

Openness, Conscientiousness, Extraversion, Stressor and Psychological Stress Response

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Abstract

Based on the theoretical analysis, with first-hand data collection and using multiple regression models, this study explored the relationship between openness, conscientiousness and extraversion, stressor and psychological stress response and figured out interactive effect of openness, conscientiousness and extraversion, and stressor on psychological stress response. We draw on the following conclusions: (1) the interaction term of stressor (family) and openness can negatively predict psychological stress response; (2) the interaction term of stressor (social) and conscientiousness can positively predict psychological stress response; (3) the interaction term of stressor (social) and extraversion can negatively predict psychological stress response.

Keywords: openness, conscientiousness, extraversion, psychological stress response

1. Introduction

Openness is a dimension of personality, including imagination, curiosity, independent judgment and other related factors. Openness is defined as an individual's understanding of what is happening around him, as well as his extent to explore and tolerate strange situations (Piedmont, 1998). Openness as an independent personality dimension began to be well-known with the emergence of "Big Five" personality model (Digman, 1990; McCrae & Costa, 1987). Big Five Personality Inventory (Costa & McCrae, 1985) for the first time views openness as a separate, internally harmonious personality dimension (McCrae & Costa, 1985). Individuals high in openness tend to be curious about inner experience as well as the outside world, which makes their experience of life more colorful. In the Big Five Personality Inventory, openness includes six sub-aspects: fantasy (full of vivid representation and active fantasy), aesthetic appreciation (appreciation of and attention to art and beauty), feel (easy to feel inner feelings and evaluation), behavior (open behavior), ideas (curiosity and an open mind) and value (re-evaluation of social values) (McCrae & Costa, 1987). The study indicated that, compared with the individual of closeness (the other pole of openness), individuals who are open are more receptive to new ideas and progressive values and they are more sensitive to both positive and negative emotions (Costa & McCrae, 1985). Openness and intelligence have a significant correlation. Some studies show that openness only relates to certain components of intelligence, such as divergent thinking, which is the core of creativity. Thus individual of higher openness also possesses stronger creativity or ability to innovate (McCrae, 1987). Openness has a positive effect on stress response (Chu et al, 2015; Schneider, 2012; Williams, 2009).

Conscientiousness represents an individual's rigorous attitude towards responsibility or tasks. It is a trait of carefulness and seriousness, which guarantees one's long-term and healthy development in career. Individuals high in conscientiousness possess the characteristics of high self-efficacy. They are methodic, responsible, persistent and highly organized, always in the pursuit of excellence. Whereas their counterpart who are low in conscientiousness tend to be messy, unreliable and arbitrary, who usually cannot keep persisting on certain goal and would make relatively more careless mistakes in their work (McCrae & Costa, 1985). Conscientiousness consists of several sub-dimensions like ability, orderliness, responsibility, diligence, self-discipline, prudence, etc. (Costa & MacCrae, 1992). Individuals of high conscientiousness tend to develop a plan ahead of time to accomplish their goals (McCrae

& Costa, 2002). In working situations, conscientiousness is positively correlated with time management skills (Griffiths, 2003). In addition, individuals of high conscientiousness always have pro-social and pro-organizational power motives; while low conscientiousness individuals often show impulsive or aggressive behaviors as their power motives (Winter, 1991). Thus, conscientiousness can effectively predict the performance of a variety of occupational groups (Barrick & Mount, 1993). Conscientiousness and health of individuals are closely linked (Hagger-Johnson, & Whiteman, 2007). As compared with general subjects, obsessive-compulsive disorder patients reported a higher conscientiousness (Cougler, Lee, & Salkovski, 2007). Some study found that conscientiousness level moderated hindrance stressor in relations to both job performance and dedication (Liu et al, 2013). And those higher in conscientiousness experienced fewer self-dependent episodic stressors and less academic and interpersonal chronic stress (Murphy et al, 2013). In addition, conscientiousness can be used to predict stress response, especially psychological stress response, which includes anxiety, nervousness; depression; hard to focus attention as before; memory loss; tendencies of demission (Chu et al, 2015).

Extraversion is an indicator of extrovert personality. It includes a wide range of personality traits of social, talkative, decisive, ambitious and passionate. Studies have shown that high extraversion and positive emotion correlated with each other (Canli et al, 2001; Amin, Constable & Canli, 2004; Jeffrey & Jaak, 2006). For example, individuals who got higher scores on extraversion report more positive emotional experience in their daily lives, and this helps to anticipate their positive emotional experience after 10 years (Costa & McCrae, 1980, 1990). There are several reasons for this phenomenon. First of all, outgoing individuals are sensitive to positive stimulation (Yuan et al, 2007). Secondly, outgoing individuals tend to pay attention to positive stimulation (Derryberry & Reed, 1994; Huang & Luo, 2006), which almost happens automatically (Yuan et al, 2007; Huang & Luo, 2007). Similarly, studies have shown that high extraversion and life satisfaction are correlated, and extroversion can improve SWB (McCrae & John, 1992); high extraversion and job stress and burnout were significantly negatively correlated (Mills & Huebner, 1998; Bakker, Zee & Lewig, 2006); extraversion has a positive effect on stress response (Chu et al, 2015; Schneider et al, 2012; Williams et al, 2009).

On the basis of previous studies, this study attempts to use primary and secondary school teachers as subjects, investigating the relationship among openness, conscientiousness and extraversion, stressor and psychological stress responses, trying to discover the underlining mechanisms.

In order to reveal the relationship between openness, conscientiousness and extraversion, stressors and psychological stress responses, this paper constructed a basic model as follows:

$$PR_i = \beta_0 + \sum \lambda_{1j} Stressor_{ji} + \lambda_2 Openness_i + \sum \lambda_{3j} Stressor_{ji} * Openness_i + \varepsilon_i$$

$$PR_i = \beta_0 + \sum \lambda_{1j} Stressor_{ji} + \lambda_2 Conscientiousness_i + \sum \lambda_{3j} Stressor_{ji} * Conscientiousness_i + \varepsilon_i$$

$$PR_i = \beta_0 + \sum \lambda_{1j} Stressor_{ji} + \lambda_2 Extraversion_i + \sum \lambda_{3j} Stressor_{ji} * Extraversion_i + \varepsilon_i$$

In the formula, *i* represents the subjects, *j* represents the type of stressors, PR represents psychological stress responses stress response, Stressor represents pressure source (including work stress, health stress, family stress and social stress), Stressor_{ji}*Openness_i, Stressor_{ji}*Conscientiousness_i as well as Stressor_{ji}*Extraversion_i is the interaction term, and ε_i is the error term. And we would test whether the interaction terms (Stressor_{ji}*Openness_i, Stressor_{ji}*Conscientiousness_i as well as Stressor_{ji}*Extraversion_i) would have significant predictive effects on psychological stress response.

2. Research Methods

2.1 Subjects

460 primary and secondary school teachers were recruited as subjects and 432 questionnaires were returned. After excluding invalid questionnaires, we finally obtained 428 valid questionnaires. The valid response rate is 93.04%. The basic information of the sample is in Table 1 as below.

2.2 Research Instrument

2.2.1 Openness, Conscientiousness and Extraversion

Big Five Personality Inventory, namely NEO-Personality Inventory is used to measure openness, conscientiousness and extraversion. This scale is based on the Big Five personality theory and was compiled by the American

psychologist Costa Costa and McCrae McCrae in 1987. After many years of use and revision, this scale has been of high reliability and validity. The scale uses five scoring system, whose range of scores is 1 to 5 points. Scoring higher or lower indicates some more obvious characteristic in openness, conscientiousness and extraversion.

2.2.2 Stressor and Stress Response

Work Stress Scale for Primary and Secondary School Teacher was used to measure stressor and stress response in this study. The scale consists of two parts. The first part is the source of stress, including a total of 36 items in four dimensions. The four dimensions are: work stress, health stress, family stress and social stress. The second part is the stress response with psychological stress response included. It has been testified that the liability and validity of the scale are good. Specifically, the scale uses five scoring system, whose range of scores is 0 to 4 points. Scoring higher or lower indicates some more obvious characteristics in certain aspects.

2.3 Research Process

The questionnaires were administrated with the unified instructions. And the questionnaires, with no time limitation, were collected on the spot and checked one by one with invalid ones eliminated. This research employed SPSS19.0 for statistical analysis, which includes analysis of variance, correlation analysis and analysis of regression.

Table 1. Basic information of the sample and the f-test for the stress response

Demographic Variable		N	Percentage	Statistical value	Psychological Stress Response
Marital status	Unmarried	85	20.4		11.81±6.089
	Married	323	77.5		14.6±6.762
	Divorced	9	2.2		18.38±5.605
				F	7.636
				P	0.001
Types of School	Elementary	154	38.1		15.25±7.170
	Junior High	77	19.1		13.29±6.823
	Senior High	173	42.8		13.33±6.283
				F	3.863
				P	0.022
Service Year	≤5	71	17		12.32±5.947
	5<≤10	146	35		13.81±6.470
	10<≤20	144	34.5		15.44±7.266
	>20	56	13.4		13.87±6.885
				F	3.643
				P	0.013
Child(ren)	With	236	66.5		14.55±6.911
	Without	119	33.5		13.15±6.085
				F	3.405
				P	0.066
Gender	Male	97	23.4		13.69±6.629
	Female	317	76.6		14.22±6.844
				F	0.427
				P	0.514

3. Results

3.1 Correlation Analysis of Openness, Conscientiousness, Extraversion, Stressors and Psychological Stress Response

A correlation analysis of the stressors and psychological stress response was conducted. As shown in Table 2, all the

dimensions of stressor are significantly positively correlated with psychological stress response. And the correlation analysis of openness, extraversion, conscientiousness and psychological stress response found that openness, extraversion, conscientiousness are all significantly negatively correlated with the psychological stress response.

Table 2. Correlation matrix of variables

Variable	1	2	3	4	5	6	7	8
1 Extraversion	1							
2 Openness	.203**	1						
3 Conscientiousness	.164**	-.070	1					
4 Stressor (work)	-.213**	-.160**	-.109*	1				
5 Stressor (health)	-.061	-.078	-.160**	.643**	1			
6 Stressor (family)	-.182**	-.100*	-.017	.457**	.285**	1		
7 Stressor (social)	-.198**	-.168**	-.080	.591**	.337**	.418**	1	
8 Psychological Stress Response	-.157**	-.203**	-.163**	.579**	.536**	.357**	.460**	1
Minimum	33	25	20	.05	0	0	0	0
Maximum	72	67	69	3.48	4.00	4.00	4.00	3.88
Mean	50.72	48.92	55.00	1.83	1.70	1.67	2.13	1.78

Note: ** and * indicate that the coefficient is significant at the 0.01 and 0.05 levels respectively.

3.2 Regression Analysis of Openness and Stressors on Psychological Stress Response

In order to understand the combined effect of stressors and openness on psychological stress response, we take psychological stress response as the predicted variable, and stressor (work), stressor (health), stressor (family), stressor (social), openness and interaction terms of openness and above-mentioned stressors as the predictive variables to do the regression analysis. The analysis results are shown in Table 3. As shown in Table 3, Model 5 indicates that in psychological stress response regression model, openness has a significant interactive effect with stressor (family). And Model 3, 4, 6 indicate that in the psychological stress response regression model, openness has no significant interaction with the other three kinds of stressor (work, health or social).

3.3 Regression Analysis of Conscientiousness and Stressors on Psychological Stress Response

In order to understand the combined effect of stressors and conscientiousness on psychological stress response, we take psychological stress response as the predicted variable, and stressor (work), stressor (health), stressor (family), stressor (social), conscientiousness and interaction terms of conscientiousness and above-mentioned stressors as the predictive variables to do the regression analysis. The analysis results are shown in Table 4. As shown in Table 4, Model 6 indicates that in psychological stress response regression model, conscientiousness has a significant interactive effect with stressor (social). And Model 3, 4, 6 indicate that in the psychological stress response regression model, conscientiousness has no significant interaction with the other three kinds of stressor (work, family or health).

3.4 Regression Analysis of Extraversion and Stressors on Psychological Stress Response

In order to understand the combined effect of stressors and extraversion on psychological stress response, we take psychological stress response as the predicted variable, and stressor (work), stressor (health), stressor (family), stressor (social), extraversion and interaction terms of extraversion and above-mentioned stressors as the predictive variables to do the regression analysis. The analysis results are shown in Table 5. As shown in Table 5, Model 6 indicates that in psychological stress response regression model, extraversion has a significant interactive effect with stressor (social). And Model 3, 4, 6 indicate that in the psychological stress response regression model, extraversion has no significant interaction with the other three kinds of stressor (work, family or health).

Table 3. Openness, stressors and psychological stress response (Predicted variable: psychological stress response)

Predictive variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Openness		-.102**	-.100	-.246**	-.043	-.021
		(-2.678)	(-.836)	(-2.914)	(-.556)	(-.238)
Stressor (work)	.221***	.212***	.590*			

	(3.728)	(3.600)	(2.400)			
Stressor (health)	.315***	.317***		.259		
	(6.408)	(6.495)		(1.119)		
Stressor (family)	.060	.060			.873**	
	(1.368)	(1.371)			(3.298)	
Stressor (social)	.211***	.197***				.783**
	(4.385)	(4.106)				(2.976)
Openness*Stressor (work)			-.035			
			(-.139)			
Openness*Stressor (health)				.282		
				(1.188)		
Openness*Stressor (family)					-.554*	
					(-2.083)	
Openness*Stressor (social)						-.339
						(-1.289)
Control variable						
Gender	.029	.023	-.004	.021	.075	.057
	(.758)	(.591)	(-.101)	(.499)	(1.625)	(1.297)
Age	.127**	.118**	.098*	.097*	.061	.147
	(3.247)	(3.049)	(2.397)	(2.359)	(1.328)	(3.303)
R ²	.427	.437	.352	.334	.168	.248
Adjusted R ²	.419	.427	.345	.326	.158	.239
N	412	412	412	412	412	412

Table 4. Conscientiousness, stressors and psychological stress response (Predicted variable: psychological stress response)

Predictive variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Conscientiousness		-.087*	-.263*	-.232**	-.219**	-.342**
		(-2.284)	(-2.364)	(-2.708)	(-2.801)	(-3.292)
Stressor (work)	.221***	.219***	.159			
	(3.728)	(3.718)	(.570)			
Stressor (health)	.315***	.302***		.006		
	(6.408)	(6.129)		(.022)		
Stressor (family)	.060	.062			.057	
	(1.368)	(1.413)			(.176)	
Stressor (social)	.211***	.210***				-.248
	(4.385)	(4.396)				(-.712)
Conscientiousness*Stressor (work)			.418			
			(1.451)			
Conscientiousness*Stressor (health)				.525		
				(1.896)		
Conscientiousness*Stressor (family)					.290	
					(.883)	
Conscientiousness*Stressor (social)						.728*
						(2.051)
Control variable						
Gender	.029	.033	.002	.030	.095*	.072
	(.758)	(.847)	(.042)	(.729)	(2.056)	(1.666)
Age	.127**	.137***	.121**	.115**	.092*	.189***
	(3.247)	(3.519)	(2.965)	(2.752)	(1.972)	(4.296)
R ²	.427	.434	.355	.321	.158	.260
Adjusted R ²	.419	.425	.347	.312	.148	.251
N	412	412	412	412	412	412

Table 5. Extraversion, stressors and psychological stress response (Predicted variable: psychological stress response)

Predictive variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Extraversion		-.041 (-1.056)	.057 (.450)	-.129 (-1.374)	-.026 (-.329)	.147 (1.451)
Stressor (work)	.221*** (3.728)	.212*** (3.539)	.791** (2.716)			
Stressor (health)	.315*** (6.408)	.320*** (6.476)		.517 (1.805)		
Stressor (family)	.060 (1.368)	.057 (1.284)			.703* (2.218)	
Stressor (social)	.211*** (4.385)	.208*** (4.319)				1.219*** (3.857)
Extraversion*Stressor (work)			-.226 (-.780)			
Extraversion*Stressor (health)				.017 (.058)		
Extraversion*Stressor (family)					-.374 (-1.200)	
Extraversion*Stressor (social)						-.760* (-2.439)
Control variable						
Gender	.029 (.758)	.031 (.805)	.005 (.119)	.035 (.849)	.086 (1.838)	.059 (1.344)
Age	.127** (3.247)	.128** (3.283)	.106* (2.591)	.110** (2.648)	.075 (1.610)	.159*** (3.609)
R ²	.427	.429	.342	.322	.144	.248
Adjusted R ²	.419	.419	.334	.314	.134	.238
N	412	412	412	412	412	412

4. Discussion

Openness includes traits of imagination, aesthetic appreciation, seeking of difference, creativity and intelligence. Individuals high in openness are imaginative. They would seek for changes and are more automatic. They are curious and free people who have broad interests and pursue novelty. From the model 5 in Table 3, we can see that Openness*Stressor (family) is a negative predictor for the psychological stress response, which means interaction term of Stressor (family) and openness can negatively predict psychological stress response. That is to say, individuals high in openness are less likely to be affected by family stress psychologically, while those low in openness would be more likely to suffer from family stress psychologically. In another word, openness is a protective factor for the psychological health in consideration of family stress. While the less open one is, the more vulnerable to family stress psychologically. This may attributes to the high tolerance for strange situation of individuals high in openness. Because their comfort zones are broader, they will feel relatively less psychological suffering when facing different stressful situations, especially related to family.

Conscientiousness refers to our control, management and regulation of our own impulses, including traits of impartiality, orderliness, self-discipline, caution and restraint. It reflects the individuals' degree of self-control and the ability to delay gratification. Individuals of high conscientiousness exhibit traits of being organized, principled and careful. From the model 6 in Table 4, we can see that Conscientiousness*Stressor (social) is a positive predictor for the psychological stress response, which means interaction term of stressor (social) and conscientiousness can positively predict psychological stress response. That is to say, individuals high in conscientiousness are more likely to be affected by social stress psychologically, while those low in conscientiousness would be less likely to suffer from social stress psychologically. In another word, conscientiousness is a risk factor for the psychological health in consideration of social stress and the more conscientious individual are more vulnerable to social stress psychologically. This finding seems to contradict with many of conclusions of studies before. However, with a close comparison we would find that the studies done before only take stressor and conscientiousness as separate predictors for the stress response. As we can see from model 6 in Table 4, conscientiousness alone is a negative predictor for psychological stress response, which is consistent with the conclusions of studies before. This is closely related to the stronger self-control of high conscientiousness individuals. Besides, individuals high in conscientiousness have relatively high capacity to delay gratification. Compared to others, when some stressful social tasks take away some leisure time, individuals high in conscientiousness are more likely to complete the task without much psychological suffering. However, when we consider the interactive effect of conscientiousness and

stressor on psychological stress response we would find that it is a positive predictor. It may be because of the perfectionism tendency of the more conscientious individuals, who would give themselves higher expectations as well as requirements comparing with their counterparts with lower conscientiousness. Along with high social stress, the high conscientiousness would be a psychological burden for them, which in turn would show up as psychological dysfunction.

The extraverts tend to be sociable, confident, optimistic, passionate and talkative. From the model 6 in Table 5, we can see that Extraversion*Stressor (social) is a negative predictor for the psychological stress response, which means the interaction term of stressor (social) and extraversion can negatively predict psychological stress response. That is to say, individuals high in extraversion are less likely to be affected by social stress psychologically, while those low in extraversion would be more likely to suffer from social stress psychologically. In another word, extraversion is a protective factor for the psychological health in consideration of social stress and the introverts are more vulnerable to social stress psychologically. Several reasons may be explainable for this result: Firstly, the extraverts are more likely to be energetic comparing with their introvert counterparts, which may be a kind of immune for social stress. Secondly, the extraverts are more stimulate-seeking comparing with their introvert counterparts. It would make minor social stressor not that unpleasant psychologically which in turn saved more mental capacity to the major social stressor in their lives, which leads to more effective coping results.

5. Conclusion

By a comprehensive exploration of effects of openness, extraversion, conscientiousness and stressor on psychological stress response, the study obtained following conclusions:

1. The interaction term of stressor (family) and openness can negatively predict psychological stress response;
2. The interaction term of stressor (social) and conscientiousness can positively predict psychological stress response;
3. The interaction term of stressor (social) and extraversion can negatively predict psychological stress response.

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