Negative life events and mental health of Chinese medical students: The effect of resilience, personality and social support

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ARTICLE INFO

Article history:
Received 6 December 2010
Received in revised form 15 November 2011
Accepted 7 December 2011

Keywords:
Resilience
Personality
Social support
Negative life events
Mental health problems
Medical students

ABSTRACT

The present study was conducted on a large sample of Chinese medical students to test the moderating effect of resilience between negative life events and mental health problems, and investigate the factors that affect the mental health problems of the students. The Adolescent Self-Rating Life Events Check List, Eysenck Adult Personality Questionnaire-Revised, Social Support Rating Scale, Connor-Davidson Resilience Scale, and Symptom Check List were adopted for a survey with 1,998 Chinese medical students as respondents. Mental health problems had a positive correlation with negative life events and neuroticism. On the other hand, mental health problems had a negative correlation with social support, extraversion, and resilience. Regression analysis showed that resilience moderated negative life events and mental health problems. Promoting resilience may be helpful for the adjustment of college students.

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1. Introduction

Currently, mental health problems are highly prevalent among medical students (Dahlin et al., 2005; Midtgard et al., 2008). Perceived fatigue, sleeping problems, anxiety, irritability, and depression increasingly affect medical students in the course of their study (Niemi and Vainiomaki, 2006). An eight-year study at the University of Louisville revealed that approximately 20% of their medical students sought psychiatric consultation and treatment because of adjustment problems, emotional disorders, compulsive behavior, and dependent personality disorders, and marital problems (Gordon, 1996). Compared with students in other majors, medical students have additional stress due to their longer course of study, exposure to death and dying, and the strain from working with patients. The excessive stress can lead to physical and mental health problems (Niemi and Vainiomaki, 1999), reduce self-esteem (Silver and Glicken, 1990; Kaplan and Saddock, 2000), and affect their academic achievement and personal or professional development.

Negative or stressful life events have also been associated with an increased risk of mental health problems such as depression and anxiety (Bifulco et al., 2000; Franko et al., 2004). Margaret et al. (2003) investigated 187 college students and found that life stress was one of the predictors of mental health status. There is much empirical evidence showing that increased stress can have a detrimental impact on the academic performance and other life aspects of university students (Chow, 2007; Deroma et al., 2009).

When university students encounter negative events, personality and social support can be their protective factors (Friedlander et al., 2007). Social support is defined as the provision of psychological and material resources of a social network intended to enhance the ability of an individual to cope with stress (Ashtosh and Sharma, 2006). Elliot and Gramling (1990) pointed out that social support from family, friends, teachers, and social groups can help college students lessen psychological problems. Lack of social support is found to be related to various psychological problems such as depression, loneliness, and anxiety (Eskin, 2003). Social support is a buffer against life stressors (McCorkle et al., 2008). Previous research has shown that personality traits are associated with mental health (Clark et al., 1994; Goodwin and Friedman, 2006). Several studies have revealed that a higher level of extraversion can significantly decrease the probability of mental disorders. However, a higher level of neuroticism significantly contributes to mental disorders.

As a component of positive psychology, resilience is an indication of positive mental health. Resilience is broadly defined as the capacity of individuals exposed to a negative event to remain healthy (Bonanno, 2004) and to cope flexibly with challenges of life (Brenda, 2007). Resilient people are typically characterized by optimism, positive coping, and hardiness, and these characteristics are associated with better physical and mental health outcomes (Connor and Davidson, 2003) and more positive adaptive behaviors to negative life events. Compared with young adults with low levels of resilience, those with high levels of resilience are less likely to
have mental health problems, interpersonal conflicts, behavioral disorders, and poor academic performance (Rew et al., 2001). Roy et al. (2011) suggested a possible role for resilience as a protective factor mitigating the risk of making a suicide attempt for an individual who has experienced childhood trauma. Nurgaham et al. (2010) conducted a longitudinal study on a subset of a representative sample of 2,464 students, and revealed that resilience is a moderator of lifetime violent events and attempted suicide. Campbell-Sills et al. (2006) found that resilience can moderate the relationship between early trauma and current symptoms. Similar results are found in the study of Lewis et al. (2008) conducted on 136 information technology students.

The population, and China accordingly, is one-fifth of the world’s population, which has a large number of medical students compared with other countries. However, researchers have devoted limited attention to the mental health of medical students. It is important to understand the relationships between mental health problems and other variables (e.g., personality traits and social support), and to testing the possible moderating effect of resilience between negative life events and mental health problems. Resilience enables people to thrive in the face of adversity. Improving resilience must be an important goal for treatment and prophylaxis (Dmitry et al., 2010). Negative life events may lead to mental health problems such as depression or anxiety, but an individual with a high level of resilience may cope with the difficulties more effectively and remain healthy.

Against this background, we conducted a cross-sectional study on Chinese medical students. We hypothesized that resilience moderated the relationship between negative life events and mental health problems. We also identified possible factors affecting mental health problems, with emphasis on resilience, personality traits, social support, and negative life events.

2. Methods

2.1. Subjects and procedures

A total of 2,089 students were recruited from three Chinese medical schools using mailed letters. Participants provided verbal and written informed consent to participate in the present study, which was approved by the Ethics Committee of the Third Military Medical University. The subjects completed a separate response booklet with structured, anonymous, and self-reported questionnaires. These questionnaires assessed negative life events, resilience, social support, personality, and mental health problems. The data from 71 participants were excluded from the data set because 41 students did not complete the survey and 30 students withdrew prior to the completion of the study. The remaining samples were composed of 849 males and 1,149 females, with age ranging from 18 to 26 years old (mean = 20.24, S.D. = 1.53). The response rate was 96.57%.

2.2. Measures

2.2.1. Psychological resilience

The Connor-Davidson Resilience Scale (CD-RISC) (Connor and Davidson, 2003) is a 25-item 5-point Likert-type assessment that measures the ability to cope with stress and adversity. The total scores range from 0 to 100, with higher scores reflecting greater resilience. The CD-RISC has been demonstrated to have adequate internal consistency, test-retest reliability, and convergent and divergent validity in the general population and patient samples. To improve the readability among Mainland Chinese, translations and back-translations were made by Yu and Zhang. The reliability coefficient of the Chinese version of the CD-RISC was 0.91. The internal reliability coefficients were 0.88, 0.80, and 0.60 for the three factors of Tenacity, Strength, and Optimism, respectively (Yu and Zhang, 2007).

2.2.2. Negative life events

The Adolescent Self-Rating Life Events Check List (Liu and Liu, 1997) is a 5-point Likert scale consisting of 27 items on six factors: interpersonal relationship (e.g., I had argued with my classmates), study pressure (e.g., I failed in the examination), being punished (e.g., I was criticized and punished), bereavement (e.g., A family member/close friend died), change for adaptation and others (e.g., My living habits changed). Responses are made based on a range, from 1 (not at all) to 5 (very much). The scale aims to assess whether the negative events occurred on the participant experienced the negative events as well as the effects, if any, of the stressful life events in the past year. Based on testing of 1,473 college students, the scale demonstrated good psychometric properties (the internal consistency was 0.85). At present, the scale is generally used to measure stress levels of Chinese students.

2.2.3. Personality

The Eysenck Personality Questionnaire-Revised (Gong, 1984) is an 88-item Chinese version of the scale, consisting of the following four subscales of personality: extraversion/introversion, neuroticism (stability/emotionality), psychoticism, and lying (the revelation of falsehoods) for the age range of 16-70 years old. The scale was administered to 2,517 individuals with good psychometric properties (the retest reliability values for each subscale are 0.67, 0.88, 0.80, and 0.78, respectively). The scale has been applied to people with different educational levels in China.

2.2.4. Social support

The Social Support Rating Scale (Xiao et al., 1991) is a 10-item scale that measures three dimensions: objective social support (three items), subjective social support (four items), and social support availability (three items), with higher scores reflecting more social support derived. The scale showed good psychometric properties (with internal consistency of 0.88 and a test-retest reliability of 0.85) among the general population in China.

2.2.5. Mental health problems

In the Symptom Checklist-90-Revised (Derogatis, 1983), the respondents rated the items on a 5-point scale reflecting their distress in the previous week. This 5-point Likert instrument is a multi-dimensional checklist that includes nine subscales (somatization, obsessive-compulsive behavior, interpersonal sensitivity, depression, anxiety, hostility, phobia, paranoid ideation, and psychoticism). The scale evaluated psychiatric and somatic symptoms, and achieved internal consistency coefficients ranging from 0.85 to 0.90, and test-retest correlations from 0.80 to 0.86, effectively reflecting the mental health levels of each individual.

2.3. Data analysis

Pearson correlations were computed to examine the relationships among negative life events, personality, resilience, social support, and mental health problems; the Pearson correlations were computed. Using non-centered data in regression analysis, which refers to the common practice of entering predictors in their original score format, often leads to inconsistent and misleading results. Hence, each of the variables was centered by subtracting the mean from each score (Kraemer and Blasey, 2004). Subsequently, t tests and one-way analysis of variance (ANOVA) were performed, respectively, to test the differences of gender and year in medical school on the total score of resilience. SPSS 15.0 software was used for the data analyses; P<0.05 and P<0.01 were accepted as statistically significant. Hierarchical multiple regression analysis was conducted to examine the hypothesis that resilience moderates the relationship between negative life events and mental health problems. An interaction model might be regarded as a buffering model if an interaction term is observed. The magnitude of the interaction effect might be assessed by the change in R².

3. Results

3.1. Total score of resilience differences on gender and number of years in medical school

The total mean score of resilience was 61.69 (10.55). The scores of males and females were 64.47 (9.93) and 58.92 (10.60), respectively. Male students had higher total resilience scores than female students (t = 5.05, P = 0.000). There was no significant difference in the total score of resilience based on the number of years in medical school (F = 0.875 (3, 1998), P = 0.545).

3.2. Relationship between mental health problems and other variables

Table 1 shows the mean scores, standard deviations, and correlations among all variables. Mental health problems positively correlated with negative life events and neuroticism; in contrast, mental health problems negatively correlated with social support, extraversion, and resilience.

3.3. Regression model of all variables

A hierarchical multiple linear regression was used to analyze associations of the level of resilience with the level of negative life events and mental health problems. The resilience factors that showed salient relationships with mental health problems were first entered into the regression (step 1), followed by negative life events (step 2) and interaction effects of negative life events and resilience (step 3). The resilience score was the strongest predictor, explaining
the 43.2% of the variance of mental health problems. Negative life events and the interaction effect of resilience and negative life events each explained 2% and 1% of the variance in the scores of mental health problems, respectively (Table 2).

To analyze further the interaction effect, the sample was divided into two groups. Group 1 was composed of students with the highest resilience scores (upper 27% of the sample) (Walter, 1937), and Group 2 was composed of students with the lowest scores (lower 27% of the sample). Separate regression analyses were subsequently conducted for the two groups. The associations of negative life events with mental health problems were weaker in Group 1 ($\beta = 0.05$, $t = 2.996, P < 0.001$) compared with Group 2 ($\beta = 0.19$, $t = 4.962, P < 0.001$). Thus, resilience buffered the effects of negative life events on mental health problems.

### 4. Discussion

The aims of the present study were to test the moderating effect of resilience on negative life events and mental health problems, and to investigate the factors associated with mental health problems in Chinese medical students. The main results supported the hypothesis, revealing that resilience had a moderating effect on negative life events and mental health problems. Moreover, negative events, personality traits, social support, and resilience were all found to be related to mental health problems among Chinese medical students.

Our study indicated that mental health problems showed a strong negative relationship to social support, which was consistent with the results from previous studies conducted in other countries (Simon et al., 2004; Bruwer et al., 2008). In addition, mental health problems positively correlated with neuroticism and negatively correlated with extraversion. Neurotic people are more vulnerable to emotional distress and disorder (Kling et al., 2003). In contrast, individuals with low neuroticism scores are considered well adjusted, emotionally stable, and able to cope with stress (Costa and McCrae, 1992). Furthermore, extraverited individuals tend to build strong social support networks easily (Rutter, 1985). In a study of undergraduates at Malaysian universities (2009), neuroticism was a significant predictor in explaining mental health, followed by extraversion. These studies demonstrate that social support and personality traits are both the key predictive factors of mental health.

Negative life events and resilience both had a significant influence on mental health problems. Through hierarchical multiple linear regression analysis and further interaction effect analysis, resilience was found to be a moderating variable between negative life events and mental health problems. Thus, when students encounter negative life events, if they have high resilience, they may not experience mental health problems (such as depression, anxiety, or phobias). The individuals in the present study with high resilience were shown to cope well with adverse events and adapt more successfully. This conclusion agrees with the study of Friberg et al. (2001) on Norwegian college students. In other words, resilient people tend to adapt more successfully even when they encounter adversity.

The present study has several key findings. First, the CD-RISC had not been previously examined using a large sample of Chinese medical students. Compared with other countries, the sample of the present study consisted of a larger number of medical students. Hence, it is possibly representative of the population of medical students and the findings obtained may be generalized. Based on the total score of resilience in the present study, the score of the Chinese medical students was lower than those obtained in other populations: 65.9 (18.5) in South African university students (Jorgensen and Seedat, 2008), 68.3 (17.5) in Iranian undergraduates (Khoshouei, 2009), and 68.3 (12.3) in young Australian adults and undergraduates (Benetti and Kambouroupolous, 2006).

Second, a gender difference was found in the present study. Males scored higher than females on resilience ($t = 5.05, P = 0.000$). However, no gender comparison reached statistical significance in terms of resilience in previous research (Bramness et al., 1991; Campbell-Sills et al., 2006). On the contrary, female students were found to have higher resilience at the Karolinska Institutet (Wallin and Runeson, 2003). One explanation of our result is that females are more willing to report or acknowledge their negative events and emotions, which might threaten and lower their psychological resilience (Parker and Hadzi-Pavlovic, 2004). Another reason is that women are thought to be more sensitive to problems under high-stress conditions (Maciejewski et al., 2001). When encountering difficulties or stresses, females tend to evade or use maladaptive coping strategies, whereas males choose positive coping strategies that focus on the immediate problem (Hampel and Petermann, 2005).

Kjeldstadli et al. (2006) conducted a study and discovered that life satisfaction decreased during attendance at medical school. Edward and Craig (1987) pointed out that resilience among college students decreased as they progressed in their studies. On the contrary, the results in the present study found no significant difference in resilience score among the students who stayed longer in medical school. This finding might suggest that resilience, as a trait, was stable to some degree if there were no severe traumatic events impinging on individuals.

However, several limitations of the present study should be noted. Considering that there have been relatively few studies on the resilience and mental health of medical students, our results should still

### Table 1

Correlations of mental health problems and negative events, social support, personality traits and resilience.

<table>
<thead>
<tr>
<th></th>
<th>Mean (S.D.)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Negative life events</td>
<td>9.37 (4.39)</td>
<td>-0.220*</td>
<td>-0.222**</td>
<td>0.364**</td>
<td>-0.340**</td>
<td>0.311**</td>
</tr>
<tr>
<td>2 Social support</td>
<td>33.75 (4.37)</td>
<td>0.407**</td>
<td>-0.386**</td>
<td>0.543***</td>
<td>-0.496***</td>
<td></td>
</tr>
<tr>
<td>3 Extraversion</td>
<td>13.70 (3.37)</td>
<td>1</td>
<td>-0.355**</td>
<td>0.553***</td>
<td>-0.446***</td>
<td></td>
</tr>
<tr>
<td>4 Neuroticism</td>
<td>10.12 (4.18)</td>
<td>1</td>
<td>-0.490***</td>
<td>0.455**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Resilience</td>
<td>61.89 (10.55)</td>
<td>1</td>
<td>1</td>
<td>-0.658***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Mental health problems</td>
<td>136.01 (26.65)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $N = 1998$; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

### Table 2

Hierarchical multiple linear regression of negative life events and resilience predictors of mental health problems.

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>$\beta$</td>
<td>B</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Resilience</td>
<td>-1.927**</td>
<td>-0.658</td>
<td>-1.791**</td>
</tr>
<tr>
<td>Negative life events</td>
<td></td>
<td>0.908**</td>
<td>0.150</td>
</tr>
<tr>
<td>Negative life events x Resilience (constant)</td>
<td>0.003**</td>
<td>0.007**</td>
<td>33.666**</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>0.432</td>
<td>0.020</td>
<td>0.010</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>0.432</td>
<td>0.452</td>
<td>0.460</td>
</tr>
</tbody>
</table>

Note: $N = 1998$; $\beta$ ($B$) = (non)standardized regression coefficient; $\Delta R^2 = $ variance explained in the step of regression analysis. ** $P < 0.05$; * $P < 0.01$; *** $P < 0.001$
be replicated and verified in other populations. Second, the present study only adhered to a cross-sectional design; hence, it failed to track the mental characteristics of the medical students throughout their entire medical school careers. Furthermore, the use of measures based on self-reporting and judgments by the individual participants might have led to under-reporting and, consequently, the occurrence of type II errors.

Despite these limitations, the present findings demonstrated that resilience has a moderating effect between negative life events and mental health problems. Therefore, for medical students, building resilience is essential for promoting better adjustment in their college life. In future studies, we hope to explore the protective factors of resilience, and how these factors influence resilience.

Acknowledgments

We sincerely thank Jonathan Davidson and Kathryn Connor for providing us with the original Connor-Davidson Resilience Scale and their amendment of this article. We are grateful for the generous contributions of the research participants and the staff who assisted with data collection during the study. The study was supported by National Natural Science Foundation of China (31170994) and the Grant of the Third Military Medical University (2009XY13).

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