differences in life events across the two samples, especially in the older age group. Finally, the lack of a psychiatric control group means that our findings do not inform about the specificity of the results to depressed samples.

In summary, our results suggest that each of the 3 methods of examining stressful life events, namely total number of events, event clusters, and individual events, can distinguish clinic-based depressed and non-clinical comparison samples and thus the approach to be used should depend on the research question being investigated. Our results also confirm findings by others (e.g., Williamson et al., 2005) that children with MDD experience more stressful life events than do peers who are not depressed and underscore the cross-cultural or cross-national nature of these across-group trends. Importantly, the indications are that young depressed patients accumulate stressful life events rapidly and early (i.e., by the age of 7 to 9). In contrast, not-depressed peers show a more gradual accumulation of life events through adolescence; a trend that appears to be the normative one. Findings that some events interact with age, and are more likely among depressed pre-adolescents than adolescents, highlight the potential importance of stress exposure during the first decade of life in the development of pediatric depression.

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Figure 1.
Mean number of life events by age in the depressed and control sample.

Table 1
Four life event clusters as predictors of MDD: Results of Logistic regression.

	Adjusted Odds Ratio [†] (95% Confidence Interval)
MODEL 1 (Main Effects)	
Parental Health Event Cluster	1.61 (1.38, 1.88) ***
Death of Close Relatives Event Cluster	2.05 (1.56, 2.70) ***
Sociodemographic Event Cluster	1.10 (0.95, 1.28)
Intrafamilial Event Cluster	2.07 (1.78, 2.40) ***
MODEL 2 (Main Effects by Age Interactions)	
Parental Health Event Cluster	1.85 (1.55, 2.20) ***
-by-Age (Years)	0.86 (0.80, 0.93) ***
Death of Close Relatives Event Cluster	2.27 (1.71, 3.02) ***
-by-Age (Years)	0.82 (0.72, 0.93) **
Sociodemographic Event Cluster	1.10 (0.94, 1.28)
-by-Age (Years)	1.02 (0.95, 1.10)
Intrafamilial Event Cluster	2.02 (1.73, 2.36) ***
-by-Age (Years)	1.01 (0.94, 1.09)

[†] Logistic regression results after controlling for age, sex, and age-by-sex interaction (not shown). Age measured continuously and centered at 11.

Model 1: $R^2 = 0.3547$, $-2\text{Log LR} = 1182.85$, 7 d.f. Change from Model 0: 289.49***.

Model 2: $R^2 = 0.3755$, $-2\text{Log LR} = 1158.80$, 11 d.f. Change from Model 1, 24.05***.

*
p < 0.05,

**
p < 0.01,

p < 0.001.

Table 2
Reported Rates of Life Events (%) in the Patient and Comparison Samples

Event Clusters and Specific Events	Depressed Patient Sample (N= 434)	School-based Comparison Sample (N = 724)	Adjusted Odds Ratio (95% CI)
Parental Health Events			
1. Medical hospitalization of biological Mother	34.8	16.3	1.70 (1.22, 2.40) **
2. Medical. hospitalization of biological. Father	27.9	11.9	1.84 (1.23, 2.76) **
3. Medical. hospitalization of stepparent	1.6	0.3	8.15 (0.82, 81.52)
4. Physical illness of biological mother	11.3	2.3	3.54 (1.72, 7.30) ***
-by-Age (Years)			0.64 (0.46, 0.89) **
5. Physical illness of biological father	7.8	2.5	1.22 (0.54, 2.78)
6. Physical illness of stepparent	0.2	0.0	n.a.
7. Psychiatric Hospitalization of biological. mother	16.4	3.8	7.04 (3.36, 14.73) ***
8. Psychiatric Hospitalization of biological. father	13.2	2.7	5.36 (2.56, 11.20) ***
-by-Age (Years)			0.69 (0.49, 0.97) *
9. Psychiatric Hospitalization of Stepparent	0.5	0.2	0.08 (0.00, 13.73)
Death of Close Relatives Events			
10. Death of a parent	5.3	1.4	3.47 (1.56, 7.71) **
11. Death of a close relative	71.7	48.0	2.64 (2.02, 3.45) ***
-by-Age (Years)			0.85 (0.75, 0.96) **
Sociodemographic Events			
12. Financial problems	31.3	16.6	2.02 (1.48, 2.77) ***
13. Move	54.4	42.9	1.33 (1.02, 1.72) *
14. Parent unemployed	46.5	29.0	1.53 (1.16, 2.01) **
15. Natural disaster	3.7	0.8	4.21 (1.46, 12.15) **
16. Loss of home	4.8	1.5	2.167 (0.93, 5.01)
-by-Age (Years)			0.67 (0.46, 0.97) *
Intra-familial Events			
17. Sibling birth	63.1	42.9	2.25 (1.52, 3.32) ***
-by-Age (Years)			1.42 (1.18, 1.71) ***
18. Sibling hospitalization	31.9	16.6	2.94 (1.77, 4.87) ***
19. Sibling psychiatric illness	7.6	1.7	6.40 (1.62, 25.31) **
-by-Age (Years)-by-Sex (Female)			0.33 (0.13, 0.87) *
20. Family arguments	52.3	17.	2.94 (1.90, 4.56) ***
21. Foster-care of subject	0.9	0.1	4.14 (0.33, 51.30)
22. Divorce of biological parents	31.8	14.0	1.64 (0.99, 2.72)
Miscellaneous Events			
23. Abuse	26.0	1.5	15.81 (7.99, 31.29) ***
24. Teasing by peers	55.7	7.5	13.75 (9.58, 19.71) ***
25. Police contact	3.5	0.3	11.76 (2.25, 61.45) **
26. Suspension from school	1.2	0.3	1.09 (0.10, 12.44)

Adjusted odds ratios were controlled for age and sex and other events in the same cluster.

n.a. = not available due to insufficient numbers

*
 $p < 0.05$

**
 $p < 0.01$

 $p < 0.001$