INFLUENCE OF INTERNALIZING PROBLEMS ON ACADEMIC ACHIEVEMENT IN CHINESE ADOLESCENTS: THE MEDIATING EFFECT OF ATTENTION PROBLEMS

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Adolescent mental health has become a public concern, and it is necessary to know how problem behaviors affect academic achievement. The current study surveyed 12,672 adolescents in eastern China, and results indicated clinical cut-offs on each problem behavior. We then examined how internalizing problems lead to negative academic results. Findings suggest Attention problems are a key factor. Anxiety/depression and somatic complaints have no direct effect on academic performance but are mediated by attention problems. This study can serve practice of schooling and parenting, and provide basis for developing clinical intervention strategy in China.

Key words: internalizing problem, adolescent, academic achievement, attention problem, mediating effect

INTRODUCTION

Problem behaviors in adolescence

Adolescence is a critical period of physical and mental development, and also a high-risk stage of psychological conflicts, emotional problems and personality disorders. 10–20% of children and adolescents worldwide experience mental disorder. Half of all mental illnesses begin by the age of 14 and three-quarters by mid-20s (World Health Organization, 2015). It's important to study adolescent problem behaviors for knowing about their mental health and predicting their potential to live fulfilling and productive lives. In China, according to earlier rough statistics, the prevalence of problem behaviors among adolescents is 13.01% (Wang, Zhang, & Patrick, 2005), with girls experiencing more internalizing problems and less externalizing problems than boys. Another study indicates that the incidence is increasing each year (Xin & Zhang, 2009). However, systematic surveys of Chinese adolescent mental health are limited in recent years.

Internalizing problems accompanied with attention problems

Anxiety/depression, withdrawal and somatic complaints are internalizing problems included as variables in the Youth Self-Report (YSR; Achenbach & Rescorla, 2001) which obtains 11- to 18-year-olds' self-ratings of specific emotional, behavioral, and social

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problems. Research has shown that somatic complaints are the outcome of a multifactorial process in which biological, psychological, and social factors all play a role (Beck, 2008). Anxiety and depression have moderately strong contemporaneous effects on somatic symptoms. (Janssens, Rosmalen, Ormel, Van Oort, & Oldehinkel, 2010). Withdrawal is characterized by depression, slowness or lack of energy, and shyness.

According to the meta-analysis conducted by Polanczyk, de Lima, Horta, Biederman, and Rohde (2007), the prevalence for attention problems in children and adolescents worldwide was estimated to be 5.29%. Attention problems are characterized by persistent and developmentally inappropriate levels of inattention, hyperactivity and/or impulsivity, and some of the children may be formally diagnosed with attention-deficit/hyperactivity disorder (American Psychiatric Association, 2013). Children with attention problems are less able to regulate their negative emotions (Kim & Deater-Deckard, 2011).

Studies have found that attention problems are often accompanied by internalizing problems (13–51%; Ollendick, Jarrett, Grills-Tauchel, Hovey, & Wolff, 2008), and they may exacerbate the outcomes of a range of internalizing behaviors (Litner, 2003; Deault, 2010). Costello and colleagues (2003) reported that adolescents with attention problems were two to seven times more likely to have a depressive disorder compared with other adolescents. A study by Zavadenko et al. (2011) showed that ratings by both of teachers and parents reflected markedly higher levels of sadness and anxiety among children with attention problems in comparison to those without.

Prediction effects of problem behaviors on academic achievement

Many empirical studies contributed to the prediction effects of problem behaviors on academic achievement. Researchers found that depressive symptoms affected subsequent academic achievement with the possibility of a mediating third variable (Hishinuma, Chang, McArdle, & Hamagami, 2012). Another group of researchers showed that children with anxiety disorders reported more somatic complaints than did the non-anxious children, and the higher frequency of somatic complaints specifically predicted poorer academic performance (Hughes, Lourea-Waddell, & Kendall, 2008). Attention problems also predict academic problems such as grade repetition and lower scores on achievement tests (Polderman, Boomsma, Bartels, Verhulst, & Huizink, 2010).

Attention deficiencies may be not only a leading cause of poor academic functioning but also an important mediator between academic functioning and a variety of other problem behaviors that do not necessarily have direct impact on academic achievements. According to a study by Barriga et al. (2002), although withdrawal, somatic complaints, rule-breaking behavior, and aggressive behavior syndromes exhibit significant zero-order correlations with the academic achievement measures, each of these effects is mediated by attention problems. However, in another comprehensive literature addressing this issue, the mediating effect of attention problems is evident only in childhood but not in adolescence (Hinshaw, 1992). It remains open to debate whether attention problems plays a mediating role for Chinese adolescents.

This study aims to build models to clarify the mediating effect of attention problem between internalizing problems and academic achievement. As youth with attention

problem may be at higher risk of social problems and peer difficulties (Tseng & Gau, 2013), we further examine correlations of internalizing problems, attention problems and social problems.

MATERIALS AND METHODS

Participants

The sample was collected using stratified random sampling. It consisted of 6414 boys and 6258 girls aged from 9 to 20 years. All elementary school students in the sample were enrolled in the fifth or the sixth grades. The older students came from junior high schools, common high schools, key middle schools, selective high schools and vocational schools. Two classes were selected from each school. The sample covered 9 cities and three social economic areas in Jiangsu Province (the north, south and central JiangSu). All students and their school leaders signed the consent form.

Measures

Adolescent Mental Health Related Behavior Questionnaire. The Chinese version of this questionnaire is a multidimensional rating scale that records the demographic information, adaptive functioning and problem behaviors of the youth. It also measures the academic achievements of the youth with a self-rating scale.

Youth Self-Report. This questionnaire consists of two parts. The first part contains a series of questions assessing adaptive behavior. The second part contains 118 items rated on a three-point scale: 0 = not true, 1 = sometimes true, 2 = often true. The ratings of the items are combined to form eight narrow band scales or syndromes, two broad-band scales and a total problem scale. The eight syndrome scales (Withdrawal, Somatic Complaints, Anxiety/Depression, Social Problems, Thought Problems, Attention Problems, Rule-breaking Behavior, and Aggressive Behavior) consist of the YSR factor structure which is used to represent various problem behaviors. The broad-band scales consist of one internalizing scale and one externalizing scale. The internalizing scale is made up of the withdrawal, somatic complaints and anxious/depressed scales whereas the externalizing scale is made up of the aggressive behavior and rule-breaking behavior scales.

Ivanova et al. (2007) have tested the syndrome structure in 23 societies to examine the similarity. The results shows that the eight-syndrome structure fits the patterns of problem ratings by different participants in a wide range of societies and is generalizable to ages 11 to 18 years.

Procedure

The survey was conducted in a quiet, distraction-free student center by trained experimenters. Students visited a specified website to fill out the questionnaires. All the answers were entered into the project implementation unit. Structural equation modeling was based on the scores of all 12,672 participants, and multiple regression analysis was used to examine the effects of problem behavior on academic achievement.

RESULTS

Descriptive statistics and cut-off scores

Mean scores and standard deviations of both genders are presented in Table 1. An independent-samples t test for boys and girls shows that the gender effect was statistically significant on the withdrawal, social problems, thought problems, attention problems, rule breaking behavior and aggressive behavior. Girls' scores were significantly higher on internalizing problems but lower on externalizing problems than boys' scores.

Cut-off scores for the YSR were calculated according to Achenbach's suggestion of the top 2% of the narrow band scales and the top 10% of the broad band scales as the

Table 1. Mean scores and standard deviations of YSR problem scales and Chinese cut-off scores, representing the 90th and 98th percentiles for 12672 adolescents aged 9 to 20 years.

Problems Scales	Boys (N = 6414)				Girls (N = 6258)				Sig.
	Mean	SD	90%	98%	Mean	SD	90%	98%	
Anxiety/Depressed	3.833	4.807	11	18	4.463	4.745	11	18	0.196
Withdrawal	2.358	2.774	6	10	2.557	2.614	6	9	0.001
Somatic complaints	2.440	3.784	8	14	2.862	3.621	8	14	0.874
Social problems	3.076	3.876	8	13	2.874	3.188	7	11	0.000
Thought problems	3.642	4.612	10	17	3.781	4.230	10	16	0.000
Attention problems	2.775	2.934	7	11	2.582	2.689	6	9	0.000
Rule breaking behavior	2.206	3.751	6	13	1.625	2.745	4	9	0.000
Aggressive behavior	4.372	5.733	11	21	4.154	4.805	10	17	0.000
Internalizing problems	8.632	10.476	23	39	9.881	9.834	23	37	0.156
Externalizing problems	6.579	9.173	17	32	5.779	7.150	13	26	0.000
Total problems	28.649	32.988	70	115	24.897	24.731	56	89	0.000

clinical range (Roussos et al., 2001). Table1 shows the descriptive statistics of YSR problem behavior scales and the cut-off scores for both genders.

Mediation effect of attention problems

We explored how attention problems acted as a (partial) mediator and indirectly affected academic achievement (observed variable) in our subsequent regression analysis. We used regression procedures put forward by Wen, Zhang, Hou, and Liu (2004) to reduce the likelihood of Type I and Type II error.

Results indicated that (see table 2) the attention problems variable was a (partial) mediator. In the first model (anxiety/depression as the independent variable) and the third model (somatic complaints as the independent variable), attention problems played a completely mediating role in the relation between problem behaviors and academic performance. The estimate of the mediating effect was -0.061 , and its relative size (the ratio of mediating effect to the total effect) was 0.813 in the first model, and the estimate of the mediating effect was -0.049 , and the relative size was 0.778 in the third model. In the second model, attention problems variable was only a partial mediator, the estimate of the mediating effect was -0.019 , and the relative size was 0.213 .

Results demonstrated that anxiety/depression and withdrawal have no direct negative impact on academic performance whereas somatic problems do.

Association of problem behaviors

Confirmatory factor analysis (CFA) was performed. Standardized factor loadings of

Table 2. Regression analysis of problem behaviors on academic achievement (y coded as academic achievement, x coded as anxiety or depression, u coded as withdrawal, v coded as somatic complaints, w coded as attention problems).

Model	Procedures	Standardized regression equations	Regression coefficients		R ²
1	Step 1.	$y = -0.075x$	SE = 0.009	$t = -8.419^{***}$	0.006
	Step 2.	$w = 0.537x$	SE = 0.007	$t = 71.615^{***}$	0.288
	Step 3.	$y = -0.014x - 0.113w$	SE = 0.010 SE = 0.010	$t = -1.341$ $t = -10.795^{***}$	0.015
2	Step 1.	$y = -0.071u$	SE = 0.009	$t = -8.044^{***}$	0.005
	Step 2.	$w = 0.388u$	SE = 0.008	$t = 47.402^{***}$	0.151
	Step 3.	$y = -0.029u - 0.109w$	SE = 0.010 SE = 0.010	$t = -3.024^{**}$ $t = -11.408^{***}$	0.015
3	Step 1.	$y = -0.063v$	SE = 0.009	$t = -7.125^{***}$	0.004
	Step 2.	$w = 0.432v$	SE = 0.008	$t = 53.868^{***}$	0.186
	Step 3.	$y = -0.014v - 0.114w$	SE = 0.010 SE = 0.010	$t = -1.409$ $t = -11.702^{***}$	0.014

Fig. 1. Structural equation model of problem behaviors.

all data were over 0.53. The root mean square error of approximation was 0.11, and the comparative fit index was 0.95 (considering the size of our sample, chi-square was not used).

Fig. 1 presents the final structural equation model including standardized coefficients and the p-values. Lisrel 8.7 (Maximum Likelihood) was used for analysis. Model fit the data sufficiently (NFI = 0.95, CFI = 0.97).

DISCUSSION

Adolescents' Problem behaviors in Eastern China

The current study presents results of YSR in Eastern China. The cut-offs at the 90th and 98th percentile are meaningful in a variety of fields including clinical treatment and counseling. Compared with U.S. data (Achenbach, 1991), scores on all problem behaviors are lower in Chinese adolescents. Previous studies have found that Chinese/Asian children experience more internalizing problems whereas Western children experience more externalizing problems (Yang, Soong, Chiang, & Chen, 2000; Liu et al., 2001). We found a significant gender difference on problem behaviors, with boys verifying more externalizing but fewer internalizing problems than girls.

Internalizing problems are common in Chinese children and may represent “normal” reactions to some dominant cultural forces (Liu, Cheng, & Leung, 2011). The “problem suppression-facilitation model” (Weisz et al., 1987) considers suppressing or inhibiting the expression as one source of internalizing problems. Asian/Eastern values encourage emotional control and restraint (suppression) while American/Western values encourage free and open emotional expression (Soto, Levenson, & Ebling, 2005; Butler & Gross, 2009). Suppression can be an emotion regulation strategy in China, as cultural expectations may encourage adolescents to suppress their negative emotions in social situations. However, overuse of this strategy is related to poorer adjustment (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004) and might incur internalizing problem behaviors (Hsieh & Stright, 2012).

Mediating effect of attention problems

In this study, attention problems play a mediating role between internalizing problems and academic performance, and a partial mediating role the prediction of social problems.

Adolescents with attention problems have symptoms of impatience and low frustration tolerance, which impairs academic achievement (Biederman, 2005). Neuropsychological theories suggest biological factors in the cognitive impairments related to attention problems (Sagvolden, Johansen, Aase, & Russell, 2005). On the other hand, cognitive impairment is heterogeneous and it can be promoted by internalizing factors (Etgen et al., 2009).

The mediating effects of attention problems in this study suggest that they present risks for academic achievement. A one-year longitudinal study in China has revealed that after controlling Time 1 internalizing problems, Time 1 academic achievement was a significant predictor of Time 2 internalizing problems. However, Time 1 internalizing problems were not a significant predictor of Time 2 academic achievement when controlling Time 1 academic achievement (Ding & Shi, 2012), which is strongly verified in the present study.

Problem behaviors in adolescents

Structural equation modeling shows that attention problem is highly correlated with internalizing problems and social problems. Clinical reviews also show that attention problems have high comorbid rates with depression and anxiety (Angold, Costello, & Erkanli, 1999).

In this study, we point out two main ways of how internalizing problems and externalizing problems incur attention problems. Anxiety and depression could lead to attention problems as a partial mediating factor and result in negative effects through somatic complaints. Adolescents who are immersed in depression or stressful situations may experience psychogenic body complaints which then lead to inattentiveness or hyperactivity. Secondly, social problems could also partially mediate between depression and anxiety and attention problems. Adolescents who are depressed or anxious may fear school or feel unloved, worry about failure or worthlessness, and even generate terrible thoughts of undue guilty, inferiority and suicide. These irrational thoughts give rise to social difficulties, characterized by loneliness, clumsiness, selfishness, overdependence, envy, accident proneness, getting teased, etc. Adolescents' self-reports have also demonstrated that problems in social communication could act as a predictor.

Limitations and future directions

Several limitations should be noted in this study. Firstly, the measures of problem behaviors and academic achievement are based on self-reports, and obtained relationships could be influenced by common method variance. Secondly, socio-regional context may be a significant influential factor in adolescents' health behavior, as our sample was collected exclusively in eastern China. In China, adolescents from different regions have diverse education and growth backgrounds, so future studies should take regional differences into consideration. Thirdly, this study lacks follow-up data. The causes and effects of problem behaviors should be further studied in precise cross-sectional studies.

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