Cross-sectional study on the relationship between life events and mental health of secondary school students in Shanghai, China

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Background: The relationship of demographic factors and negative life events to the mental health of mainland Chinese school students has not been fully explored.

Aim: Assess the prevalence of different types of life stressors among secondary school students and identify the demographic characteristics and types of life events that are most closely associated with perceived psychological difficulties in these students.

Methods: This cross-sectional study administered two self-completion questionnaires to a stratified random cluster sample of 1818 students from four secondary schools in two districts of Shanghai: the Strengths and Difficulties Questionnaire (SDQ) and an abbreviated version of the Adolescent Self-rating Life Events Checklist (ASLEC) that assesses 11 negative life events.

Results: Academic stress (74%), criticism from others (66%), family conflict (29%) and peer bullying & discrimination or interpersonal conflict (26%) were the most frequently reported negative life events, but their prevalence varied significantly by gender, type of school and urban versus rural residence. Similarly, the level of reported psychological stress associated with life events, the total perceived psychological difficulty, and the level of pro-social behavior in the students varied significantly between different groups of students. Multivariate linear regression analysis identified the following independent predictors of high perceived psychological difficulty in the prior 6 months (in order of importance): high total stress score from negative life events in the prior year, experiencing peer bullying & discrimination or interpersonal conflict, not experiencing the death of a family member, male gender, attending a school in a rural district, and not suffering from a major disease or physical impairment. The independent predictors of a high level of pro-social behavior were high total stress score from negative life events, attending an urban school, female gender, attending a regular-tier school (vs. a high-tier school), experiencing peer bullying & discrimination or interpersonal conflict, not experiencing the death of a family member, and attending a middle school (vs. a high school).

Conclusion: Negative life events are one of many factors associated with perceived stress and level of pro-social behavior in secondary school students. Prospective studies are needed to clarify the causal pathways that connect stress with negative life events in students and to develop and test cohort-specific interventions aimed at decreasing stress and increasing pro-social behaviors.

1. Introduction

Secondary school students experience dramatic physiological and psychological changes as well as increasing pressure associated with social competition. Consequently, the mental health of this population has become an increasing concern for society. Surveys in China indicate that 12.9 to 23.2% of adolescents have psychological or behavioral problems. Negative life events can act as psychological stressors that affect the mental health of adolescents. In the present cross-sectional study we assess the relationship of negative life events to the psychological health of secondary school students in Shanghai, China.

2. Subjects and methods

2.1 Subjects

As shown in Figure 1, subjects were selected by stratified random cluster sampling. One urban district (i.e., Xuhui) and one suburban district (i.e., Songjiang)
in Shanghai were randomly chosen from all districts in Shanghai. Two high schools (one top-tier and one regular-tier) and two middle schools (one top-tier and one regular-tier) were randomly chosen from the high schools and middle schools in each of the two districts. (‘Top-tier’ schools have higher standards for admission and get better financial support from the community.) Two classes were randomly selected from each class in each grade for each of the three grades in each school (grades 7, 8, 9 for middle schools and grades 10, 11, 12 for high schools). This resulted in a total sample of 1860 students. All participating students and a parent for each participating student signed a written consent form to participate in the study. The surveys were conducted over a two-week period in March 2007.

2.2 Instruments

The student version of the self-report Strengths and Difficulties Questionnaire (SDQ) was used to assess the psychological status of respondents over the prior 6 months. After its introduction in 1997 by Goodman, this questionnaire has been successfully administered in 40 countries and regions as a brief behavior screening tool with excellent reliability and validity.\cite{7,8} The SDQ contains 25 items (psychological attributes) divided between 5 scales with 5 items each: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and pro-social behavior. Each item is scored on a 3-point scale (0=normal, 1=borderline, 2=abnormal) so each of the five subscales has a range of 0 to 10. The total score on the first four subscales is used as the measure of overall level of difficulty (range=0-40, with higher scores representing greater difficulty). The score on the last scale (pro-social behavior) measures the level of strengths, with higher scores representing better psychological health. In a previous study among Shanghai students\cite{7} the reported alpha values for the five scales ranged from 0.66 to 0.77 and the alpha for the 20 items used to compute the total score was 0.79; the 6-week test-retest reliability for the 5 subscales was fair (Pearson correlation coefficient=0.48-0.74) and the test-retest reliability of the overall SDQ score was good (r=0.72).

The Adolescent Self-rating Life Events Checklist (ASLEC) is used to assess the frequency and intensity of psychological stressors experienced by subjects. In the present study, 11 major negative life events relevant for students were selected from the 27 life events considered by the ASLEC: peer bullying or interpersonal
conflict, major academic stress or failure, intra-family conflict or poor parent relationship, major disease or physical impairment, family financial difficulty, abuse (physical, emotional or sexual), death of a family member, parental divorce, criticism from others, accidents, and other negative events. The respondent codes the time of occurrence of each life event (1=did not occur; 2=more than 12 months ago; 3=within the past 12 months; 4=currently ongoing) and rates the psychological impact of the life event (1=no effect; 2=mild; 3=moderate; 4=severe; 5=extremely severe). The product of these two codes is the stress score for each life event (range=1-20), with higher scores representing greater stress related to the life event.[10,11] An overall life-event related stress score is the simple sum of the 11 separate stress scores (range=11-220).

2.3 Conduct of the survey

Survey forms were distributed to subjects in each class by their teachers. Survey staff (5 psychiatrists) who had received training in the process of conducting the survey explained the instructions to the students, answered any questions they had about the content of the questionnaire, and checked the completed questionnaires for missing items when the students handed in the completed questionnaires. On average it took students 15 minutes to complete the questionnaire. The questionnaire was not completed anonymously; students wrote their names at the top of the form.

2.4 Statistical analysis

SPSS 12.0 software (SPSS, Chicago, IL, USA) was used to analyze the results. Data were assessed using descriptive analysis, t-tests, $\chi^2$ tests, Mann-Whitney tests for ranked variables, and multivariate regression analyses. The distribution of the stress scores for individual life events were quite skewed and many of these events occurred in less than 25% of respondents so the interquartile ranges showed no variation between groups; for these variable we present the mean and standard deviation of the scores (which provides information about the distribution) but use Mann-Whitney tests to make comparisons across groups. Multivariate linear regression models were used to identify demographic and life-event variables that were independently related to perceived difficulty and pro-social behavior as assessed by the SDQ. The demographic variables (gender, urban versus rural school, high-tier versus regular-tier school, high school versus middle school, and grade level) were forced into the regression models and then the life event variables (total stress score from all 11 negative life events, number of life events, and presence or absence of each of the separate 11 life events) were entered in a stepwise manner, only retaining the life event variables that are statistically significant in the model. Age was not included in the model because grade level is very closely related to age.

The study was approved by the Institutional Review Board of the Shanghai Mental Health Center.

3. Results

3.1 General results

A total of 1818 of the 1860 distributed survey forms (97.74%) were validly completed. Subjects who validly completed the survey included 871 males (48.3%) and 947 females (51.7%) with a mean (sd) age of 15.3 (1.7) years (range 12-19 years of age); 967 (53.2%) were from middle schools and 851 (46.8%) were from high schools; 636 (35.0%) were from urban districts and 1182 (65.0%) were from rural districts; and 921 (50.7%) were from top-tier schools and 897 (49.3%) were from regular-tier schools.

The 42 students who did not complete valid forms include 19 males and 23 females with a mean age of 15.5 (1.8) years. There were no statistically significant differences in age (t=–0.79, p=0.432) or gender ($\chi^2=0.12$, p=0.732) between the subjects who provided a valid survey and those who did not.

3.2 Negative life events

The prevalence of negative life events in all students and stratified by gender, by type of school (middle school or high school) and by residence (urban or rural) is shown in Table 1. The most common life events for all groups were academic stress and experiencing criticism from others. Most of the negative life events were more frequently reported by males than females, particularly abuse, accidents, and bullying. Academic stress, intra-family conflict and accidents were more commonly reported by high school students than by middle school students. And compared to students from urban schools, students from rural schools were more likely to report negative life events related to academic stress, bullying, intra-family conflict, or being criticized by others.

The range in the total number of negative life events reported at any time in the past was from 0-11; the mean (sd) was 2.6 (1.8) and the median (IQR) was 2 (1-4). Male students reported more negative life events than females [median (IQR)=3 (2-4) versus 2 (1-3), U=–2.82, p=0.005]; high school students reported more negative life events than middle school students [2 (1-4) versus 2 (1-4), U=2.01, p=0.045]; and rural students reported more negative life events than urban students [3 (2-4) versus 2 (1-3), U=4.90, p<0.001].
3.3 Perceived level of difficulties and stress from negative life events.

The SDQ results (Table 2) show that female students had significantly higher scores for emotional symptoms and for pro-social behaviors than male students, but male students report more difficulties with conduct problems, hyperactivity/inattention and peer relationships, and they have higher overall difficulty scores. The overall life-event related stress score for males was significantly higher than that for females and the stress associated with several specific life events was also higher in males than females, including abuse, accidents, major disease, peer bullying and interpersonal conflict, criticism from others, and family financial difficulty.

Comparison of the SDQ and life event stress results for middle school students versus high school students and for students from rural schools versus those from urban schools are shown in Table 3. Middle school students had significantly higher scores for peer relationship problems and conduct problems than high school students while high school students had higher scores for emotional symptoms and hyperactivity/inattention. Middle-school students also scored higher on pro-social behaviors. The stress associated academic problems and family conflict was significantly greater in high school students than in middle-school students but the stress associated with criticism from others and abuse was significantly greater in middle school students.

| Life event                                                  | Total [N=1818] n (%) | by gender        | by type of school | by residence |
|-------------------------------------------------------------|----------------------|------------------|-------------------|--------------|
| Academic stress or failure                                  | 1339 (73.7)          | 635 (72.9)       | 660 (68.3)        | 416 (65.4)   |
|                                                             |                      | 704 (74.3)       | 679 (79.8)        | 923 (78.1)   |
|                                                             |                      |                  | 31.04 (<0.001)    | 34.26 (<0.001) |
| Criticism from others                                       | 1207 (66.4)          | 602 (69.1)       | 656 (67.8)        | 390 (61.3)   |
|                                                             |                      | 605 (63.9)       | 551 (64.7)        | 817 (69.1)   |
|                                                             |                      |                  | 1.94 (0.011)      | 11.27 (0.001) |
| Intra-family conflict or poor parent relationship            | 524 (28.8)           | 256 (29.4)       | 254 (26.3)        | 149 (23.4)   |
|                                                             |                      | 268 (28.3)       | 270 (31.7)        | 375 (23.1)   |
|                                                             |                      |                  | 6.58 (0.011)      | 13.85 (<0.001) |
| Peer bullying & discrimination or interpersonal conflict     | 471 (25.9)           | 259 (29.7)       | 244 (25.2)        | 130 (20.3)   |
|                                                             |                      | 212 (22.4)       | 227 (26.7)        | 341 (23.8)   |
|                                                             |                      |                  | 0.49 (0.486)      | 15.23 (<0.001) |
| Family member death                                         | 418 (23.0)           | 203 (23.3)       | 217 (22.4)        | 131 (20.6)   |
|                                                             |                      | 215 (22.7)       | 201 (23.6)        | 287 (24.3)   |
|                                                             |                      |                  | 0.36 (0.577)      | 3.17 (0.080) |
| Family financial difficulty                                 | 229 (12.6)           | 122 (14.0)       | 110 (11.4)        | 90 (14.2)    |
|                                                             |                      | 107 (11.3)       | 119 (14.0)        | 139 (11.8)   |
|                                                             |                      |                  | 2.80 (0.103)      | 2.15 (0.159) |
| Accidents                                                   | 170 (9.4)            | 105 (12.1)       | 77 (10.9)         | 59 (9.3)     |
|                                                             |                      | 65 (6.9)         | 93 (10.9)         | 111 (9.4)    |
|                                                             |                      |                  | 4.70 (0.036)      | 0.01 (0.936) |
| Parent divorce                                              | 140 (7.7)            | 57 (6.5)         | 75 (7.8)          | 59 (9.3)     |
|                                                             |                      | 83 (8.8)         | 65 (7.6)          | 81 (6.9)     |
|                                                             |                      |                  | 0.01 (0.930)      | 3.42 (0.066) |
| Abuse (physical, emotional or sexual)                       | 140 (7.7)            | 92 (10.6)        | 84 (8.4)          | 49 (7.7)     |
|                                                             |                      | 48 (5.1)         | 56 (6.6)          | 91 (7.7)     |
|                                                             |                      |                  | 2.83 (0.095)      | 0.00 (>0.999) |
| Major disease or physical impairment                         | 75 (4.1)             | 48 (5.5)         | 40 (4.1)          | 30 (4.7)     |
|                                                             |                      | 27 (2.9)         | 35 (4.1)          | 45 (3.8)     |
|                                                             |                      |                  | 0.001 (>0.999)    | 0.87 (0.387) |
| Other negative life events                                  | 28 (1.5)             | 19 (2.2)         | 19 (2.0)          | 10 (1.6)     |
|                                                             |                      | 9 (1.0)          | 9 (1.1)           | 18 (1.5)     |
|                                                             |                      |                  | 2.46 (0.130)      | 0.01 (0.935) |
Students from rural schools had higher overall difficulty scores than students from urban schools and the scale scores for hyperactivity/inattention and emotional symptoms were also higher in rural students, but the mean scores for pro-social behaviors were much higher in urban students than in rural students. Overall stress from negative life events was higher in rural students than urban students and the stress associated with academic problems, bullying or interpersonal conflict, intra-family problems, and criticism from others was also higher in rural students.

3.4 Multivariate assessment of factors associated with perceived difficulty and pro-social behavior

The results of the multivariate linear regression analyses are show in Table 4. The factors that were significantly associated with high overall perceived difficulty (in order of importance) include: high total stress score from negative life events, experiencing peer bullying & discrimination or interpersonal conflict, not experiencing the death of a family member, male gender, attending a school in a rural district, and not

Table 2. Comparison of the SDQ and ASLEC results for male and female subjects

| Item                                                                 | Total [n=1818] | males [n=871] | females [n=947] | t-value | p-value |
|----------------------------------------------------------------------|---------------|---------------|-----------------|---------|---------|
| **Strengths and Difficulties Questionnaire (SDQ)**                   |               |               |                 |         |         |
| Overall difficulty                                                   | 10.61 (5.05)  | 11.06 (5.20)  | 10.18 (4.88)    | 3.72    | <0.001  |
| Emotional symptoms                                                   | 2.34 (2.09)   | 2.20 (2.05)   | 2.47 (2.12)     | -2.70   | 0.006   |
| Conduct problems                                                     | 2.10 (1.46)   | 2.30 (1.56)   | 1.90 (1.34)     | 5.72    | <0.001  |
| Hyperactivity/inattention                                            | 3.40 (2.03)   | 3.62 (2.08)   | 3.20 (1.95)     | 4.41    | <0.001  |
| Peer relationship                                                    | 2.77 (1.76)   | 2.94 (1.75)   | 2.60 (1.76)     | 4.11    | <0.001  |
| Pro-social behavior                                                  | 5.50 (2.88)   | 5.14 (2.83)   | 5.83 (2.90)     | -5.17   | <0.001  |

| Stress score from ASLEC | Total [n=1818] | males [n=871] | females [n=947] | U'     | p-value |
|-------------------------|---------------|---------------|-----------------|--------|---------|
| OVERALL STRESS SCORE    | 25.5 (15.5)   | 26.5 (15.8)   | 24.6 (15.3)     | 2.05   | 0.041   |
| Academic stress or failure | 5.65 (4.30) | 5.58 (4.42)   | 5.71 (14.20)    | 1.23   | 0.218   |
| Criticism from others   | 4.00 (3.21)   | 4.20 (3.25)   | 3.83 (3.17)     | 2.76   | 0.006   |
| Intra-family conflict or poor parent relationship                    | 2.71 (3.37)   | 2.80 (3.42)   | 2.64 (3.34)     | 1.15   | 0.251   |
| Peer bullying & discrimination or interpersonal conflict             | 2.21 (2.54)   | 2.42 (2.75)   | 2.02 (2.32)     | 3.66   | <0.001  |
| Family member death                                                | 2.16 (2.58)   | 2.21 (2.56)   | 2.13 (2.61)     | 0.88   | 0.377   |
| Family financial difficulty                                         | 1.79 (2.58)   | 1.92 (2.85)   | 1.69 (2.30)     | 1.98   | 0.048   |
| Parent divorce                                                      | 1.55 (2.19)   | 1.47 (2.80)   | 1.63 (2.63)     | 0.91   | 0.364   |
| Abuse (physical, emotional, or sexual)                              | 1.52 (2.07)   | 1.74 (2.50)   | 1.32 (1.55)     | 5.01   | <0.001  |
| Accidents                                                           | 1.46 (1.73)   | 1.60 (1.94)   | 1.35 (1.53)     | 4.09   | <0.001  |
| Major disease or physical impairment                                 | 1.29 (1.55)   | 1.37 (1.66)   | 1.22 (1.45)     | 3.81   | <0.001  |
| Other negative events                                               | 1.12 (1.21)   | 1.19 (1.45)   | 1.07 (0.96)     | 2.47   | 0.013   |

ASLEC, Adolescent Self-rating Life Event Checklist

1. The range in possible scores of SDQ subscale scores is 0-10 and the range for the overall difficulty score is 0-40.
2. The range in possible stress scores for each ASLEC life event is 1-20 and the range for the overall stress score is 11-220.
3. U value is from Mann-Whitney rank test.
suffering from a major disease or physical impairment.
After adjustment for all variables in the model, perceived difficulty was not independently associated with grade-level, type of school (high school vs. middle schools or high-tier vs. regular-tier school) or with the occurrence of any of the other eight negative life events.

The variables significantly associated with high levels of pro-social behavior (in order of importance) include:

- High total stress score from negative life events, attending an urban school, female gender, attending a regular-tier school, experiencing peer bullying & discrimination or interpersonal conflict, not experiencing the death of a family member, and attending a middle-school.
- Grade level and experiencing any of the remaining nine negative life events was not related to the level of pro-social behavior.

| Item                                                   | Middle-school students [n=967] | High-school students [n=851] | Students at urban schools [n=636] | Students at rural schools [n=1182] |
|--------------------------------------------------------|-------------------------------|-------------------------------|----------------------------------|-----------------------------------|
| **Strengths and Difficulties Questionnaire (SDQ)**     |                               |                               |                                  |                                   |
| Overall difficulty                                     | 10.62 (5.21)                  | 10.58 (4.87)                  | 10.13 (5.30)                     | 10.86 (4.90)                     |
| Emotional symptoms                                     | 2.16 (2.02)                   | 2.54 (2.15)                   | 2.21 (2.14)                      | 2.42 (2.07)                      |
| Conduct problems                                       | 2.17 (1.55)                   | 2.01 (1.36)                   | 2.15 (1.57)                      | 2.07 (1.40)                      |
| Hyperactivity/inattention                              | 3.26 (2.07)                   | 3.56 (1.96)                   | 3.09 (2.08)                      | 3.57 (1.98)                      |
| Peer relationship                                      | 3.02 (1.83)                   | 2.78 (1.63)                   | 2.69 (1.64)                      | 2.81 (1.82)                      |
| Pro-social behaviora                                    | 5.70 (2.82)                   | 5.28 (2.94)                   | 6.09 (2.82)                      | 5.18 (2.87)                      |
| **Stress score from ASLEC**                            |                               |                               |                                  |                                   |
| Overall stress score                                   | 25.1 (13.9)                   | 26.0 (17.2)                   | 24.57 (17.13)                    | 26.02 (14.60)                    |
| Academic stress or failure                             | 2.08 (1.08)                   | 2.17 (1.00)                   | 5.20 (4.46)                      | 5.90 (4.20)                      |
| Criticism from others                                  | 1.78 (0.89)                   | 1.57 (0.77)                   | 3.85 (3.47)                      | 4.09 (3.06)                      |
| Intra-family conflict or poor parent relationship       | 1.46 (0.93)                   | 1.49 (0.91)                   | 2.45 (3.29)                      | 2.86 (3.41)                      |
| Peer bullying & discrimination or interpersonal conflict| 1.34 (0.74)                   | 1.36 (0.76)                   | 1.98 (2.46)                      | 2.34 (2.58)                      |
| Family member death                                    | 1.38 (0.90)                   | 1.42 (0.91)                   | 1.98 (2.33)                      | 2.27 (2.71)                      |
| Family financial difficulty                            | 1.18 (0.58)                   | 1.22 (0.70)                   | 1.40 (2.17)                      | 1.74 (2.48)                      |
| Parent divorce                                         | 1.14 (0.52)                   | 1.17 (0.62)                   | 1.50 (2.05)                      | 1.45 (1.55)                      |
| Abuse (physical, emotional, or sexual)                 | 1.18 (0.67)                   | 1.16 (0.64)                   | 1.65 (2.53)                      | 1.50 (2.00)                      |
| Accidents                                              | 1.19 (0.67)                   | 1.16 (0.63)                   | 1.56 (2.32)                      | 1.50 (1.92)                      |
| Major disease or physical impairment                   | 1.12 (0.53)                   | 1.10 (0.52)                   | 1.36 (1.85)                      | 1.26 (1.37)                      |
| Other negative events                                  | 1.05 (0.34)                   | 1.04 (0.34)                   | 1.14 (1.28)                      | 1.12 (1.19)                      |

**ASLEC, Adolescent Self-rating Life Event Checklist**

a The range in possible scores of SDQ subscale scores is 0-10 and the range for the overall difficulty score is 0-40

b The range in possible stress scores for each ASLEC life event is 1-20 and the range for the overall stress score is 11-220

c U value is from Mann-Whitney rank test
4. Discussion

4.1 Main findings

We found that academic stress (74%), criticism from others (66%), family conflict (29%) and peer bullying & discrimination or interpersonal conflict (26%) are the most frequently reported negative life events for secondary students in Shanghai. The prevalence of these events, severity of the psychological stress associated with negative life events, overall perceived psychological difficulty, and level of pro-social behaviors in the students varied significantly by gender, type of school and urban versus rural residence. Male students reported more negative life events, greater stress related to negative life events, and a higher level of perceived psychological difficulty. Meanwhile female students reported higher levels of pro-social behaviors. The overall stress associated with negative life events in the prior year was the most important predictor of self-reported psychological difficulties (i.e., poor ‘mental health’) over the last six months.

These findings are largely consistent with other studies in China and elsewhere. Several studies find that male students have more conduct problems and interpersonal relationship problems than female students[9], and many studies with different types of students find that negative life events can affect the psychological health of students.[4-6,12-16] Where we depart from previous studies is that we computed an overall stress score (by simply adding the stress scores for each of the 11 life events recorded) and found that this measure was the most powerful predictor of perceived psychological difficulty. This suggests that interventions should place more emphasis on reducing stress generally (e.g., stress management techniques) rather on trying to reduce the occurrence of specific negative life events. Moreover, in the multivariate model male students and students from rural schools reported significantly more psychological difficulties so there clearly needs to be some differentiation in the approaches taken to address the problem of student stress in different cohorts of students.

After adjusting for demographic variables and overall life event-related stress, the only remaining factors independently associated with perceived difficulty were: a) experiencing peer bullying & discrimination or interpersonal conflict; b) not experiencing the
death of a family member, and c) not suffering from a serious physical illness or disability. ‘Peer bullying and discrimination’ is quite different from ‘interpersonal conflict’ so it will not be possible to interpret this finding — or to develop appropriate interventions — until the two phenomena are differentiated. The findings that the occurrence of a family death and the presence of a serious medical illness or disability are associated with low psychological difficulty are counter-intuitive; follow-up qualitative work is needed to identify the reasons for this unexpected finding.

We also assessed the factors associated with high levels of pro-social behavior, something that has not been reported previously in China. Not surprisingly, the associated demographic factors were opposite to those found for high perceived psychological difficulty. Where high perceived difficulty was greatest in male students and in those from rural schools, high levels of pro-social behaviors were more common in female students and in students from urban schools. The finding that pro-social behavior was more common in students from regular-tier schools than those from high-tier schools and for students in middle schools than students in high schools requires some further explanation; it may be related to the greater level of competition in high-tier schools compared to regular-tier schools and in high schools compared to middle schools. Somewhat surprisingly, high levels of overall stress from negative life events and experiencing peer bullying & discrimination or interpersonal conflict were also associated with high levels of pro-social behavior. Here, again, prospective studies and qualitative studies are needed to help clarify the relationships between these variables.

4.2 Limitations

Several issues need to be considered when interpreting these results. This large sample is a reasonable representative of students in the two selected districts of Shanghai in 2007 but it may not be representative of other districts in Shanghai or, given the rapid rate of social change in urban China, of the current situations of middle-school students. In particular, the students from ‘rural’ schools in Shanghai are definitely not representative of students from other parts of rural China; we expect the differential results seen in this study for urban and rural students would be much greater if students from rural provinces in China were surveyed.

The current analysis combines three types of life events, those that occurred more than one year ago, those that occurred in the last year but did not have a psychological effect on the respondent at the time of the survey, and those that continued to have a psychological effect on the respondent at the time of the survey. A stratified analysis would be needed to determine whether or not the effects of these different types of life events on the current level of perceived difficulty in students is different. The study selected 11 of the 27 life events included in the ASLEC, but there are no separate reliability and validity parameters for this subset of items from the ASLEC so there remains some doubt about the appropriateness of this abbreviated version of the instrument. And the combination of ‘peer bullying & discrimination’ and ‘interpersonal conflict’ in a single life event on the ASLEC makes it impossible to distinguish these very different situations, situations that have different causes and need different interventions; in subsequent studies these life events should be listed as separate items.

Other potential confounding factors such as academic performance, family financial status, academic level of parents, and so forth were not considered in the analysis of the factors associated with overall perceived difficulty of the students; the results may be different if these additional factors are considered. Given the very large sample size many small differences identified between groups that are probably of little practical significance did, nevertheless, reach statistical significance so readers need to consider both the statistical significance and the magnitude of the differences. Our analysis only considers factors associated with total perceived difficulty; secondary analyses of factors associated with each of the four types of difficulties assessed by the SDQ could provide a more nuanced assessment of the relationships of these issues. Finally, this is a cross-sectional study so it is only able to identify associations, it cannot determine cause-effect relationships. Long-term prospective studies are needed to determine the extent to which the stress associated with life events causes perceived difficulties in students.

4.3 Significance

This large, representative cross-sectional study found a strong relationship between the overall stress associated with life events and the level of perceived difficulty reported by middle school students in Shanghai. There were, moreover, substantive differences in the prevalence of different types of life events, in the stress associated with life events, in the perceived psychological difficulties, and in the level of pro-social behavior of students by gender, type of school, and residence (urban versus rural). Prospective studies that will help clarify the causal direction of these relationships and intervention studies that use this information to test different targeted programs for reducing stress and promoting pro-social behaviors in different cohorts of students are urgently needed.

Acknowledgements

We are grateful to Drs. Guofang Zhang (Mental Health Center, Xuhui district, Shanghai) and Yongxiang Wang (Mental Health Center, Songjiang district, Shanghai) for their assistance and support of this study.
Conflict of interest

The authors report no conflict of interest related to this study.

Funding

The study was supported by a Key Grant from the Shanghai Municipal Center for Disease Control and Prevention.

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(received: 2012-01-12; accepted: 2012-05-02)
上海市中学生心理健康状况与生活事件之间关系的横断面研究

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摘要

背景 在国内，学生的人口学特征及负性生活事件与其心理健康的关系尚未得到充分的研究。

目的 评估中学生中各种生活应激事件的发生率，确定与中学生自我感知的心理健康问题密切相关的人口学特征和生活事件的类型。

方法 采用分层随机抽样的方法进行横断面调查，抽取上海市2个区4所中学共1818名学生，应用2种自评问卷进行评估：长处与困难问卷（Strengths and Difficulties Questionnaire, SDQ）学生版和用于评估11项负性生活事件的简易版青少年生活事件量表（Adolescent Self-rating Life Events Checklist, ASLEC）。

结果 中学生报告的常见负性生活事件为学习压力（74%），受到批评（66%），家庭冲突（29%）以及受人欺负、歧视或人际关系紧张（26%）。但是这些事件的发生率因学生的性别、学校类型以及所处城郊位置不同而有所差异。同样，不同组别的学生其生活事件所致心理应激水平、心理困难总分以及社会行为水平亦有所不同。多因素线性回归分析表明，评估前6个月内心理困难的独立预测因素依次为（按照重要性先后顺序）：过去一年内负性生活事件所致的应激总评分高，受人欺负、歧视或人际关系紧张，没有发生亲人死亡，男性，学校位于郊区，以及未患重病或残疾。社会行为水平的独立预测因素依次为负性生活事件所致的应激总评分高，学校位于城区，女性，普通中学（与重点中学比），受人欺负、歧视或人际关系紧张，没有发生亲人死亡，初中（与高中比）。

结论 与中学生的应激和社会行为相关的众多因素之一是负性生活事件。进一步需要开展前瞻性研究以阐明中学生应激与负性生活事件的因果关系，开展并验证人群特异性的干预方法以减轻应激，增加适应性社会行为。