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Teacher autonomy support reduces adolescent anxiety and depression: An 18-month longitudinal study

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ABSTRACT

Grounded in stage–environment fit theory, this study adopts a longitudinal design to examine the contribution of autonomy support from teachers to reducing adolescent anxiety and depression. A total of 236 Chinese adolescents (57.38% females, $M_{age} = 14.34$) completed questionnaires on teacher autonomy support, basic psychological needs satisfaction, school engagement, anxiety, and depression in the fall and spring semesters of their 7th and 8th grade years. The results showed that teacher autonomy support in the fall of 7th grade boosted basic psychological needs satisfaction in the spring of 7th grade; this, in turn, increased school engagement in the fall of 8th grade, which subsequently decreased anxiety and depression in the spring of 8th grade. These findings demonstrated the significant effect of teacher autonomy support on reducing adolescent anxiety and depression; furthermore, it highlighted the mediating roles of basic psychological needs satisfaction and school engagement in this relationship.

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Introduction

Adolescence is a transitional period wherein individuals are highly susceptible to anxiety and depression, due to rapid changes in their physical growth and psychological and social development (Eccles et al., 1993; Hein, Koka, & Hagger, 2015; Vansteenkiste et al., 2012). Numerous studies have shown that adolescent anxiety and depression are related to poor academic performance, poor mental health, and substance abuse, and might foreshadow crime and malfunctioning in adulthood (Capaldi & Stoolmiller, 1999; Hofstra, Van Der Ende, & Verhulst, 2002; Sowislo & Orth, 2013). Given the pervasiveness of adolescent anxiety and depression and their far-reaching impacts on adolescent populations, families, schools, and communities, it is of vital importance to identify the factors related to adolescent anxiety and depression. To do so, this study examined the predictive effect of autonomy support from teachers on adolescent anxiety and depression.

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Teacher autonomy support and adolescent anxiety and depression

The role of teacher autonomy support on adolescent development has received increased attention over the past two decades (Eccles et al., 1993; Jang, Kim, & Reeve, 2012; Yu, Li, & Zhang, 2015). Teacher autonomy support refers to the degree to which students perceive their teachers as providing opportunities for choice and decision making with respect to learning and school life (e.g., “My teachers encourage me to ask questions” or “My teachers ask us what we want to learn about”) (Deci & Ryan, 1985; Jia et al., 2009; Reeve, 2009). Autonomy-supportive teachers are characterized by their ability to adopt adolescents’ perspectives, use of invites and welcomes, and the fact that they incorporate adolescents’ opinions, interests, and concerns into their instruction and school activities; furthermore, they support students’ motivational development and capacity for autonomous self-regulation (Deci & Ryan, 1985; Reeve, 2009). Ecological researcher Bronfenbrenner (1977) posited that development is driven by specific interaction processes between adolescents and the school context; the influence of teacher autonomy support on adolescent anxiety and depression is one such process. There is considerable empirical support for the robust protective effects of teacher autonomy support on adolescent anxiety and depression (Chirkov & Ryan, 2001; Tang et al., 2013; Way, Reddy, & Rhodes, 2007). For example, Chirkov and Ryan (2001) found that teacher autonomy support was negatively related to depression in both Russian and American high school students. Similarly, in a two-year longitudinal study of American adolescents (Grade 6–8), Way et al. (2007) reported that the rate of change in teacher autonomy support was negatively associated with the rate of change in students’ depression. Moreover, in a sample of 4988 Chinese middle school students, Tang et al. (2013) found that those who perceived higher teacher autonomy support showed more skillful emotion regulation and fewer emotional problems (e.g., anxiety and depression). These findings highlight the beneficial role of teacher autonomy support in reducing adolescent anxiety and depression.

Even so, previous research has focused primarily on the direct association between teacher autonomy support and adolescent anxiety and depression; thus, the mediating mechanism underlying this relationship remains largely unknown. It is crucial to identify such a mechanism to best guide creation of prevention programs and targeted interventions for adolescent emotional problems. In the current study, rooted in stage–environment fit theory (Eccles & Midgley, 1989; Eccles et al., 1993), we aim to test two process variables that may help to explain how teacher autonomy support relates to adolescent anxiety and depression—basic psychological needs satisfaction and school engagement.

Basic psychological needs satisfaction and school engagement as mediators

Stage–environment fit theory (Eccles & Midgley, 1989; Eccles et al., 1993) provides an excellent theoretical framework of how environmental influences such as school context affect adolescent development. This theory posits that optimal development takes place when adolescents’ psychological needs adequately fit the opportunities granted by their school environment. More specifically, positive environmental resources such as teacher autonomy support can nurture adolescents’ psychological needs satisfaction, which in turn predicts the extent of school engagement. Ultimately, the extent of school engagement predicts various developmental outcomes such as academic achievement and emotional and behavioral adaptation. In contrast, a mismatch between these psychological needs and school resources can result in maladjustment such as anxiety and depression. This sequential mediation model has been empirically supported in the academic achievement domain (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Jang et al., 2012; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005). However, whether the same model could be applied to adolescent mental health (e.g., anxiety and depression) has yet to be determined. The purpose of the current study was to empirically test this sequential mediation model. Based on the theoretical and empirical evidences, it is plausible to expect that basic psychological needs satisfaction and school engagement will mediate the association between teacher autonomy support and adolescent anxiety and depression. In other words, teacher autonomy support may help satisfy adolescents’ increasing psychological needs, which would promote stronger motivation (e.g., intrinsic motivation) and deeper school engagement, and ultimately facilitate positive adjustment by reducing anxiety and depression.

Adolescence is characterized by decreased parental reliance, more interactions with teachers and peers, an enhanced desire for self-expression, and increased behavioral independence and psychological autonomy (Eccles et al., 1993; Soenens, Park, Vansteenkiste, & Mouratidis, 2012; Waters, Cross, & Runions, 2009). According to self-determination theory, people are motivated by three basic psychological needs—autonomy, competence, and relatedness—which in turn help maintain their psychological health (Deci & Ryan, 1985; Ryan & Deci, 2000a). In other words, individuals will be more intrinsically motivated (i.e., motivated by the enjoyment or interest of performing the act rather than motivated by the outcome of the act; Ryan & Deci, 2000b) to participate and engage in activities if their basic psychological needs for autonomy, competence, and relatedness are satisfied by the context (e.g., school). In contrast, environments that neglect or thwart one’s basic psychological needs can lead to adverse developmental outcomes (e.g., poor academic achievement, physical health challenges, socio-emotional deficits) (Deci & Ryan, 1985; Ryan & Deci, 2000a). Teacher autonomy support can help to satisfy students’ need for autonomy, as well as offer students the opportunity to achieve competence and establish positive interactions with teachers and peers (Adie, Duda, & Ntoumanis, 2008; Hein et al., 2015; Yu et al., 2015). Therefore, psychological needs satisfaction may serve as the motivational mechanism for why students who perceive higher levels of teacher autonomy support show greater school engagement.

School engagement—which reflects the degree to which students are involved in school—is typically regarded as being multidimensional. More specifically, it is considered to have behavioral, emotional, and cognitive aspects (Fredricks, Blumenfeld, & Paris, 2004; Li & Lerner, 2013; Wang & Degol, 2014). Behavioral engagement refers to active participation in school-based activities; emotional engagement refers to students' affective reactions in school, including their interest, values, and emotional attachment; and cognitive engagement refers to students' willingness and effort invested in learning and performance. Drawing on the principles of stage–environment fit theory and self-determination theory, teacher autonomy support is hypothesized to satisfy basic psychological needs, which in turn contribute to adolescent school engagement, including a favorable attitude and strong emotional bonding with the school (emotional engagement), self-regulated learning and preference for challenge (cognitive engagement), and active involvement and persistency in school activities (behavioral engagement).

There is ample empirical evidence supporting the mediating effect of basic psychological needs satisfaction on the relation of teacher autonomy support and school engagement (Jang et al., 2012; Yu et al., 2015; Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006). For instance, Zimmer-Gembeck et al. (2006) found that basic psychological needs satisfaction partially mediated the association between teacher autonomy support and behavioral and emotional engagement among Australian high school students. Similarly, in a two-year longitudinal study, Yu et al. (2015) reported that teacher autonomy support measured in fall of the 7th grade boosted students' basic psychological needs satisfaction a year later (fall of 8th grade), which in turn promoted students' behavioral, emotional, and cognitive engagement in the fall of 9th grade. Therefore, it is plausible to expect that basic psychological needs satisfaction will mediate the association between teacher autonomy support and school engagement.

School engagement has also afforded potential insight into how teacher autonomy support influences adolescent anxiety and depression. As noted previously, students in an autonomy-supportive school are more likely to enjoy school life and be motivated to participate in school activities and invest in learning, which in turn promotes greater adjustment (Eccles et al., 1993; Tian, Han, & Huebner, 2014; Waters et al., 2009). Numerous studies have confirmed the merits of school engagement in reducing adolescent anxiety and depression (Govender et al., 2013; Li & Lerner, 2011; Van Ryzin, Gravely, & Roseth, 2009; for an overview, see Wang & Degol, 2014). Active and engaged adolescents are more likely to gain social–emotional support from teachers and peers, which can help in their coping with life stressors and thereby offset or reduce the likelihood of anxiety and depression.

In addition to this theoretical rationale, the pathway of “teacher autonomy support → school engagement → anxiety and depression” has also garnered empirical support (Chirkov & Ryan, 2001; Savard, Joussemet, Pelletier, & Mageau, 2013; Van Ryzin et al., 2009; Vansteenkiste et al., 2012). In a longitudinal study of American teenagers, Van Ryzin et al. (2009) found that emotional and behavioral engagement mediated the effect of teacher autonomy support on students' hopelessness (a typical internalizing behavior that triggers anxiety and depression). Similarly, Chirkov and Ryan (2001) concluded that teacher autonomy support promoted adolescents' willingness to engage in school life, which was in turn found to be a protective factor against anxiety and depression. More indirectly, there is a large body of research showing that teacher autonomy support is positively related to school engagement (Jang et al., 2012; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Yu et al., 2015) and that school engagement is negatively associated with adolescents' anxiety and depression (Govender et al., 2013; Li & Lerner, 2011; Van Ryzin et al., 2009). Therefore, both the theoretical literature and empirical evidence supports our hypothesis that school engagement mediates the link between teacher autonomy support and adolescent anxiety and depression.

The present study

The current study adopted a longitudinal design to examine the underlying motivational processes in the relationship between teacher autonomy support and adolescent emotional problems. We utilized an 18-month longitudinal design to test the following hypothesis: teacher autonomy support measured in the fall of students' 7th grade (T1) will increase students' basic psychological needs satisfaction measured in the spring of 7th grade (T2); this, in turn, will increase school engagement in the fall of 8th grade (T3), which will ultimately decrease anxiety and depression measured in spring of students' 8th grade (T4). Fig. 1 presents the proposed mediation model.

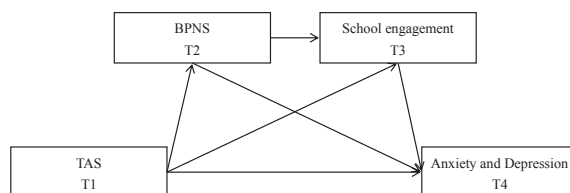


Fig. 1. The proposed mediation model. TAS = perceived teacher autonomy support; BPNS = basic psychological needs satisfaction; T1 = fall 7th grade, T2 = spring 7th grade, T3 = fall 8th grade, T4 = spring 8th grade.

Method

Participants

Participants were recruited from two junior high schools in southern China and were assessed four times with 6-month intervals between assessments. At the baseline assessment (T1; October 2011), 289 seventh grade students participated, all of whom were Chinese. We then re-assessed this sample after a 6-, 12-, and 18-month intervals. Specifically, at T2 (April 2012), T3 (October 2012), and T4 (April 2013), 272, 251, and 236 of them returned and completed the assessment, respectively. Attrition was mainly due to students being absent from school on the day of the assessment or because they had transferred to another school. Chi-square and *t* tests revealed no significant differences in any of the studied variables between students who participated throughout the study period and students lost to attrition. Among the 236 students who fully completed the study, the mean age was 14.34 years ($SD = 0.57$, range 11–17 years) at T4; 57.38% were female, and 111 adolescents came from one school while 125 came from the other. Furthermore, 84.59% of their fathers and 79.55% of their mothers had received junior or senior high school educations, and 73.40% of the participants came from families with an average monthly income of ¥ 1000 to ¥ 5000 per capita.

Procedure

We obtained written informed consent from both participants themselves and their parents before beginning all data collection. The survey was conducted in participants' classes by well-trained psychology graduate students. All participants received instructions and were told that their participation was voluntary and that their privacy would be protected. Adolescents received a pencil for their participation each time. All materials and procedures were approved by the ethics in human research committee of the authors' university.

Measures

Teacher autonomy support In the fall of participants' 7th grade (i.e., T1), students reported their perceived teacher autonomy support using the five-item version of the perceived teacher autonomy support questionnaire (Jia et al., 2009), which has been validated among Chinese adolescents in previous studies (Jia et al., 2009; Yu et al., 2015; Zheng, Zhang, & Li, 2015). For each item, adolescents rated how often the statement (e.g., "Students are given the chance to help making decisions") applied to them on a 4-point scale ranging from "1 = never" to "4 = always." The mean of the 5 items was used in the analysis, with higher scores representing greater teacher autonomy support. The Cronbach's alpha was 0.68, which suggests that this questionnaire had fair internal consistency.

Basic psychological needs satisfaction At T1 and T2, participants reported on their basic psychological needs satisfaction using Gagné's (2003) General Basic Needs Satisfaction Scale. Three items were removed because of their ambiguity and because they had low factor loadings in a previous study (Yu et al., 2015). Six items each tapped autonomy (e.g., "I generally feel free to express my ideas and opinions"), competence (e.g., "Most days I feel a sense of accomplishment from what I do"), and relatedness (e.g., "The people I interact with regularly do not seem to like me much," reverse scored). Participants indicated how true each statement was to their real school life on a 5-point scale ranging from "1 = not at all true" to "5 = very true." The mean of the 18 items was used in the analysis, with higher scores representing greater satisfaction of basic psychological needs. The Cronbach's α coefficients at T1 and T2 were 0.90 and 0.91, respectively, indicating that the scale had good internal consistency.

School engagement At T2 and T3, participants reported their school engagement using the 15-item School Engagement Scale (Zhang et al., 2011). Five items each tapped behavioral engagement (e.g., "I actively participate in classroom discussions"), emotional engagement (e.g., "I am happy to be at my school"), and cognitive engagement (e.g., "I want to learn as much as I can at school"). The response format for behavioral engagement ranged from "1 = never" to "5 = always," and that of emotional and cognitive engagement ranged from "1 = completely disagree" to "5 = completely agree." The mean of the 15 items was used in the analysis, with higher scores representing deeper school engagement. The Cronbach's α coefficients of the whole scale at T2 and T3 were 0.90 and 0.93, respectively, which indicated that the scale had good internal consistency.

Anxiety and depression At T3 and T4, participants reported their anxiety and depression using the anxiety and depression subscales of the Youth Self-Report (Achenbach, 1991). Eight items each tapped anxiety (e.g., "worries," "nervous," "has to be perfect") and depression (e.g., "sad," "worthless," "cries"). Participants rate the extent to which each problem has applied to them in the last six months on a 3-point scale: 1 = never, 2 = sometimes, and 3 = often. The mean of the 16 items was used in the analysis, with higher scores representing a higher level of anxiety and depression. The Cronbach's α coefficients of this scale at T3 and T4 were 0.92 and 0.94, respectively, in the current study, indicating good internal consistency.

Control variables Given that prior studies have shown that adolescents' gender, age, and self-esteem are associated with their level of anxiety and depression (Sowislo & Orth, 2013; Vansteenkiste et al., 2012), we included them as control variables in all of the statistical models. Self-esteem was assessed using the Rosenberg Self-esteem Scale (Rosenberg, 1965). This scale comprises 10 items (e.g., "I feel that I'm a person of worth, at least equal to others"), which assess overall feelings of self-worth or self-acceptance. Adolescents indicated how true each item was of them on a 4-point scale ranging from 1 = strongly

disagree to 4 = strongly agree. Responses across the 10 items were averaged, with higher numbers representing greater self-esteem. For the current study, the measure demonstrated excellent internal consistency (Cronbach's $\alpha = 0.81$).

Results

Descriptive analyses

Table 1 presents the zero-order correlations, means, standard deviations, and internal consistencies of all study variables. Teacher autonomy support at T1 was negatively associated with anxiety and depression at T4, indicating that greater teacher autonomy support was associated with less anxiety and depression a year later. Moreover, basic psychological needs satisfaction at T1 and T2 and school engagement at T2 and T3 were negatively associated with anxiety and depression at T3 and T4. This suggests that greater basic psychological needs satisfaction and school engagement were linked with decreased anxiety and depression. Finally, teacher autonomy support was positively associated with basic psychological needs satisfaction and school engagement.

Testing for mediation effects

We used Mplus 7.1 (Muthén & Muthén, 1998–2012) to perform structural equation modeling with the full-information maximum likelihood estimation method to test the fit of our hypothetical model. The following three indices are recommended by statisticians to evaluate the goodness of fit of a model: (1) the chi-square statistic and normed chi-square (χ^2/df), (2) comparative fit index (CFI), and (3) root mean square error of approximation (RMSEA). The model fit is considered acceptable when the χ^2/df ratio is less than 3, CFI is above 0.95, and RMSEA is below 0.06 (Hoyle, 2012; Hu & Bentler, 1999; Kline, 2011). Adolescents were nested into two schools; however, because having just two schools was insufficient for multilevel modeling (Hox, 1998; Hoyle, 2012; Kline, 2011), we created a dummy variable for the school variable, and included it as a covariate in all of the statistical models. Besides, all the variables were standardized to reduce multicollinearity. Given that anxiety and depression scores were not normally distributed, bias-corrected bootstrap confidence intervals (CIs) with 1000 resamples were used to estimate the statistical significance of the path coefficients (MacKinnon, 2008).

We conducted our model testing as follows. First, we evaluated the fit of the full model, and then conducted model comparisons. The full model (Model 1) included: (a) the hypothesized paths from T1 teacher autonomy support → T2 basic psychological needs satisfaction → T3 school engagement → T4 anxiety and depression; (b) the direct paths from T1 teacher autonomy support and T1 basic psychological needs satisfaction → T3 school engagement and T3 and T4 anxiety and depression; (c) the direct paths from T2 basic psychological needs satisfaction and T2 school engagement → T4 anxiety and depression; and (d) the direct path from T3 anxiety and depression → T4 anxiety and depression. We originally conducted a multi-group comparison analysis to determine whether the associations differed across gender; however, the results of this analysis indicated that there were no gender differences. Therefore, the whole sample was used to evaluate the model.

We first report the results of the full model and then report the results of the model comparison. The full model (Model 1) revealed an excellent fit to the data: $\chi^2(1) = 0.789$, $\chi^2/df = 0.789$, CFI = 1.000, RMSEA = 0.000 (this model has only 1 degree of freedom because the correlation between gender and age was not included in the model). Consistent with the hypothesized pathways, T1 teacher autonomy support enhanced T2 basic psychological needs satisfaction, which in turn improved T3 school engagement. T3 school engagement, in turn, reduced T4 anxiety and depression. Furthermore, we adopted 95% CIs to test the significance of the indirect effects (IEs). CIs that do not overlap with zero indicate significance at $\alpha = 0.05$ (Hoyle, 2012; Kline, 2011). The results revealed a significant IE of T1 teacher autonomy support → T2 basic psychological needs satisfaction → T3 school engagement → T4 anxiety and depression (standardized IE = -0.025 , 95% CI = -0.049 to -0.002).

Table 1
Descriptive statistics and correlations between study variables ($N = 236$).

Variables	1	2	3	4	5	6	7	8	9	10
1.Gender	1.00									
2.Age	-0.05	1.00								
3.Self-esteem	-0.06	-0.04	1.00							
4.TAS T1	0.08	0.05	0.30**	1.00						
5.BPNS T1	0.00	-0.16*	0.50**	0.35**	1.00					
6.BPNS T2	0.00	-0.07	0.42**	0.53**	0.46**	1.00				
7.School engagement T2	0.08	-0.02	0.37**	0.42**	0.40**	0.60**	1.00			
8.School engagement T3	-0.07	0.01	0.39**	0.33**	0.41**	0.52**	0.47**	1.00		
9.Anxiety and Depression T3	0.11	-0.03	-0.29**	-0.22**	-0.30**	-0.25**	-0.27**	-0.41**	1.00	
10.Anxiety and Depression T4	0.08	-0.02	-0.20**	-0.19**	-0.29**	-0.27**	-0.34**	-0.46**	0.60**	1.00
<i>M</i>	0.57	12.85	3.05	3.03	3.58	3.54	3.84	3.85	1.24	1.28
<i>SD</i>	0.50	0.57	0.45	0.62	0.46	0.56	0.75	0.65	0.33	0.36

Note. Gender was dummy coded by 1 = boys and 0 = girls. TAS = teacher autonomy support; BPNS = basic psychological needs satisfaction; SD = standard deviation. T1 = fall 7th grade, T2 = spring 7th grade, T3 = fall 8th grade, T4 = spring 8th grade.

* $p < 0.05$; ** $p < 0.001$.

However, the IEs of T1 teacher autonomy support → T2 school engagement → T3 school engagement → T4 anxiety and depression and T1 teacher autonomy support → T2 school engagement → T3 anxiety and depression were both not significant.

Chi-square difference tests were used to compare the full model (Model 1) with the alternative models (Models 2–17), as shown in Table 2. If the chi-square value increases significantly when a path is removed from the full model, then that path was significant and thus should be retained; in contrast, if the chi-square value increases nonsignificantly when a path is removed, then that path was nonsignificant and should be dropped (Hoyle, 2012; Judd, McClelland, & Ryan, 2011; Kline, 2011). Table 2 summarizes the results of the model comparisons. Based on the criteria mentioned above, the paths removed in Models 3, 4, 5, 10, 12, 13, and 15 should be dropped from the structural model, whereas the paths removed in Models 2, 6, 7, 8, 9, 11, 14, 16, and 17 should be included in the final model (as shown in Fig. 2).

Discussion

This prospective study utilized an 18-month longitudinal design to investigate the underlying mechanism of how teacher autonomy support was related to adolescent anxiety and depression via the sequential mediation of basic psychological needs and school engagement. The findings supported our predictions, as follows: fall 7th grade teacher autonomy support boosted spring 7th grade basic psychological needs satisfaction, which in turn increased fall 8th grade school engagement; this, in turn, led to decreased spring 8th grade anxiety and depression. The results further revealed that basic psychological needs satisfaction and school engagement are two significant underlying psychological mechanisms explaining how teacher autonomy support reduces adolescent anxiety and depression. Specifically, teacher autonomy support significantly increases adolescents' needs for autonomy, competence, and relatedness, thereby making adolescents more engaged and involved in their school daily activities. This enhanced school engagement in turn mitigates or offsets adolescent anxiety and depression. The results echo the empirical evidence in the academic achievement domain (Jang et al., 2012; Wang & Eccles, 2013; Zimmer-Gembeck et al., 2006), suggesting that the merits of teacher autonomy support also apply to emotional adjustment.

It is worth noting that we did not find any support for the direct mediation of basic psychological needs satisfaction or school engagement between teacher autonomy support and adolescent anxiety and depression. The following paths were not significant: (1) T1 teacher autonomy support to T2 basic psychological needs satisfaction to T3 anxiety and depression; (2) T1 teacher autonomy support to T2 basic psychological needs satisfaction to T4 anxiety and depression; (3) T1 teacher autonomy support to T2 school engagement to T3 anxiety and depression; and (4) T1 teacher autonomy support to T2 school engagement to T3 school engagement to T4 anxiety and depression. These findings suggest that basic psychological needs satisfaction and school engagement do not function independently; rather, basic psychological needs satisfaction and school engagement sequentially mediate the relationship between teacher autonomy support and adolescent anxiety and depression. Specifically, basic psychological needs satisfaction facilitated school engagement, which in turn reduced the likelihood of anxiety and depression. Self-determination theory has proposed that increased intrinsic motivation is the direct result of basic psychological needs satisfaction, while school engagement is the outward manifestation of such motivation, expressed via various goal-oriented behaviors, thoughts, or feelings (Fredricks et al., 2004; Wang & Degol, 2014). Therefore, the findings highlight the joint effects of psychological needs satisfaction and school engagement in reducing adolescent emotional problems.

As noted in the Introduction section, the current study elucidated the link of teacher autonomy support with adolescent emotional problems. Although stage–environment fit theory has garnered considerable empirical support in individualistic

Table 2

Model fit statistics and chi-square difference tests comparing fit of the full model (model 1) with alternative models.

	$\chi^2(df)$	χ^2/df	CFI	RMSEA	$\Delta\chi^2(df)$	<i>p</i>
Model 1 (full model)	0.490(1)	0.490	1.000	0.000	–	–
Model 2 (T1 TAS → T2 school engagement)	18.678(2)	9.339	0.973	0.185	17.889(1)	<0.001
Model 3 (T1 TAS → T3 school engagement)	0.928(2)	0.464	1.000	0.000	0.139(1)	0.709
Model 4 (T1 TAS → T3 anxiety and depression)	1.348(2)	0.674	1.000	0.000	0.559(1)	0.455
Model 5 (T1 TAS → T4 anxiety and depression)	1.362(2)	0.681	1.000	0.000	0.573(1)	0.449
Model 6 (T1 BPNS → T2 BPNS)	19.973(2)	9.986	0.971	0.192	19.184(1)	<0.001
Model 7 (T1 BPNS → T2 school engagement)	13.350(2)	6.675	0.981	0.153	12.561(1)	<0.001
Model 8 (T1 BPNS → T3 school engagement)	5.292(2)	2.646	0.995	0.082	4.503(1)	0.034
Model 9 (T1 BPNS → T3 anxiety and depression)	6.937(2)	3.468	0.992	0.101	6.148(1)	0.013
Model 10 (T1 BPNS → T4 anxiety and depression)	1.918(2)	0.959	1.000	0.000	1.129(1)	0.288
Model 11 (T2 BPNS → T3 school engagement)	14.031(2)	7.016	0.980	0.157	13.242(1)	<0.001
Model 12 (T2 BPNS → T3 anxiety and depression)	0.856(2)	0.428	1.000	0.000	0.067(1)	0.796
Model 13 (T2 BPNS → T4 anxiety and depression)	0.823(2)	0.412	1.000	0.000	0.034(1)	0.854
Model 14 (T2 school engagement → T3 school engagement)	8.328(2)	4.164	0.990	0.114	7.539(1)	0.006
Model 15 (T2 school engagement → T3 anxiety and depression)	3.283(2)	1.641	0.998	0.051	2.494(1)	0.114
Model 16 (T2 school engagement → T4 anxiety and depression)	5.271(2)	2.636	0.995	0.082	4.482(1)	0.034
Model 17 (T3 anxiety and depression → T4 anxiety and depression)	73.403(2)	36.701	0.883	0.383	72.614(1)	<0.001

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; TAS = perceived teacher autonomy support; BPNS = basic psychological needs satisfaction.

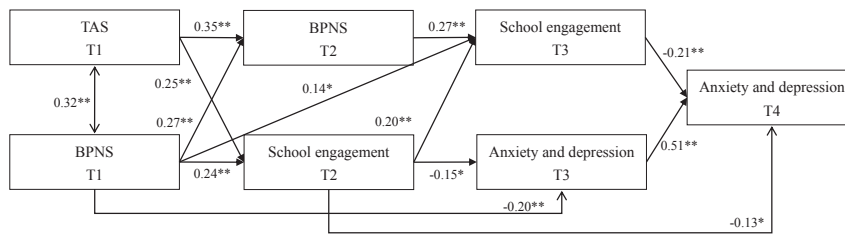


Fig. 2. The final structural model with standardized coefficients ($N = 236$). Nonsignificant paths, paths between gender, age, self-esteem and each of the variables in the model, and error covariance between T2 BPNS and T2 school engagement, T3 school engagement and T3 anxiety and depression were not displayed. Of those paths and error covariance, the following were significant: self-esteem to T2 BPNS ($\beta = 0.18^{***}$), T2 school engagement ($\beta = 0.19^{**}$), and T3 anxiety and depression ($\beta = -0.14^*$); age with T1 BPNS ($r = -0.14^*$); self-esteem with T1 TAS ($r = 0.29^{***}$) and T1 BPNS ($r = 0.50^{***}$); the error covariance between T2 BPNS and T2 school engagement ($r = 0.43^{***}$) and the error covariance between T3 school engagement and T3 anxiety and depression ($r = -0.25^{***}$). TAS = teacher autonomy support. BPNS = basic psychological needs satisfaction. $^*p < 0.05$. $^{**}p < 0.01$.

cultural settings (e.g., the United States, Wang & Eccles, 2013; Zimmer-Gembeck et al., 2006), there has been little empirical investigation on such links in the collectivistic cultural context. Our results add to the literature by showing that the need for autonomy is equally important in collectivistic culture such as China. Given the cross-cultural significance of autonomy is still debatable (Chen, Yao, & Yan, 2014; Zhou, Ma, & Deci, 2009), these findings are important to the field. Some researchers (i.e., Iyengar & DeVoe, 2003; Markus & Kitayama, 2003) have argued that autonomy is an individualistic value inherent to Western culture, whereas in collectivistic cultures such as China, loyalty, harmony, and conformity are strongly valued, and the experience of being led and controlled is culturally normative. On the contrary, the findings of the current study have reconfirmed the importance of autonomy in improving adjustment outcomes for adolescents in China.

Implications

The present study has several practical implications for schools, teachers, and parents. First, the findings suggest that increased autonomy opportunities could be an effective way of reducing anxiety and depression among adolescents. This is of particular importance in the Chinese school context, because the Chinese classroom culture is characterized by a strict hierarchical relationship between teachers and students, wherein students are given very limited autonomy (Jia et al., 2009; Zhou et al., 2009). Some recent research (Vansteenkiste et al., 2012; Yu et al., 2015; Zhou et al., 2009) has suggested that teachers could improve students' sense of autonomy by acknowledging their feelings, providing more opportunity for choices, and minimizing use of shame- or guilt-inducing teaching strategies. Additionally, our mediation findings suggested two important avenues for potential intervention. For example, practices that promote basic psychological needs satisfaction or school engagement, ideally a combination of the two, might be more effective in reducing adolescent emotional problems such as anxiety and depression.

In addition, the current study makes a significant contribution to the existing literature by confirming the cultural universality of students' need for autonomy. Our results showed that teacher autonomy support works in much the same way as it has been shown to work in Western school contexts in reducing adolescent problem behaviors, with basic psychological needs satisfaction and school engagement as the underlying mediators. These findings demonstrate the importance of teacher autonomy support for adolescent anxiety and depression and the interpretative power of combining basic psychological needs satisfaction and school engagement.

Limitations

Several limitations of the current research should be noted. First, the data were collected using self-report measures. Although self-report methods are warranted for the exploration of perceived teacher support (Eccles, Lord, & Roeser, 1995), subjective satisfaction, and affective states (Chan, 2009), self-report data are subject to common method biases (i.e., variance attributable to the measurement method rather than to the measured construct; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Thus, future studies should use multiple informants and multiple methods for data collection. Second, given our control of gender, age, and self-esteem, future research should consider including other relevant control variables such as family dynamics (Eccles et al., 1993). Third, generalization of our findings is somewhat limited, as this study only focused on Chinese adolescents. Therefore, future research should recruit a larger sample from a wider cultural background in order to clarify the relationships between the variables addressed in this study. Fourth, considering the increasing demands for both autonomy and assertiveness during adolescence, we concentrated only on the effect of teacher autonomy support; future research will need to include other factors related to the teacher, such as perceived teacher care (Bieg, Rickelman, Jones, & Mittag, 2013). Finally, adolescents with anxiety and depression might be more likely to rate teacher autonomy support negatively, and thereby might experience less needs satisfaction and less engagement with school. Therefore, future research should include multiple waves of data for each construct and examine alternative models.

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