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The relationship between conscientiousness and posttraumatic stress disorder among young Chinese firefighters: The mediating effect of perceived social support

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ABSTRACT

Previous studies have showed that personality traits are associated with posttraumatic stress disorder (PTSD). The present study investigated the mediating effect of perceived social support between conscientiousness and PTSD in young Chinese firefighters. A total of four hundred and nine firefighters were recruited from a firefighter school in this study. The Chinese big five personality inventory, the PTSD checklist for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), and perceived social support scale were used to test personality traits, PTSD and perceived social support from family and from others. The results showed that conscientiousness has a significant positive correlation with perceived social support and has a significant negative correlation with PTSD. Moreover, support from others mediated the relationship between conscientiousness and PTSD, while support from family didn't. The results of this study suggest that support from others plays a key role in the relationship between conscientiousness and PTSD of young Chinese firefighters. Clinical implications for trauma interventions and limitations were discussed.

1. Introduction

Over the last few decades, research has provided extensive empirical support for the fact that people who were exposed to a wide range of extreme life events may develop mental problems, such as depression, anxiety, and posttraumatic stress disorder (PTSD; Ayub et al., 2015; Cao et al., 2015; McLean et al., 2015). Among these, PTSD is the typical negative psychological problem (Chen et al., 2014; Wilson et al., 2004).

Except direct victims of the disaster, rescuers such as firefighters, also have a high possibility to develop PTSD. Firefighters have the permanent responsibility for the tasks of firefighting and salvage operation, and they often witness the trauma and death scenes, which may lead to mental pressure (Bryant and Harve, 1995; Katsavouni et al., 2015; Wagner et al., 1998). What's more, there are some people in China who have the dual identities of a firefighter and a solider. In daily life, they live in the army and participant in the military training, while they do fire-fighting work outside when there are fire disasters. Therefore, they also have the pressure of the military training except the stress of facing crisis situations, which increase the risk of PTSD. A survey of firefighters after a forest fire rescue found that the prevalence rate of PTSD among them was 13% (McFarlane, 1988). Moreover, there is a study that has documented the prevalence rate of 33% for firefighters in Hurricane Katrina (Sharma et al., 2008). Since firefighters are susceptible to PTSD, it is of great importance to investigate the impact factors of PTSD among them, trying to improve this critical situation.

Currently, researchers are paying more attention to the correlative factors of PTSD (Silvestre et al., 2014). In previous studies, in addition to the disaster itself, there are many factors associating with PTSD, such as genetic factors, education, exposure to trauma, the fear of death, the preexisting appraisal, the death of a colleague, physical injury and personality traits (Andrew et al., 2013; Berant and Pizem, 2015; Berninger et al., 2010; Bryant and Guthrie, 2007; Jakovljević, 2012; Jakovljević et al., 2012).

Among those, personality traits are widely perceived as contributing to PTSD (Bryant and Harvey, 1995; Gil, 2005; Miller and Resick, 2007; Wolf et al., 2012). The firefighters take high responsibility for saving lives in a fire disaster. Therefore, a sense of conscientiousness is crucial to them. There are different personality models in interpreting the relationship between the personality and PTSD (Miller, 2003). A study proved that conscientiousness is significantly associated with positive

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changes after traumatic events (Campbell-Sills et al., 2006). Caska et al. (2013) also suggested that higher extraversion and conscientiousness may ease the symptoms of PTSD. However, to our knowledge, it is still not very clear how conscientiousness is related to PTSD. This current study will explore the internal mechanism of the relationship between conscientiousness and PTSD by taking the perspective of perceived social support into consideration.

Perceived social support is individuals gain spiritual and material support from their relationships, which can relieve the mental stress reaction and improve their social adjustment (Schwarzer and Knoll, 2007). According to the direct effect model of perceived social support, perceived social support can directly contribute to posttraumatic adaptation by enhancing people's healthy behavior (Ali et al., 2012; Ma et al., 2011; Neria et al., 2008). There is growing amount of research that has studied the mitigation effect of perceived social support on PTSD, and the results showed that perceived social support can directly alleviate PTSD (Platt et al., 2014; Tarrier and Humphreys, 2004; Wright et al., 2013). In a supportive perceived social environment, individuals can be encouraged to think positively about traumatic events, promote the integration of trauma significance, and reduce the negative effects of the events. However, in indifferent perceived social environments, individuals cannot effectively receive cognitive exposure to the traumatic events, so the trauma will have a greater negative impact on them (Carpenter et al., 2010). Research also showed that the lack of perceived social support can increase the PTSD (Vranceanu et al., 2007).

Moreover, there is also a direct relationship between personality and perceived social support. Pierce et al. (1997) demonstrated that perceived social support can reflect personality and information processing mode. For example, Bowling et al. (2005) found that extraversion and agreeableness are associated with perceived social support. What's more, individuals who have a higher score in conscientiousness are prone to interpret other's behavior conduct as prosaically supportive behavior (Moran et al., 1997), then positive emotions can lead to a greater perceived social support (Wood et al., 2008).

From a review of previous theories and empirical studies, we can find that conscientiousness is associated with perceived social support, and perceived social support can decrease PTSD (Ali et al., 2012; Ma et al., 2011; Moran et al., 1997). Therefore, perceived social support will probably act as a mediator in the relationship between conscientiousness and PTSD. To be specific, firefighters with high levels of conscientiousness may perceive increased perceived social support, which may lead to low levels of PTSD symptoms. To our knowledge, this mediation model has not been studied in prior studies among firefighters.

Besides, some psychologists have pointed out that different sources and types of perceived social support may have different influence in the same variance (Sun et al., 2014). Families and friends are the two most important parts in our life. Prior studies found that support from family is important in the process of reducing PTSD (e.g., Batten et al., 2009; Scarpa et al., 2006). Families can provide timely and full support when individuals are in trouble, which may help them recover from traumatic events. What's more, some firefighters live in the military that is a closed-off environment, in which they meet peers and supervisors almost every day, which is also an important support system. The study among firefighters found that support from supervisors has significantly negative correlation with perceived stress (Varvel et al., 2007), which may have a great effect on the recovery from PTSD. In addition, Laffaye et al. (2008) found that support from peers is the most common source of emotional support among veterans. Therefore, in this study, we choose the two scores of perceived social support (i.e. support from family and support from others) to examine their key role on the relationship between conscientiousness and PTSD.

Above these, in this study we hypothesized that (1) conscientiousness has the negative correlation with PTSD; (2) conscientiousness has the positive correlation with perceived social support; (3) perceived social support and PTSD have the negative correlation; (4) support from family and support from others play the mediating role between conscientiousness and PTSD.

2. Methods

2.1. Participants and procedures

We recruited firefighters in a firefighter military school in September 2017. Those firefighters have the dual identities of a firefighter and a solider. They lived in the army for at least 2 years before they moved to firefighter school and can't go back home unless on vacation (they have 30 days of vacation a year). In daily life, they participate in military training in the army, while they do fire-fighting work outside when there are fire disasters. One month ago, they moved to the firefighter military school (consisting of firefighters, supervisors, and some teachers) from different armies to learn more about fire-fighting, where they also can't go back home until winter and summer vacation in China.

A total of 409 firefighters completed the whole process of study. The participants were all males. The mean age of the firefighters was 21.34 (SD = 1.58) years, and the age range was 18–29 years. Of this, 32.8% (n = 134) of them worked less than 3 years, 27.1% (n = 111) worked for 3 years, and 31.3% (n = 128) worked over 3 years (36 participants didn't report their working years). In terms of education, 8.1% (n = 33) of them were junior high school or below, 75.3% (n = 308) of them were high school, and 14.2% (n = 58) of them were Bachelor (10 participants didn't report their education). Table 1 shows the details.

The research project was approved by The School of Psychology Nanjing Normal University Institutional Review Board. The purpose of the study was highlighted before the survey, and the informed-consent forms were provided to all participants. We used the questionnaire packets to assess the personality, perceived social support and PTSD of firefighters in the firefighter school. The test was conducted in a quiet environment with the organization of the instructor. Participants were initially asked to write their number on the first page and provide demographic information including their gender, age, and working years et al. They were then asked to complete the remaining questionnaires. After the questionnaires were completed, we offered participants group counseling for relaxation and compensation.

2.2. Measures

2.2.1. The Chinese big five personality inventory (CBF-PI)

The Chinese Big Five Personality Inventory (CBF-PI) (Wang et al., 2010) was used to assess dimensions and facets of The Big Five. The questionnaire was adapted for people who received secondary education and were 16 years old or older in China. This 20-item questionnaire

Table 1
Demographics of firefighters.

	N	Percentage
Age		
<21	130	31.8%
21–22	176	43.0%
>22	92	22.5%
Working years		
<3	134	32.8%
3	111	27.1%
>3	128	31.3%
Education		
Junior high school or below	33	8.1%
High school	308	75.3%
Bachelor	58	14.2%

Note. 11 participants didn't report their age; 36 participants didn't report their working years; 10 participants didn't report their education.

has five factors which are *extraversion, neuroticism, openness, agreeableness*, and *conscientiousness*. Items are rated on a 5-point Likert scale ranging from 1 (*very like me*) to 5 (*very unlike me*). Higher scores indicate higher level of personality trait. The conscientiousness subscale with 8 items had good internal consistency reliability in the current sample, with a Cronbach's alpha of 0.77.

2.2.2. Perceived social support scale (PSSS)

We assessed perceived social support with the Perceived Social Support Scale (PSSS). The scale was modified by Huang and Jiang (1996), which was used to assess the perceived support from family, and others. This 12-item scale has two factors, which are *Support from Family* and *Support from Others*. Items are rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate higher perceived social support. In the current sample, the scale had good internal consistency reliability, with a Cronbach's alpha of 0.92.

2.2.3. PTSD checklist for DSM-5 (PCL-5)

PTSD was assessed using the PTSD Checklist for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; Weathers, 2013). The items were translated into Chinese by Zhou et al. (2017). In this study, the respondents rated the frequencies of symptoms after a fire rescue. This 20-item scale has four factors which are *Intrusions, avoidance, negative cognition and emotion alteration*, and *hyper-arousal*. Items are rated on a 4-point Likert scale ranging from 0 (*never*) to 3 (*always*). Higher scores indicate higher level of symptoms. In the current sample, the scale had good internal consistency reliability, with a Cronbach's alpha of 0.92.

2.3. Data analysis strategies

Since we proposed the relationships among conscientiousness, perceived social support, and PTSD, analytic strategies were chosen to address the association. The descriptive analysis was conducted for all measures that were administered by SPSS 20.0. Moreover, Cronbach's alpha coefficients were calculated to examine the reliability of the three questionnaires. We also examined the associations of all variables using Pearson's correlations.

Statistical analyses were conducted using SPSS 20.0 and AMOS 21.0. Missing data was handled by using full information maximum likelihood estimates (FIML) in the models. The structural equation model (SEM) was used to examine the mediating effects. Besides, we used Chi-square ratio (χ^2 /*df*), the normed-fit index (NFI), incremental-fit index (IFI), Tucker-Lewis index (TLI), comparative-fit index (CFI), and the root mean square error of approximation (RMSEA) to evaluate the model fit.

According to the mediating effects test procedures (Wen et al., 2004a,b), we assessed the following two SEM models: (1) a direct effect model (M1) with the path from conscientiousness to PTSD, and (2) based on M1, we inserted mediators (i.e., support from family and support from others) between conscientiousness and PTSD (M2). In addition, in order to test the significance of the mediating effect on M2, we conducted bias-corrected bootstrap tests with a 95% confidence interval (MacKinnon et al., 2004).

3. Results

3.1. Descriptive statistics and correlations for all variables

Table 2 shows the means, standard deviations, and correlations among all study variables. As shown in Table 2, conscientiousness was positively significant as related to perceived social support total score, support from family, and support from others. Conscientiousness, perceived social support total score, and support from others had significantly negative correlations with PTSD total score, Intrusions, avoidance, negative cognition and emotion alteration, and hyper-arousal. Support from family had significantly negative correlations with PTSD total score, negative cognition and emotion alteration, and hyper-arousal, but its correlations with intrusions and avoidance were non-significant.

3.2. Analysis of the direct association between conscientiousness and PTSD

We built a direct effect model (M1) with the path from conscientiousness to PTSD, which demonstrated that conscientiousness was directly associated with PTSD. The general cutoffs for accepting a model are equal to or more than 0.90 for NFI, IFI, TLI, and CFI, and equal to or less than 0.08 for RMSEA (Wen et al., 2004a,b). Therefore, the fit indexes of this model were well, $\chi^2/df = 2.392$, $NFI = 0.993$, $IFI = 0.996$, $TLI = 0.986$, $CFI = 0.996$, $RMSEA = 0.058$. Path analysis revealed that conscientiousness can significantly predict PTSD, with the coefficient $\beta = -0.400$, $p < 0.001$, 95% CI $= -0.491$ to -0.307. What's more, the associations between conscientiousness and PTSD subfactors are also significant (the indirect effect from conscientiousness to intrusions, $\beta = -0.268$, $p < 0.001$, 95% CI $= -0.153$ to -0.087; the indirect effect from conscientiousness to avoidance, $\beta = -0.235$, $p < 0.001$, 95% CI $= -0.065$ to -0.036; the indirect effect from conscientiousness to hyper-arousal, $\beta = -0.342$, $p < 0.001$, 95% CI $= -0.233$ to -0.138; the indirect effect from conscientiousness to negative cognition and emotion alteration, $\beta = -0.384$, $p < 0.001$, 95% CI $= -0.286$ to -0.167).

3.3. Analysis of the mediating effects of support from family and support from others

Basis on the direct model, we built mediating effect models (M2, see Fig. 1) by adding support from family and support from others to the relationship between conscientiousness and PTSD. Moreover, we added a covariance between family and other. The model fit the data well, $\chi^2/df = 2.058$, $NFI = 0.987$, $IFI = 0.993$, $TLI = 0.984$, $CFI = 0.993$, $RMSEA = 0.051$. The mediating effects are reported in Table 3 (with 95% confidence interval using the bootstrap method). Table 3 suggested that support from others significantly mediated the relationship between conscientiousness and PTSD, while support from family didn't mediate the relationship between conscientiousness and PTSD (the mediating effect for support from family, $\beta = -0.001$, $p = 0.949$, 95% CI $= -0.017$ to 0.020; the mediating effect for support from others, $\beta = -0.028$, $p = 0.015$, 95% CI $= -0.059$ to -0.005). What's more, the total indirect effects between conscientiousness and PTSD subfactors are all significant (the total indirect effect from conscientiousness to intrusions, $\beta = -0.266$, $p < 0.001$, 95% CI $= -0.334$ to -0.202; the total indirect effect from conscientiousness to avoidance, $\beta = -0.233$, $p < 0.001$, 95% CI $= -0.306$ to -0.156; the total indirect effect from conscientiousness to hyper-arousal, $\beta = -0.338$, $p < 0.001$, 95% CI $= -0.419$ to -0.261; the total indirect effect from conscientiousness to negative cognition and emotion alteration, $\beta = -0.387$, $p < 0.001$, 95% CI $= -0.479$ to -0.294).

4. Discussion

To our knowledge, this is the first study to investigate the relationships between conscientiousness, perceived social support, and PTSD in young Chinese firefighters. We explored the mediation effect of perceived social support on the relationship between conscientiousness and PTSD. In this study, we found that conscientiousness has the significant negative correlation with PTSD, which supports the first hypothesis and is in line with previous studies (Caska et al., 2013; Fauerbach et al., 2000; Talbert et al., 1993). The finding that a higher level of conscientiousness is associated with a higher level of perceived social support (i.e., support from family and support from others) supports the second hypothesis. This is consistent with prior studies

Table 2
Means, standard deviations, and correlations among PTSD, conscientiousness, and perceived social support.

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Conscientiousness	28.10	5.13	1								
2. Perceived Social Support Total Score	62.33	23.34	0.53***	1							
3. Support from Family	21.93	4.67	0.43***	0.86***	1						
4. Support from Others	40.40	8.63	0.52***	0.96***	0.70***	1					
5. PTSD Total Score	10.83	9.14	−0.34***	−0.27***	−0.19***	−0.29***	1				
6. Intrusions	2.89	2.59	−0.21***	−0.15**	−0.08	−0.17**	0.84***	1			
7. Avoidance	0.83	1.24	−0.16**	−0.12*	−0.05	−0.15**	0.70***	0.61***	1		
8. Negative Cognition and Emotion Alteration	3.67	3.45	−0.39***	−0.34***	−0.27***	−0.34***	0.92***	0.64***	0.60***	1	
9. Hyper-arousal	3.44	3.17	−0.33***	−0.25***	−0.17**	−0.26***	0.92***	0.67***	0.52***	0.82***	1

PTSD = Posttraumatic stress disorder.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

(Kitamura et al., 2002; Leskelä et al., 2009).

We also found that support from others has the significantly negative correlation with PTSD and its dimensions. The negative association between support from family and PTSD is significant, except intrusions and avoidance. This can partly support the third hypothesis. The result that a higher level of support from others is associated with a lower level of PTSD is in line with prior research (Salami, 2010; Wu et al., 2009) and supports the direct effect model of perceived social support (Cohen and Syme, 1985). That's because a good perceived social network can provide material support and emotional comfort for individuals (Norris et al., 2005). What's more, perceived social support can reduce the negative evaluation of events, which may alleviate symptoms of PTSD (Salami, 2010). The association between support from family and intrusions or avoidance is not significant. We assumed that support from family would make the firefighters be more careful and stop thinking about the fire scene. For instance, parents may ask about the fire situation to ensure firefighters' safety. This may remind firefighters of the fearful fire scene. Therefore, support from family can't decrease the symptoms of intrusions and avoidance.

In this study, we considered two aspects, which are support from family and support from others, as the intermediary role of perceived social support. We found that support from others significantly mediated the relationship between conscientiousness and PTSD, while support from family didn't mediate this relationship. This result can only partly support the fourth hypothesis and is not consistent with the direct model of perceived social support (Cohen and Syme, 1985). Previous studies suggested that support from family can reduce the severity of PTSD, and it is a significant indicator of lesser emotional problems (Kef and Dekovic, 2004) and more happiness (Helsen et al., 2000). But in the current study, we can't find the significant indirect path from conscientiousness to PTSD through support from family in the tested model. One possible reason is that those firefighters live in the army

Table 3
Bias-corrected bootstrap test in mediating effects.

Paths	β	*P*	95%CI Low	High
Direct path				
C-PTSD	−0.303	< 0.001	−0.415	−0.182
Indirect paths				
C-F-PTSD	−0.001	0.949	−0.017	0.020
C-O-PTSD	−0.028	0.015	−0.059	−0.005

Note. CI = confidence interval; C = conscientiousness; PTSD = posttraumatic stress disorder; F = family (support from family); O = others (support from others).

almost all year and get together with their supervisors and peers, but have no time to meet with their families. In the early post traumatic period, there is a strong and stable connection between fear and PTSD (Pyszczynski and Kesebir, 2011). But for those firefighters, when they are suffering from stressful events, most of them perceive support from supervisors and peers, not their families. Therefore, it's difficult for them to have the sense of belonging and security from family. Besides, firefighters may not want their family to worry about them, so they may choose not to tell their family about negative events. Then if they experience negative emotions, they may ask their supervisors and peers for help. Therefore, the support from family is more limited than support from supervisors, peers, etc. What's more, the deep feeling from the family is probably a burden for firefighters. When they see victims in the disaster, they will worry about their family, which may lead to a poor intermediary role for support from family.

The finding that support from others is more important for buffering the level of PTSD can help us think more deeply about the direct effect model of perceived social support. When we think about the influence

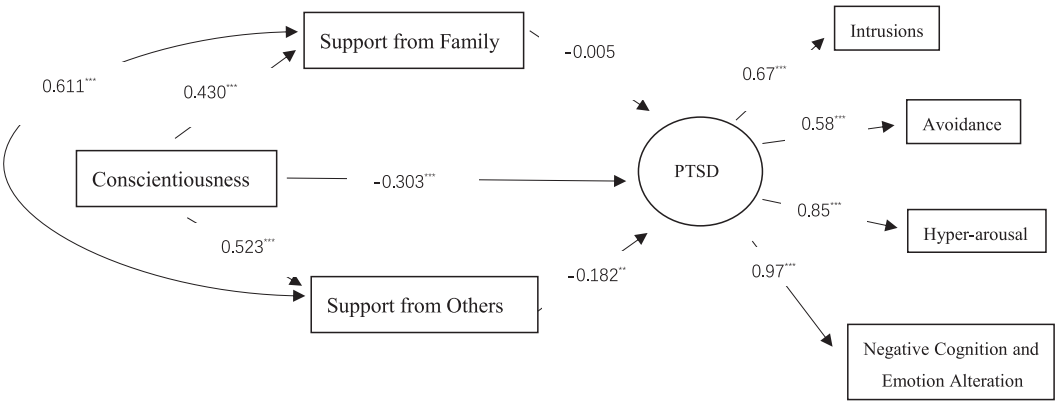

Fig. 1. Mediating effects model (M2).

of social resources for posttraumatic status, it's necessary to consider it from subtle perspective and take the social support source into account. The buffer influence may be difference with support source for different individuals.

This study can also provide implications for psychological intervention with firefighters. Results from the current study suggest that support from others might be a key factor of firefighters' psychological health and PTSD. Therefore, in the psychological intervention among firefighters, we would better focus on the important role of support from others. On the one hand, we can conduct some courses teaching firefighters some social communication skills, so that they can get along well with their supervisors and peers. On the other hand, we can conduct psychological group counseling with the theme of cooperation and trust to increase the support among firefighters.

However, several limitations of the current study should be noted. First, the data was cross-sectional, which precludes conclusions regarding causation and the direction of relationship among variables. Second, the findings are only generalizable to the population studied, which leads to difficulties in generalizing the conclusions to other groups of rescuers. Future studies should explore the relationships between these constructs among different samples. Third, there was no information about the participants' current family status (e.g., marriage status, how much time they spend with family), alcohol consumption, smoking status and sleep duration. Future studies should consider those variables and explore whether these statuses will influence the results of these findings.

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Supplementary materials

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