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The Relationship Between Perceived Stress and Adolescent Depression: The Roles of Social Support and Gender

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Abstract In this study, we explored the roles of differential social support in strengthening capability to cope with stress for positive responding against depressive symptoms and further explored the moderating role of gender with a sample of 1,674 junior high school students. Participants responded to a series of scales including their levels of perceived stress, depressive symptoms, and quality of social supports. The results evidenced the mediating roles of family and others' support in the relationship between perceived stress and depression and the mediating effects were found to fit only boys instead of girls. What's more, the moderating effect of social support between perceived stress and depression was only found in the subcategory of friend support. The moderating effect of friend support between perceived stress and depression was found to have significant gender differences. The significance and limitations of the results were discussed.

Keywords Adolescents · Family support · Friend support · Others' support · Mediating effect · Moderating effect

1 Introduction

Depression, with a core of mood disorders such as dismay, worthlessness, helplessness, and hopelessness and a decline in physical activity, along with a series of physically and psychologically uncomfortable symptoms, is an invalid response to the consequences of life stress (Naicker et al. 2013). As a very common symptom in adolescent populations, numerous studies have shown that depression has increased dramatically during adolescence and can be regarded as a danger that cannot be ignored (Brière et al. 2013). Depression can affect the normal growth and development of adolescents as well as their school performance and their relationships with peers and family members (Lee et al.

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2010; Thapar et al. 2012). In addition, adolescent depression is a serious illness associated with substantial morbidity and mortality as a number of researchers have evidenced the high suicide rate resulted from depression (AlHorany et al. 2013; Mueller 2009). Therefore, studying adolescent depression and its related risk factors during adolescence is of great necessity.

Perceived stress has proven to be an important factor affecting adolescent depression. Perceived stress is defined as the extent to which an individual experiences life events as unpredictable, uncontrollable, or overloading (Cohen et al. 1983). The intensity of perceived pressure and the degree of depression has been found to work in a manner of dose–response relationship, that is, greater perceived stress is always associated with more serious depressive symptoms (Neese et al. 2013). A large number of studies have also focused on the effects of perceived stress on depression in adolescents. When adolescents perceive an increase in stress, they may experience fatigue, guilt, depressive mood, dissatisfaction, a sense of failure, irritability, and other symptoms associated with depression (Choi and Dancy 2009). The greater the amount of perceived stress, the more obvious the increase in an individual's level of depression (Liu and Alloy 2010).

One important focus of depression research has been on stress and coping frameworks. Previous studies found that perceived social support can influence how people perceive stress. Social support refers to the degree to which individuals believe that family, friends, and others can be expected to provide material assistance, emotional relief, and information when necessary (Thoits 2011). Social support can also alleviate the adverse consequences of perceived stress, reduce an adolescent's sensation of pressure, and improve their ability to adapt to stress (Beehr et al. 2010). What's more, social support may interfere with the relationship between a stressful event and a stress reaction by reducing or preventing the evaluation of the event as a stress. Specifically, the support of others can provide the necessary resources to make it possible to redefine potential hazards by strengthening a person's perceived ability to deal with the requirements imposed, thus preventing the particular case from being evaluated as high stress (Park et al. 2013).

In addition, a large number of empirical studies have found the significant negative correlation between social support and depression. In other words, the greater the perception of social support, the less the experience of depressive symptoms (Grav et al. 2012). Conversely, people who perceive less social support are prone to report more depressive symptoms, especially when he or she is in need of others' support (Auerbach et al. 2011). In other aspects, existing studies have also revealed the intervening role of social support on depression. For example, Chou and his colleagues revealed the mediating effects of social support in a study which indicated that social support was either a complete or a partial mediator in the relationship between different major sources of income and depression in a target population (Chou et al. 2004). Studies have shown that social support can change the strength of the relationship between perceived stress and depression. High social support lowers the predictive power of perceived stress for depression; in other words, social support has a significant moderating effect on the relationship between perceived stress and depression (e.g., Peirce et al. 2000).

Social support is an important psychological resource for teenagers in enabling them to deal effectively with outside pressures and negative emotional experiences. The three main sources of social support are family support, friend support and others' support (Zimet et al. 1990). Different types of social supports, as different interpersonal relationships, can serve as different roles and provide different functional resources for adolescents, such as emotional, material, informational, esteem and companionship support (Levitt et al. 2005). For example, when determining future plans and facing choosing a college or a future

occupation, parents are more likely to be the main provider of the referencing information for adolescent students, followed by friends, teachers, and classmates (Brown 1990; Malmberg 2001); while friend support plays a more important role in forming styles of adolescent behavior and thinking (Bandura and Walters 1963; Rueger et al. 2010). However, the empirical evidence still showed mixed results as to the effects of different types of social support on depression. For example, Burton et al. (2004) found that family support instead of peer support was of more robust effect on adolescents' depression, while Young et al. (2005) didn't find the independent effect of either family support or friend support on adolescents' depression.

Previous studies have focused on the relationship between perceived stress and depression as well as on the roles of social support in the relationship between perceived stress and depression. However, seldom has yet explored the specific effects of different subtypes of social support (i.e., friend support, family support, or others' support) on the relationship between perceived stress and depression among adolescents, nor has research examined the effects of gender on the roles of the different subtypes of social support in the relationship between perceived stress and depression among adolescents.

Drawing on previous literature about the relationship between perceived stress, social support, depression, and gender differences on social supports, this study examined the respective roles of family support, friend support, and others' support in the relationship between perceived stress and depressive symptoms and further explored the moderating effects of gender. Based on the literature review, we made the following hypotheses for our research.

Hypothesis 1 Family support, friend support and others' support may play mediating roles in the relationship between perceived stress and depression.

Hypothesis 2 Family support, friend support and others' support may moderate the relationship between perceived stress and depression.

Hypothesis 3 Gender moderates the relationships between perceived stress, social support (i.e., friend support, family support, and others' support) and depressive symptoms for adolescents.

2 Methods

2.1 Participants

A total of 1,700 questionnaires were collected from high school students. After removing 26 invalid questionnaires, a total of 1,674 valid questionnaires remained, among which 49.04 % were boys (N = 821) and 47.37 % were girls (N = 793) except 60 students who didn't report their gender. Children's age ranges from 13 to 16, and their average age was 15.90 (SD = .91), with boys' average age being 15.96 (SD = .92) and girls' 15.84 (SD = .89).

2.2 Procedure

The study was conducted in high schools in an East-Asian country. Before filling the questionnaires, we first explained our research purpose to students and assured them that they were voluntary and free to decline participation without any negative consequences.

Then we distributed the questionnaires to students and asked them to finish the self-report survey anonymously and handed them into the experimenter. All the participants finally received small gifts as rewards.

2.3 Measures

2.3.1 Depressive Symptoms

A short version of the Center for Epidemiological Studies Depression Scale was used to measure the level of depressive symptoms in the participants. 13 items, such as "I had trouble keeping my mind on what I was doing", and "I felt that everything I did was an effort" were included in the scale. Each item was accompanied by a standard 4-point Likert scale of potential responses from 0 (1 or 2 days a week) to 3 (5 days or more per week). Higher scores indicate more depressive symptoms (Radloff 1977). In previous studies, the CES-D-13 was correlated closely with the original 20-item version of CES-D, with a correlation coefficient of .97. Through rigorous testing, the CES-D-13 has also been shown to have a high reliability with an α coefficient of .87 for all 13 items (Zhang and Li 2011). In current sample, the α coefficient for the total scale of 13 items was .85.

2.3.2 Perceived Social Support

The perceived social support scale was used to measure the perceived availability and satisfaction with social support. The scale consists of 12 items, which yield three subscale scores for family support (e.g., "my family is willing to help me make decisions"), friend support (e.g., "I can talk about my problems with my friends"), and others' support (e.g., "there is a special person (other classmates or teachers) in my life who cares about my feelings"). Using a 7-point Likert scale, the items should be scored from 1 (very strongly disagree) to 7 (very strongly agree). A high score means a high level of perceived social support (Zimet et al. 1988). The Cronbach's alpha for family support was .87, friend support was .85 and others' support was .91. In this study, the three dimensions of the scale were used to measure the subjects' perceived family support, friend support, and others' support.

In order to examine whether dividing social support into three subcategories is reasonable, confirmatory factor analysis was employed to determine the best fitted factor structures of social support. Specifically, we compared the goodness of fit of three competing models including a first-order factor model, a second-order factor model and a one-factor model to confirm whether friend, family and other support form distinct subtypes of a higher order social support factor and whether dividing social support into three subtypes fits better than single factor. In the first-order factor model, family support, friend support and others' support were regarded as three independent factors. Because these factors were also correlated with each other, we used the oblique rotation model. The goodness of fit of the first-order factor model showed that $\chi^2(51) = 378.52$, $p < .000$, comparative fit index (CFI) = .96, root mean square error of approximation (RMSEA) = .06, and Akaike information criterion (AIC) = 432.52. As all indices lay within the suggested range, the fit of the model is quite reasonable. In the second-order factor model, the three factors including friend, family and others' support were considered to be dependent on a single second-order factor. The result also showed satisfactory fit indices, with $\chi^2(51) = 378.52$, $p < .000$, CFI = .96, RMSEA = .06, and AIC = 432.52. In the one-factor model, the total score of the social support items was used as an indicator of social support, which suggests a unidimensional structure. The result of the goodness of fit indicated that the

single-factor model of social support showed the worst fit to the data, as $\chi 2(54) = 1{,}638.20$, $p < .000$, CFI = .81, RMSEA = .13, and AIC = 1,686.20. As the first-order factor model and the second-order factor model were both satisfactorily established than the unidimensional structure of social support, it suggested that friend, family and other support form distinct subtypes of a higher order social support factor. So we picked the more parsimonious structure of dividing social support into three subtypes.

2.3.3 Perceived Stress

The Perceived Stress Scale (Cohen et al. 1983) is one of the most widely used psychological instruments for measuring the perception of stress. The scale consists of 14 items (e.g., "In the last month, how often have you felt that things are going your way?"). Participants were asked to evaluate the level of perceived stress during the last month through a 5-point response scale (from 0 = never to 4 = very often). The total score on the PSS is obtained by adding the 14 item scores. A higher score indicates a higher level of perceived stress. For current sample, the Cronbach's alpha coefficient was .72.

2.3.4 Gender

A questionnaire was designed to collect background information on a number of demographic variables, including gender, class and so on. Gender was used in this study and was assessed using a fixed-response item (coded 1 = boy; 2 = girl). Gender was coded as a dummy variable with girl as the omitted category.

2.4 Data Analysis

First, we examined the measurement invariance of perceived stress, social support and depression to test whether the constructs we used have the same psychological meaning for boys and girls with AMOS 17.0. Then, the preliminary analysis of the data was conducted with SPSS 16.0 to examine the correlation between variables. Also we used SPSS 16.0 to test the multiple mediating effects and the applicability of the multiple mediator model across the two gender groups. Fit indices reported in the current study include χ^2, df, RMSEA, AIC, and CFI. Following the recommendation by Schermelleh-Engel et al. (2003), the cut-off standards of these fit indices are as follows: RMSEA values lower than .08 are accepted; CFI values greater than .90 are accepted; AIC values in default model lower than that in saturated model and independent model are accepted. Finally, in order to analyze for the presence of moderating effects, we conducted three regressions with SPSS 16.0 to test the moderating roles of family, friend and others' support and the moderating role of gender in these moderating effects.

3 Results

3.1 Measurement Invariance of Perceived Stress, Social Support and Depressive Symptoms

As has been suggested by Vandenberg and Lance (2000), when using the same measure in two different groups, measurement invariance should be established to make sure the

measure taps the same construct (such as social support) in the same way across groups and meaningful comparisons between groups can be made. The measure social support used is of three-factor construct while perceived stress and depressive symptoms are both of single-factor construct. We conducted a test for measurement invariance to examine whether these constructs have the same psychological meaning for boys and girls. The measurement invariance traditionally tested the fit indices of nested models in the order of configural invariance, metric invariance and scalar invariance. In the configural invariance model, no equality constraints were imposed on the intercepts, factor loadings and residual variances across groups. Then in the metric invariance model, factor loadings were set equal across gender and in the scalar invariance model, intercepts and factor loadings were set equal across two groups. The results of measurement invariance of perceived stress, social support and depressive symptoms have shown acceptable model fits as is shown in Table 1. Take social support as an example. The results showed that the configural model fitted the data reasonably well, with $\chi^2(102) = 461.64$, $p < .001$, CFI = .96, RMSEA = .05, and AIC = 569.64. Then in the metric invariance model, factor loadings were set equal across gender, and the constrained model showed acceptable model fit, with $\chi^2(111) = 464.74$, $p < .001$, CFI = .96, RMSEA = .04, and AIC = 554.74. The change in fit indices between configural and metric invariant model were not significant, $\Delta\chi^2 = 3.10$, $\Delta df = 9$, $p > .05$. Then in the scalar invariance model, intercepts and factor loadings were set equal across two groups and the results also indicated well fit indices with CFI = .96, RMSEA = .05 and AIC = 550.16. The changes in fit indices between the metric and the scalar invariance models were not significant, $\Delta\chi^2 = 7.42$, $\Delta df = 12$, $p > .05$. The results showed that the constructs of friend, family and others' support, though form distinct subtypes of social support, have the same psychological meaning for both gender groups. What's more, compared with the configural model, the fit indices in metric invariant model didn't change significantly in perceived stress and depressive symptoms, with $\Delta\chi^2 = 6.23$, $\Delta df = 13$, $p > .05$ and $\Delta\chi^2 = 23.11$, $\Delta df = 12$, $p > .05$ independently. The changes in fit indices between the metric and the scalar invariance models were also not significant with $\Delta\chi^2 = .15$, $\Delta df = 14$, $p > .05$ in perceived stress and $\Delta\chi^2 = 27.34$, $\Delta df = 13$, $p > .05$ in depressive symptoms separately. Consequently, all the psychological constructs were proven to have the same psychological meaning across gender groups, allowing for comparisons of means and associations with other constructs between boy group and girl group (Table 1).

3.2 Intercorrelations Between Variables

The correlations among variables are presented in Table 2. Perceived stress was negatively and significantly correlated with friend support ($r = -.35$, $p < .01$), family support ($r = -.26$, $p < .01$) and others' support ($r = -.33$, $p < .01$), while it was positively and significantly correlated with depressive symptoms ($r = .31$, $p < .01$). What's more, depressive symptoms was significantly correlated with friend support ($r = -.19$, $p < .01$), family support ($r = -.25$, $p < .01$) and others' support ($r = -.25$, $p < .01$) in negative direction.

3.3 Mediating Effects of Friend Support, Family Support and Others' Support

To test the mediating roles of three subcategories of social support, a multiple mediation model was investigated with a structural model (see Fig. 1) and tested the path relationships among perceived stress, friend, family and others' support and depressive symptoms.

Table 1 Goodness-of-fit indices for invariance models of perceived stress, social support and depression

Model	χ^2	df	AIC	RMSEA	CFI
Perceived stress					
Configural	481.185	154	673.185	.038	.902
Metric	487.416	167	659.416	.037	.903
Scalar	487.570	181	657.570	.037	.903
Social support					
Configural	461.638	102	569.638	.047	.958
Metric	464.738	111	554.738	.044	.959
Scalar	472.158	123	550.158	.043	.958
Depressive symptoms					
Configural	768.329	130	928.329	.056	.928
Metric	791.438	142	929.438	.054	.927
Scalar	818.782	155	930.782	.052	.925

Table 2 Correlations among main variables

	1	2	3	4	5
1. Perceived stress	–				
2. Friend support	−.348**	–			
3. Family support	−.263**	.427**	–		
4. Others' support	−.328**	.686**	.642**	–	
5. Depressive symptoms	.310**	−.194**	−.245**	−.250**	–

* $p < .05$ (2-tailed); ** $p < .01$ (2-tailed)

Mediating effect occurs when the effect of an independent variable (X) on a dependent variable (Y) is transmitted by one or more mediator (Preacher et al. 2007). The mediation size was assessed with a bootstrap procedure using the SPSS version macro by Preacher and Hayes (2008). In order to bootstrap the sampling distribution of the total indirect effects, 2,000 bootstrap samples was used and the estimates and bias corrected 95 % CI were shown in Table 3. The multiple indirect effects of perceived stress on adolescents' depressive symptoms was .08, SE = .02, bias corrected CI = [.05, .11], $p < .001$. Specifically, in agreement with results of the product-of-coefficients strategy, the bias corrected CIs of mediation effects of family and others' support don't include zero as is described by Shrout and Bolger (2002), indicating that family support and others' support play mediating roles in the relationships between perceived stress and depressive symptoms (partially support Hypothesis 1).

3.4 Gender Differences of Mediating Effects

In order to determine whether the multiple mediation model remains constant across different gender groups (Hypothesis 2), we tested the moderating role of gender to examine whether the mediating model fits both boy and girl samples. The results showed that the fit indices were satisfactory in both boy and girl group, with fit indices in boy group being $\chi^2(97) = 423.34$, $p < .001$, $CFI = .94$, $RMSEA = .06$, and $AIC = 501.34$ and in girl group, $\chi^2(97) = 350.72$, $p < .001$, $CFI = .94$, $RMSEA = .06$, and $AIC = 428.72$. However, the regression weights results showed that all the path coefficients were significant in

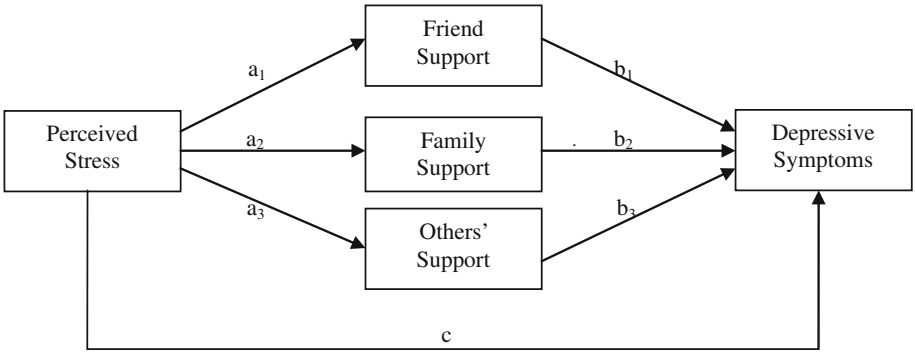

Fig. 1 Interrelationship model of perceived stress, friend support, family support, others' support and depressive symptoms

boy group, while path b_1, b_2 b_3 and c were not significant ($p > .05$) in girl group as is seen in Fig. 2. So the mediating model fits only boys instead of girls.

3.5 Moderation Analysis

In this study, in order to analyze for the presence of moderating effects (Hypothesis 3), we conducted three regressions in which depression was separately regressed against the product of friend support and perceived stress, the product of family support and perceived stress, and the product of others' support and perceived stress to determine the interaction effects. The main effects of friend support, family support and others' support were similarly included in the first, second and third models, respectively. Friend support, family support and others' support were centralized before creating the products. If the interaction effects between the independent and the moderator variables (i.e., the product term of friend support and perceived stress, that of family support and perceived stress, and that of others' support and perceived stress) on the dependent variable were statistically significant when their independent effects were controlled, moderation had occurred.

3.5.1 Moderating Effects of Friend Support

The results of the hypothesized moderating effects of friend support are presented in Table 4. The interaction between friend support and perceived stress on depressive symptoms was significant, $\beta = -.02$, $SE = .01$, $B = -.08$, $t = -3.32$, $p < .01$, indicating that the relationship between perceived stress and depressive symptoms was affected by the level of friend support, as perceived by the adolescents.

To further verify the moderating effects of friend support, according to the friend support scores, the highest 27 % of the subjects' scores and the lowest 27 % of the subjects' scores were taken to compose a high friend-support group and a low friend-support group. Then we conducted a regression analysis of the perceived stress on depression for each of these two groups.

In the high friend-support group, $\beta = .31$, $SE = .06$, $B = .23$, $R^2 = .06$, $p < .001$ and in the low friend-support group, $\beta = .48$, $SE = .07$, $B = .34$, $R^2 = .11$, $p < .001$. These results showed that in the high friend-support group, perceived stress accounted for 5.5 % of the variance in depression, less than the 11.3 % of the variance in the low friend-support

Table 3 Mediation effects of family, friend and others' support in the relationship between perceived stress and depressive symptoms

	Causal steps approach: coefficients			Bootstrapping: indirect effects of IV on DV through proposed mediators (a * b paths)				
	IV to mediators (a paths)	Mediators to DV (b paths)	Direct effect of IV on DV (c path)	Point estimate	Product of coefficients		BCa 95 % C	
					SE	Z	Lower	Upper
Family	−.2763***	−.1565***		.0433	.0117	3.6993***	.0160	.0719
Friend	−.3568***	.0130		−.0046	.0159	−.2916	−.0374	.0330
Others	−.3186***	−.1336*		.0426	.0176	2.4216*	.0054	.0842
Total			.3353***	.0812	.0146	5.5541***	.0517	.1136

Total effect of IV on DV (c path) = .4165; Z, asymptotic critical ratio; BC, bias corrected; 2,000 bootstrap samples

* $p < .05$; *** $p < .001$

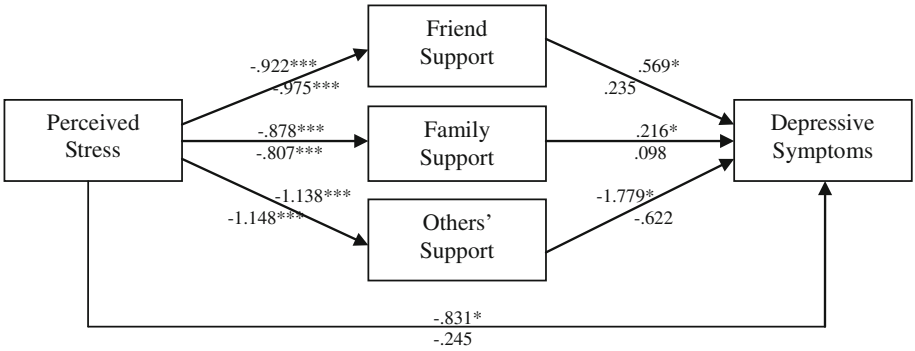

Fig. 2 Estimates of mediating model in boy and girl samples. *Note Data above the arrowhead* represents path coefficients of boy group; *data below the arrowhead* represents girl group. ***$p < .001$; *$p < .05$

group. This finding shows that the higher the level of friend support, the smaller the predictive power of perceived stress on depression and further indicates that friend support buffered the impact of perceived stress on depression, that is, that friend support played a moderating role.

In order to further reveal the moderating effect of friend support in the relationship between perceived stress and depression, we used simple slope tests with the results shown in Fig. 3.

As can be seen in Fig. 3, for the low friends-support group, the simple slope = 1.33, $t = 28.26$, $p < .001$; for the high friends-support group, the simple slope = −.59, $t = 12.55$, $p < .001$. These results showed that, compared with the high friend-support group, the low friend-support group had the stronger predictive power of perceived stress on depression.

3.5.2 Moderating Effects of Family Support

The results of the possible moderating effects of family support are also presented in Table 3. The interaction between family support and perceived stress on the depressive symptoms was not significant, $\beta = -.01$, $SE = .01$, $B = -.03$, $t = -1.35$, $p > .05$. This result indicated the family support did not moderate the effects of perceived stress on depressive symptoms in these adolescents.

3.5.3 Moderating Effects of Others' Support

The results of the hypothesized moderating effect of family support are also presented in Table 3. The interaction between others' support and perceived stress on depressive symptoms was not significant, $\beta = -.01$, $SE = .01$, $B = -.05$, $t = -1.96$, $p > .05$. This result indicated that others' support did not moderate the effects of perceived stress on depressive symptoms in these adolescents.

3.6 Gender Difference of Moderating Effects

Because the moderating effects of family support and others' support were not significant, we did not further investigate the role of gender in these moderating effects. Thus, we next

Table 4 Results of moderation analysis with regard to friend support, family support, and others' support

	Moderation analysis for friend support				Moderation analysis for family support				Moderation analysis for others' support			
	β	Beta	SE	t	β	Beta	SE	t	β	Beta	SE	t
Perceived stress	.368	.273	.034	10.693***	.357	.265	.033	10.758***	.343	.255	.034	10.117***
Friend support	−.124	−.092	.034	−3.618***								
Family support					−.219	−.172	.031	−6.971***				
Others' support									−.225	−.161	.035	−6.356***
Interaction effects												
Friend support × perceived stress	−.019	−.079	.006	−3.316**								
Family support × perceived stress					−.007	−.032	.006	−1.350				
Others' support × perceived stress									−.011	−.047	.006	−1.957
R^2	.110				.125				.122			

β indicates the unstandardized coefficients, and Beta indicates the standardized coefficients

** $p < .01$; *** $p < .001$

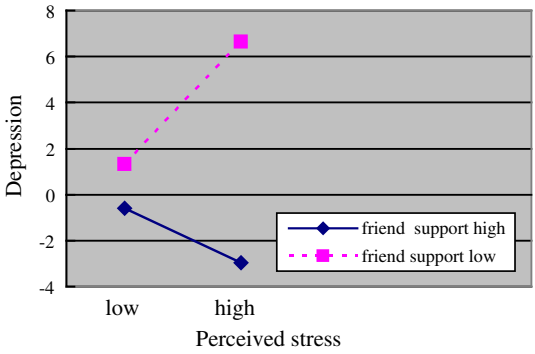

Fig. 3 Interaction between friend support and perceived stress in their effect on depression

focused on the significance of the moderating effect of friend support by gender (Hypothesis 2).

To analyze for the role of gender, we conducted a regression in which depressive symptoms was regressed against the product of friend support, perceived stress, and gender to determine the interaction effects. Moderation effects were indicated by the presence of statistically significant interactions between the independent and moderator variables, and gender (i.e., the product term of perceived stress, friend support, and gender) on the dependent variable, when their independent effects were controlled.

The interaction between perceived stress, friend support, and gender on depressive symptoms was significant, $\beta = -.03$, $SE = .01$, $B = -.09$, $t = -3.45$, $p < .01$. These results indicate that gender moderated the effects of perceived stress and friend support on depressive symptoms among adolescents.

To further verify the moderating effects of gender, boys and girls were considered separately in regression analyses of perceived stress and friend support on depression. The details of the regression equations are presented as follows: in the girls group, the interaction between perceived stress and friend support on depressive symptoms was significant, $\beta = -.02$, $SE = .01$, $B = -.10$, $t = -3.01$, $p < .01$; in the boys group, the interaction between perceived stress and friend support on depressive symptoms was marginally significant, $\beta = -.02$, $SE = .01$, $B = -.06$, $t = -1.82$, $p = .07$. These results indicated that the girls were more vulnerable than the boys to the impact of friend support.

4 Discussion

4.1 The Mediation Effects of Friend Support, Family Support and Others' Support and Moderating Role of Gender

Previous studies have explored the mediating role of social support in the relationship between stress and adolescents' well-being including depression, but they have found conflicting results. For example, McDougall (2005) found the mediating role of social support in the relationships between symptoms of social anxiety and depression among high school-aged youth with chronic physical health problems. While Yami and Katz (1997) evidenced against the mediating role of social support because they found that stress didn't predict social support despite the significant correlation between social support and negative affectivity as well as stress and negative affectivity.

We first examined the roles of three types of social support (i.e., friend support, family support, and others' support) in the relationship between perceived stress and depression and the results partially revealed the mediating roles of two subtypes of social support. Adolescents who perceived higher level of stress showed more dissatisfaction with social support and reported lower family, friend and others' support, which would in turn increase their report of depressive symptoms (except that the effect of perceived friend support on depression was not statistically significant). The result evidenced the change of subjective feeling of social support with the fluctuation of the perception of stress and in turn takes effect on depression among adolescents, echoing the social support deterioration model, that is, stressful events may lead to the decreased perception of social support (Barrera 1988). Consequently, when adolescent teenagers feel greater pressure, they may need increased support from family members and others to help them relieve stress. All these supports from different sources should be effective tools for reducing the perception of stress.

The gender difference of the mediating model lies in that the mediating roles of three subtypes of social support were only found in male group rather than female group. Specifically, the increase of perceived stress would result in the decrease of perceived social support in both boy and girl groups. However, the decreased perception of social support was only found to result in significantly higher level of depressive syndrome in boy than girl group. It means that when in situations where they feel less social support from family, friends or others, boys are more vulnerable to emotional problems than girls. The reason may be boys are more vulnerable to interpersonal conflict when they experience decreased social support. As an important resource of social support, interpersonal relationship has different effects on boys and girls (Blyth and Foster-Clark 1987). Generally, girls receive and give more emotional support in interpersonal relationship than boys, while boys seek and receive more tangible support (Reevy and Maslach 2001). As boys during early adolescence period tend to have better relationships with the opposite-sex peers than girls (Blyth and Foster-Clark 1987), boys would receive more emotional support from their friendship with opposite-sex peers; boys can also receive material and information assistance from their same-sex peers. What's more, studies have proven the positive effect of father involvement instead of mother involvement on adolescents' resilient response against setbacks (Zhang et al. 2014). Because girls have proven to have better relationship with mothers and boys have better relationship with fathers (Blyth and Foster-Clark 1987), boys are able to receive more beneficial resources from family support than girls do, which would benefit them in improving their depressive syndromes. That is, boys are more dependent on their interpersonal relationship than girls. Consequently, the lack of social support may not only lead to the demand of additional social support but also generate more interpersonal disorder to boy group than to girl group, which would lead to higher level of subsequent depressive symptoms. Thus, more social supports should be given to boys who were in stressful situations to benefit their psychological well-being.

4.2 The Moderating Effects of Friend Support and Gender

First, previous studies have mostly focused on the buffering role of social support on perceived stress (e.g., Peirce et al. 2000). Consistent with previous research (except Burton et al. 2004 with participants from western cultures), our results partially supported the moderating role of social support in the effect of perceived stress on depression among adolescents. Perceived stress is associated with social support in that, if a person is subject to certain types of social support, he or she will underestimate the damage of stress

scenarios and reduce the perception of stress. Thus, social support plays a buffering role on perceived stress thereby reducing the adverse effects of perceived stress (Park et al. 2013). This can also be explained by self-determination theory (SDT). Social support, as a basic environmental need of relatedness, can provide individuals with a sense of connectedness and benefit individuals in coping with stressful situations. On the contrary, the absent or lack of social support may lead to increased stress and less resilient responses, such as depression (Weinstein and Ryan 2011; Brown and Ryan 2007). What's more, social support would affect stress processing, cognitive appraisal and coping strategies for better adaptation and less mental problems.

Second, along with the studies showing the extremely important role of friend support in adolescents' behavior (Mercken et al. 2010; Rueger et al. 2010), the results of this study deepen these studies by further investigating the moderating roles of different types of social support in the relationship between perceived stress and depression and found that the buffering effect of social support exists only in friend support instead of family and others' support. That is, under increased perception of stress, those who perceived higher quality of friend support would result in lower level of depression and the lack of friend support may result in the increase of depressive symptoms. In the concept analysis by Dennis (2003), among the various functions, one indirect path of the intervening effect of friend support on adolescents' depressive symptoms is by indirectly reducing impact of stressors. Actually, under stressful situations, friend support can also benefit by directly decreased isolation from others and increased sharing of health and self-management information (Dennis 2003). Based on these findings, taking friend support into account in studies that examine the intervening factors that mitigate depressive symptoms for adolescent population is reasonable.

Another interesting finding of the present study is that the strength of the moderation of friend support differed by gender. That is, the strength of the moderation of friend support on the relationship between perceived stress and depression was stronger in the girls than in the boys. When girls have sufficient friend support, their perceived stress will impose less harmful effects on their positive affect; but when they lack friend support, their perceived stress will contribute more to their depressive symptoms. For boys, perceived stress and depression are closely related to each other regardless of their perceived levels of friend support. Dalgard et al. (2006) once suggested that when confronted with negative life events, women with less social support were more vulnerable than men with less support. Rueger et al. (2010) also indicated that girls seek friend support to get emotional support and to cope with stresses while boys tend to use physical recreations to deal with stresses, that is, friend support plays a more significant role in girls' mental health development than boys'. However, our results didn't evidence the moderating role of family support in the relationship between perceived stress and depression. During adolescent period, the relative importance of peer or friend increased while they communicate less with parents. This may because they are in a special period seeking for independence from parents and endeavor to find their value in peers.

4.3 Implications and Limitations

This study has important theoretical implications in that it extends the field of research about the relationship between perceived stress and depressive symptoms among young people. A large number of studies have examined the associations between perceived stress and depression and have revealed a significant correlation between these two variables (Baldwin et al. 2003; Chang and Sanna 2003). Additionally, many studies also found that

perceived social support can influence how people perceive stress (Kwag et al. 2011; Seeman 1996). However, to the authors' knowledge, this study is the first attempt to examine the respective roles of family support, friend support, and others' support in the relationship between perceived stress and depressive symptoms using a youthful sample and further explored the moderating effects of gender.

This study also has important practical implications for interventions aimed at mitigating depression among young people. The discoveries of this study showed that friend support was a moderated mediator for the relationship between perceived stress and depressive symptoms, indicating that the effects of family support and friend support on the depression were different in adolescents. Baron and Kenny (1986) suggested that knowing which particular factors play moderator or mediator roles is significant for understanding the complicated relationship between risk factors and depression so that interventions can be planned accordingly. The results remind us that, in order to reduce the likelihood of adolescent depression, enhancing family support and friend support is important.

This study has three study design limitations. First, the use of cross-sectional design makes it difficult to reveal the causal relationships between the variables. Previous studies have revealed that personality vulnerability and stressful events work together to affect depression and also proven that personality may take effect through the disturbed relationships and decreased social support. Consequently, personality should be taken into consideration as an important moderator in future studies (Zuroff et al. 2004; Klein et al. 2011). Second, because the relationship between perceived stress and depression is influenced by culture and since this research was conducted in the context of Eastern culture, whether these results are suited to Western culture is worthy of further investigation. Compared with the West, the East may place more emphasis on relationships (Sampson 1988). Ultimately these differences will affect the different roles that the various types of social support play in Eastern and Western cultures. Future research could focus on exploring whether the impact of social support on the relationship between perceived stress and depression in the East has applicability in the West, that is, whether it is indicative of relationships in Western culture. Third, the term "others' support" in this study primarily refers to classmates' support and teachers' support. Of course, others' support may also involve some other relationships which may also have an impact on the relationship between perceived stress and depression. What is more, there may be interactions between these variables which can be revealed through more in-depth discussions and research in the future.

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