

# Suicidality, depression, major and minor negative life events: a mediator model

## Suizidalität, Depression, majore und minore negative Lebensereignisse: ein Mediatormodell

### Abstract

**Background:** Major negative life events are associated with higher suicidality. In this association, two mediating paths were hypothesized: (a) via minor negative life events and (b) via depression.

**Methods:** Ninety-six adolescent primary care patients were recruited in clinics, a physician's office, and school nurses' offices.

**Results:** (1) Minor negative life events were associated with depressive symptoms and suicidality. (2) Depressive symptoms were associated with suicidality. (3) Depressive symptoms mediated the association of minor negative life events with suicidality.

**Conclusions:** Findings suggest that minor negative life events may be associated with suicidal ideation among adolescent primary care patients, and that depressive symptoms may mediate the association of minor negative life events with suicidality.

**Keywords:** suicidality, depression, major and minor negative life events, mediator model

### Zusammenfassung

**Zielsetzung:** Majore negative Lebensereignisse hängen mit erhöhter Suizidalität zusammen. Es werden hierbei zwei Mediatorvariablen angenommen: (a) über minore negative Lebensereignisse und (b) über Depression.

**Methodik:** Hierfür wurden 96 jugendliche Patienten in Kliniken und bei niedergelassenen Ärzten rekrutiert.

**Ergebnisse:** (1) Minore negative Lebensereignisse hingen mit depressiven Symptomen und Suizidalität zusammen. (2) Depressive Symptome hingen mit Suizidalität zusammen. (3) Depressive Symptome waren Mediatorvariable im Zusammenhang mit minoren Lebensereignissen und Suizidalität.

**Fazit:** Die Ergebnisse legen nahe, dass Kindheitserlebnisse mit Suizidgedanken bei jugendlichen Patienten zusammenhängen, und dass depressive Symptome den Zusammenhang zwischen Kindheitserlebnissen und Suizidalität medieren.

**Schlüsselwörter:** Suizidalität, Depressivität, negative majore und minore Lebensereignisse,, Mediatormodell

### Introduction

Worldwide, between 800,000 and 1 million people die from suicide every year [1]. In the US the rate is about 12 per 100,000 [2]; in Europe, we face rates between 4 and 40 in 100,000 [3]. China displays a rate of about 22 in 100,000 [4]. The most common immediate risk factors are mental diseases, particularly depression. Almost 90% of suicide attempters actually suffer from a

mental disease at the time of the attempt [5]. Various studies have shown that the experience of childhood adversities is associated with a higher risk for suicide attempts in later life [6], [7], [8], [9], [10]; in particular, experiences of early violence are associated with an increased risk for suicidality [11]. In addition, the presence of negative life events (LE) in adolescence or adulthood shows associations with suicide attempts. Associations between suicidality and unemployment, financial prob-

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lems, and divorce/separation have been reported [12]; suicide attempts were predicted by a summary score of major LE [13], [14]. However, a closer look reveals that the results are not consistent. One study found fewer major LE in suicidal patients than in non-suicidal patients [15]. In another study, significant marginal associations of major LE and minor LE with suicidality were observed for girls and boys, but in a multivariate model these associations remained significant for boys only [16]. For girls, depression and lack of social support turned out to be the best predictors for suicidal ideation.

More consistency is seen regarding the associations between major LE and general psychological distress. Major LE tend to be associated with indicators of psychological distress as measured in various ways [17], [18], [19], [20]. Other studies have indicated that self-reported minor LE, i.e. daily hassles such as social commitments, missing a bus or train, or receiving an unexpected bill, are more strongly associated with symptoms than are major LE, i.e. death of a close friend [17], [20], [21]. Lazarus and Folkman [22] formulated the hypothesis that minor LE play a more important role in the onset and exacerbation of psychological distress than do major LE. The reason is that major events occur relatively rarely; they tend to have direct or acute effects, whereas minor LE occur more frequently and thus tend, in their combined effects, to have more adverse chronic health consequences.

There always is some concern about the validity of the assessment of major and minor LE. One concern addresses the issue of partially retrospective assessment. It has been argued that subjects who develop psychological distress may recall major LE better than those who remain healthy [23]. However, Hardt and Rutter [24] have argued that such an effect, even if it never can be ruled out totally, does not seem to be very strong in general. Another issue addresses the conceptual distinction between psychological distress and major LE. Dohrenwend et al. [25], [26], [27] argued that LE questionnaires tend merely to assess previously existing psychological distress. This argument has received support from findings that uncontaminated LE items were not associated with psychological distress [28], [29]. However, other researchers have reported that LE measures predicted psychological distress even after preexisting symptoms were accounted for [17], [30]. Such results have provided support for the assertion of Lazarus et al. [30] that although stress measures may be partially confounded with symptom measures, the extent of this confounding is not sufficient to prevent LE measures from predicting change in illness symptoms. Concern with potential confounding has stimulated revision of at least one widely used LE measure, the Minor LE Scale (Hassles Scale; HS). DeLongis [18] thoroughly revised the original HS, eliminating items and words that suggested symptoms of mental and/or physical illness. The Revised Minor LE Scale (Revised Hassles and Uplift Scale; RHUS) has been reported to predict subsequent physical and psychiatric symptomatology, after controlling for preexisting symptomatology [18], [31].

Discrepant findings may have been due also to the tendency of distally administered LE measures to be less effective than proximally administered LE measures at predicting symptom levels, because the effects of LE on symptoms may tend to diminish over time [32], [33], [34], [35]. For example, Swindle et al. [35] found that whether LE were able to predict change in psychological functioning depended upon the time interval involved. Unfortunately, most of the prospective and longitudinal studies that have investigated LE/symptom relationships have either measured LE and symptoms over long intervals – during which the LE/symptom relationship has tended to weaken – or measured LE and symptoms contemporaneously, which can result in spuriously high correlations due to the possible effects of symptoms on the perception of LE.

Lazarus [22] hypothesized that major LE tend to be discrete events that often have negative health consequences because they bring about the occurrence of numerous minor LE, which in turn bring about the onset or exacerbation of physical and psychiatric symptoms. For example, most of the negative effects of a natural disaster (LE) may be due less to the traumatic nature of the event itself than to the numerous daily inconveniences that ensue when one is forced to file insurance claims, oversee home repairs, replace lost possessions, and so on (minor LE). Research findings that minor LE mediated the relationship between major LE and symptoms of distress have provided support for this hypothesis [36], [37], [38]. However, other researchers have reported that major LE and minor LE both predicted change in symptom levels [34], and that major LE predicted symptoms even after minor LE were accounted for [17], [39], [40]. Thus, research has indicated that major LE may play both a direct and an indirect role in the onset and exacerbation of psychiatric symptomatology.

The present study was therefore conducted to further investigate: (1) whether minor LE mediate the relationship between major LE and suicidal thoughts; and (2) whether depression further mediates any of the relationships between the minor LE and/or major LE and suicidal thoughts.

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## Method

### Sample and procedure

The participants in this study were 96 adolescent primary care patients between 15 and 19 years of age, recruited from consecutive admissions to the following primary care offices and clinics in New York, New Jersey, and Ohio (USA): The Columbia Presbyterian Medical Center Adolescent Medical Clinic in New York (N=8), the Staten Island New York Hospital Adolescent Medical Clinic (N=22), the Monmouth County New Jersey Medical Center (N=2), a primary care physician's office in Monmouth, New Jersey

(N=3), and school nurses' offices at Keyport High School in Keyport, New Jersey (N=35), Green High School in Green, Ohio (N=20), and St. Mary's Regional High School in South Amboy, New Jersey (N=6). The composition of this sample was 71.9% Caucasian, 7.3% African American, 14.6% Hispanic, 1.0% Asian or Pacific Islander, 1.0% American Indian, and 4.2% Other. Information sheets describing the study were posted in the clinics and physician's and nurses' offices. Questionnaire packets, including measures of depression, LE, and suicidality, as well as informed consent forms, were mailed to the youths who reported an interest in participating. The 96 youths who completed these questionnaires and returned them by mail to the research team were mailed a payment of \$25 each. The study procedures were approved by the Columbia University College of Physicians and Surgeons Institutional Review Board and the New York State Psychiatric Institute Institutional Review Board. A National Institute of Mental Health Certificate of Confidentiality has been obtained for these data. The majority of respondents in the present sample reported visiting their physician or school nurse for minor physical health problems (e.g. cold, flu, headache, digestive problem; N=56, 58.3%) or for a medical examination or testing (N=69, 71.9%). Thirty-two respondents (33.3%) reported seeking medical attention for major physical health problems (e.g. diabetes and pneumonia), and 7 respondents (7.3%) reported seeking help for psychological problems (e.g. problems with anxiety, depression, sleep, alcohol, or drugs).

## Measures

### Scale for Suicidality (SSI)

Suicidality was measured with the SSI [41], a self-rating scale containing 21 items. The first five items assess whether the subject has any thoughts or wishes to die or to avoid the necessary steps to prevent himself or herself from entering a life-threatening situation or killing him- or herself. Further, the items assess how often these ideations occurred, how strong they were, and whether the subject had ever attempted suicide. All items are coded "0", "1", or "2"; higher values represent more suicidal ideation. A simple sum score ranges from zero to maximal 42. In the present dataset, an extremely skewed distribution of the score was observed; hence the score was recoded according to three categories: Zero remained and stands for no suicidal ideation; the values from 1 to 3 were recoded as 1, representing mild suicidal ideation; and values higher than 3 were recoded as 2, representing more severe suicidal ideation.

### Beck Depression Inventory (BDI)

Depression was measured by the BDI [42], a widely used 21-item self-report measure. Each item is rated on a "0" to "3" scale, with higher values standing for more severe depression. A simple sum score usually ranges from zero to maximal 53. To prevent any spurious associations with

the SSI, in the present analysis we left out two items: item 2, hopelessness, and item 9, suicidality.

### Revised Hassles and Uplift Scale (RHUS)

Minor LE were measured with the RHUS [18], [19], a thoroughly revised version of the original 117-item minor LE Scale [20]. The RHUS eliminated all of the original HS items that were found to be contaminated by symptoms of mental and/or physical illness. On the RHUS, participants responded to the instruction "indicate how much of a hassle this item was" by rating each of 53 common daily LE (e.g. "family-related obligations") that had occurred during the past month on a four-point scale, ranging from "none" (0) to "a great deal" (3). RHUS scores were computed by summing these ratings for all RHUS items. DeLongis et al. [19] reported that the RHUS predicted onset of medical symptoms. Additional reliability and validity data for the RHUS were reported by DeLongis (1985 [18]; see also 1988 [19]).

### Life Experiences Survey (LES)

Major negative LE were measured with the LES [43]. On the LES, participants provided intensity/severity ratings for each of 57 major LE (e.g. "death of a close friend") that had occurred during the past month on a seven-point scale, ranging from "extremely negative" (-3) to "extremely positive" (+3). Positive ratings were not counted in the present analysis; the overall effect of major LE was assessed by summing the severity ratings for each of the LES items assigned a negative rating. Findings regarding the reliability and validity of the LES have been reported by Sarason et al. [43].

## Statistical analysis

Statistical analysis was performed on the basis of a simplified Graphical Markov model [44], [45], a method developed particularly for analysis of observational data. Graphical Markov models are an elaboration of path analysis, such that interaction terms and categorical variables can be included. Computationally, Graphical Markov models can be analysed via a set of multiple linear and multiple logistic regression equations, depending on the response variable being continuous or discrete; the method of multiple logistic regression was chosen here. Graphical Markov provides a good background to test for mediation effects. Even though Graphical Markov models generally include testing for interaction effects, in the present analysis no use of this option was made. The reasons for skipping the tests for interactions were that no interaction was part of our hypotheses and there were extremely skewed distributions of all the scales. Most of the subjects displayed low scores regarding depression, major LE, and minor LE, and only a few individuals had high scores. Significant interaction effects often are produced just by single cases under these circumstances. Hence, the Graphical Markov model was simpli-

**Table 1: Variable description**

Variable		Observed values				
Abbreviation	Description	Possible values	Min	Max	Mean	SD
1	SUI	Suicidal ideation	0; 1; 2		see text	
2	DEP	Depression	0	50	8.95	9.68
3	MINOR	Minor life events in the past month	0	105	32.44	23.29
4	MAJOR	Major negative life events in the past two months	-77	0	-8.11	15.20
5	AGE	Age	15	19	17.47	1.25
6	SEX	Sex	0; 1		81% female	
Total n		96				

**Note:** The column “Possible values” denotes the theoretical range of each scale, “Min” and “Max” the observed range in this sample.

fied to test main effects only, i.e. to explore the direct and indirect effects as stated in the Introduction.

For suicidal thoughts as a response variable, an ordered logistic regression analysis was performed on the categories 0 = “no suicidal ideation”, 1 = “mild suicidal ideation”, and 3 = “severe suicidal ideation” [46]. In contrast to multinomial logistic regression, in ordered logistic regression the coefficients between the two cut points (no vs mild and mild vs more severe suicidal thoughts) are fixed to the same value; only the intercept varies. This method was chosen because the numbers of subjects in two categories of suicidality were too small to test the coefficients separately (see results below). For the other response variables, simple linear regressions were performed.

All the associations displayed in Figure 1a–c and Tables 2 to 5 were tested so as not to be an effect of outliers. Therefore, each association was calculated by running a cycle that excluded, one by one, the highest (or lowest, depending on the skewness) value of any scale that was part of the analysis, i.e. responses as well as explanatory variables. Only those associations that remained significant in these tests were kept in the model. In the present analysis, no association was rejected due to the check for outliers (to the contrary, some associations became significant in these checks, but in order not to increase the alpha error they were not included). Hence, only false positive but not false negative results were checked. The significance level of alpha was set to .05 (two-tailed) for all tests. According to the hypotheses in the present study, one – tailed significance tests would have been possible. However, two – tailed tests were chosen for the following reason: due to multicollinearity, in multiple regression coefficients that were assumed to be positive become negative. Statistics were performed using Stata 8.2 [47].

## Results

The adolescents of the sample were between 15 and 19 years old, with an average age of 17 years (Table 1). Girls preponderated with 81%. On the SSI, 73 out of the 96 subjects had a value of zero, whereas the rest had values ranging from 1 to 24. After recoding, the values of the group of 73 remained zero, the values of 14 subjects were recoded as “1”, and the remaining 9 subjects were recoded as “2”. The BDI values varied between zero and 50, with an average of 8.95. On minor LE (RHUS), subjects received scores between zero and 105, and major LE (LES) scores varied between zero and -77. Table 2 shows the Pearson correlations among all variables.

**Table 2: Pearson correlations among all variables**

Variable	SUI	DEP	MINOR	MAJOR	AGE
Depression	–				
Minor life events	–	.46			
Major life events	–	–.23	–.16		
Age	–	.00	.09	.07	
Sex	–	.07	–.20	–.03	–.01

r becomes significant at a value of above/below +/- .20 in this sample.

SUI as a rank variable cannot have Pearson correlations.

The simplified Graphical Markov model showed significant paths from depression to suicidality ( $\beta=.11$ ,  $p<.001$ , Table 3, Figure 1b), and from minor LE to depression ( $\beta=.18$ ,  $p<.001$ , Table 4). In this model, no significant direct association between minor LE and suicidality could be observed ( $\beta=.02$ ,  $p=.208$ , Table 3). When depression was

taken out of the analysis, a significant path from minor LE to suicidal thoughts became apparent ( $\beta=.03, p<.001$ , Table 5); thus, under this condition we observed a mediating effect. The first hypothesized mediation effect could not be detected in the present sample. There was neither an association between negative life events and suicidal thoughts ( $\beta=.01, p=.261$ , Table 3), nor one between minor LE and suicidal thoughts ( $\beta=-.25, p=.120$ , Table 6). The association between major LE and depression failed to reach the significance level slightly ( $\beta=-.10, p=.080$ , Table 4).

**Table 3: Model 1 – ordered logistic regression for the primary response variable suicidal ideation**

Model 1: SUI = DEP + MINOR + MAJOR				
Explanatory variable	Estim. coeff.	Stand. error	z-value	p-value
Constant(1)	2.98	.55		
Constant(2)	4.56	.72		
DEP	.11	.03	3.49	0.000
MINOR	.02	.01	1.26	0.208
MAJOR	-.02	.02	-1.12	0.261
Pseudo R <sup>2</sup> = 22.3%				

**Table 4: Regression for the secondary response variable depression**

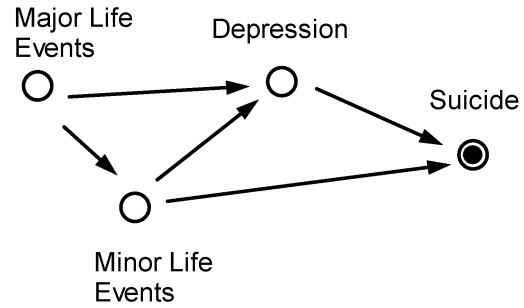
Model: BDI = MINOR + MAJOR				
Explanatory variable	Estim. coeff.	Stand. error	t-value	p-value
(Constant)	2.26	1.53	1.48	0.142
MINOR	.18	.04	4.73	0.000
MAJOR	-.10	.06	-1.77	0.080
Pseudo R <sup>2</sup> = 22.1%				

**Table 5: Model 2 – ordered logistic regression for the primary response variable suicidal ideation**

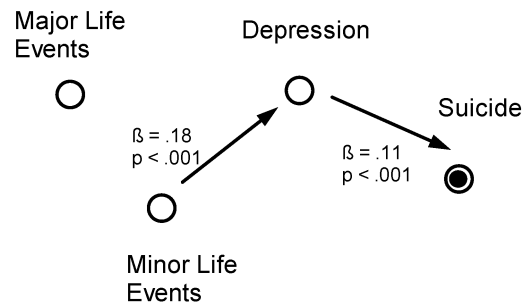
Model 2: SUI = MINOR + MAJOR				
Explanatory variable	Estim. coeff.	Stand. error	z-value	p-value
Constant(1)	2.60	.51		
Constant(2)	3.89	.62		
MINOR	.03	.01	3.30	0.001
MAJOR	-.02	.01	-1.68	0.093
Pseudo R <sup>2</sup> = 11.4%				

**Table 6: Regression for the tertiary response variable minor life events**

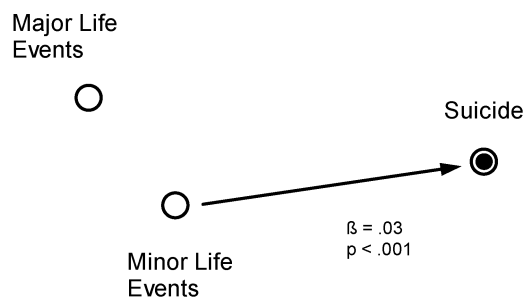
Model: MINOR = MAJOR				
Explanatory variable	Estim. coeff.	Stand. error	t-value	p-value
(Constant)	30.45	2.68	11.37	0.000
MAJOR	-.25	.16	-1.57	0.120
Pseudo R <sup>2</sup> = 2.6%				



**a) mediation model as hypothesized**



**b) observed model**



**c) observed model without depression**

Arrows indicate directed associations, circles stand for continuous variables, the symbol used for suicidal ideation refers to a rank variable (see text).

**Figure 1: Hypothesized and observed paths explaining suicidal ideation**

## Discussion

The results provide support for our second hypothesis, i.e. the mediation effect of depression in the association between minor LE and suicidal ideation. A significant association between minor LE and suicidal thoughts in a model without depression vanished when depression was included. Instead, minor LE showed a significant association with depression and depression a significant association with suicidal ideation. Here, the conditions of mediation as defined by Baron and Kenny [48] were met. (Baron and Kenny restrained their view to consider three variables, only. No method of an integration into a complex model was discussed. Taking into account that drawing a sample generally means to rely on various and partly unobserved background variables, we tested the mediation hypotheses given all other significant effects in the model.)

Our first hypothesis, that there would be a mediating effect of minor LE for the association between major LE and suicidality or major LE and depression could not be confirmed in this sample. The sum score of major LE as assessed by the LES was not significantly associated with any other variable in the model. For one association, the p-value was close to significance, but in each case the value failed to reach the critical level. Given the prodigious evidence of an association between major LE and psychological distress [17], [18], [19], [20], this result is surprising. Several explanations are possible: the most likely one is that major LE were so rare in the present sample of adolescents that there was simply not enough statistical power to establish an association.

However, other reasons may have contributed to the missing effect that we had expected here. The mechanism that coping with major LE leads to an increased number of minor LE may become established later in life but may not be present in 17-year-old adolescents. They typically face a situation that is characterised by leaving home, finishing school, establishing their work situation, and finding a partner. Even if those factors were assessed in our questionnaire used for major LE (LES), they are not necessarily associated with minor LE at this age. Other factors, e.g. still living with parents vs running one's own household, also may contribute to the experience of minor LE. Unfortunately, such factors could not be tested in the model.

The study has several limitations. First and most importantly, suicidality was not very common in this sample. The majority of the participants received a score of zero on the SSI; 14 subjects marked only one to three items of the SSI positive, indicating extremely mild suicidal ideation; as few as 9 subjects reported more severe suicidal ideation. These results led to the necessity of recoding the SSI score into three categories, with the consequence of reducing the information contained in the score along with some statistical power. Second, the explanatory variables also showed skewed distributions, indicating that the subjects of the present sample did not have many problems, on average. Third, the results were

not obtained among suicide attempters but refer to suicidal ideation. It is known that the majority of those who report suicidality fortunately will never commit suicide [49]. On the other hand, it is known that most people who commit suicide have reported suicidality beforehand [8]. Fourth, the sample size is relatively small and the observed effects should be confirmed in a larger sample. Fifth, in this sample females preponderate, so it remains unclear to what extent the present results are valid for males. Sixth, all our data rely on self-reports of the adolescents. An expert measure, such as the HAMD [50] for depression, may have increased the validity of the study. Sixth, even if there is a significant path from minor LE to depression and from depression to suicidal ideation, the effects are small in magnitude and the product likely would be non-significant. One strength of the study is that data have been collected directly from the adolescents – not from caregivers. It has been shown that particularly in the case of good parent-child relationships, the problems of children are not reported accurately by the parents [51].

## Conclusions

We were able to show that depression constitutes a possible mediator between minor LE and suicidal thoughts among adolescents. According to the model, not much common variance is left that may be explained by another pathway. Taking into account that a considerable proportion of depressed patients remain untreated even in wealthy countries [52], and that suicide prevention programs do not demonstrate strong effects in general [53], the present results point towards the necessity of detecting and treating depression [54]. This recommendation seems particularly important because there are concerns that the modern world leads to more depression among children rather than less [55].

## Notes

### Conflicts of interest

None declared.

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