

# Factors Impacting the Mental Health of the Caregivers of Children with Asthma in China: Effects of Family Socioeconomic Status, Symptoms Control, Proneness to Shame, and Family Functioning

TING ZHOU<sup>\*,†</sup>  
CHUNLI YI<sup>†</sup>  
XUXIA ZHANG<sup>‡</sup>  
YUYIN WANG<sup>§</sup>

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*Caregiver mental health is widely considered to be an important factor influencing children's asthma symptoms. The present study aimed to examine key factors that contribute to caregiver mental health in pediatric asthma with a Chinese sample. Two hundred participants reported their family socioeconomic status (SES), proneness to shame, asthma symptoms control of their child, family functioning, and their depression and anxiety symptoms. Results suggested that low family SES, low family functioning, and a high level of shame proneness were associated with high levels of anxiety and depression for caregivers. Family functioning mediated the effects of SES and shame on caregiver mental health and also moderated the effects of SES and shame on caregiver depression. This study highlights the importance of reducing experience of shame and enhancing family functioning in families affected by pediatric asthma.*

**Keywords:** *Pediatric Asthma; Caregiver Mental Health; Proneness to Shame; Family Functioning*

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Asthma is a chronic disorder of the airways that affects patients of all ages; however, morbidity is the highest among children and young adults (Onnis et al., 2001). As other chronic diseases, pediatric asthma impacts not only the child but also the family in whole. Based on previous research, caregivers of children with asthma report more negative affect and poorer psychological health when compared with caregivers of children without asthma (Bartlett et al., 2001; Brehaut et al., 2009).

Factors that affect the mental health and coping of caregivers have recently begun to receive considerable attention (Gelkopf & Roe, 2014; Hernandez, Barrio, & Yamada, 2013; Polenick & Martire, 2013; Zhou & Yi, 2014). Financial burden is an important factor

<sup>\*</sup>School of Management, Beijing University of Chinese Medicine, Beijing, China.

<sup>†</sup>Department of Psychology, Peking University, Beijing, China.

<sup>‡</sup>Department of Pediatrics, The Second Hospital of Tianjin Medical University, Tianjin, China.

<sup>§</sup>Department of Psychology, Sun Yat-Sen University, Guan77Ko12.65out

which contributes to mental health problems of caregivers of children with asthma. It has been found that such caregivers from families with low socioeconomic status report lower levels of quality of life (Annett, Bender, DuHamel, & Lapidus, 2003; Celano, et al., 2008; Erickson et al., 2002). Factors related to the disease itself are also potential risk factors for the caregivers. Some researchers have found that more asthma symptoms and higher rates of health care use in children are associated with higher levels of depression (Wood et al., 2002) and lower quality of life in caregivers (Haltermann et al., 2004). However, effects of indices of asthma symptoms control do not reach significance in other studies (Annett et al., 2003; Shalowitz, Berry, Quinn, & Wolf, 2001; Vila et al., 2003).

Aside from those two objective stressors, family functioning has been studied as an important resource for families coping with a child's illness. Families with functional dynamics can flexibly make changes and work collaboratively to deal with stressors. There has been evidence that the successful psychological adaption of caregivers to children's chronic illness is associated with family functioning that provides a high level of support (Drotar, 1997; Thompson, Gustafson, Hamlett, & Spock, 1992). In research particularly on pediatric asthma, family routines and rituals that bring family members together, have been found to be effective in reducing anxiety of caregivers (Fiese & Wamboldt, 2000; Markson & Fiese, 2000; Schreier & Chen, 2010). In addition, family functioning seems to relate to other factors and impact caregivers' mental health collaboratively. Despite not being examined in the specific context of pediatric asthma, research suggests that family support acts as a buffer to the effects of child-related stress on parental depression (Brown, Lambert, Hsu, & Eckman, 1998; Jackson, 1992). Furthermore, according to the Conservation of Resources theory, family stress occurs with resource loss, such loss serving to make families more vulnerable (Hobfoll & Spielberger, 1992). Dysfunctional dynamics prevent families from making positive use of their resources and can even create secondary stressors which make the situation worse (Chaney et al., 1997). Family conflict has been identified as an important stressor for caregivers (Kung, 2003). Therefore, family dysfunction seems to mediate the effects of stressors to caregiver mental health.

Although the effects of the aforementioned factors on caregivers' mental health in isolation have been examined repeatedly, how they work collaboratively is relatively less explored. Moreover, previous research is mainly conducted in western countries; similar research is scarce with Chinese participants. Due to the specific social and cultural characteristics, we expect such caregivers in China might encounter more specific stressors and the effects of the established factors might be different as well.

First of all, according to the medical insurance policies in China, most expenses of pediatric asthma have to be paid by the affected families. The medical costs could be a heavy burden for many families. Hence, the impact of family economic status on the mental health of caregivers might be more salient.

Secondly, as previous research suggests, chronic illness sometimes relates with experience of shame and social stigma (Bury, 1982; Charmaz, 2000; Crandall & Moriarty, 1995; Joachim & Acorn, 2000). Shame is a complex social emotion accompanied by self-evaluated failure and shortcomings, which implies negative introspection such as "I am weak, incompetent, and inferior" (Tangney & Fischer, 1995; Fung, 1999). In previous research in the West, illness-related shame seems to be more reported in the context of psychiatric disorders than in physical diseases (Byrne, 2000; Hinshaw, 2007). Also, it seems more likely to be reported in patients than in caregivers. For example, previous research has found that adult patients of chronic asthma report the experience of shame because of the illness (Snadden & Brown, 1992), but the elevation of shame in caregivers in pediatric asthma is rarely reported. However, the case in China might be different.

Shame seems to be an important experience in the Chinese cultural context. Chinese culture, along with other East Asian cultures, is considered to be a shame-socialized

culture in which individuals are socialized to “have a sense of shame” and are encouraged to act so as to maximize the positive evaluation granted by others and avoid their disapproval (Fung, 1999). For Chinese, shame is closely related with the concept of “face”. Failure to fulfill positive duties and obligations and failure to keep social status are two important reasons for “losing face” and an important source of shame (Hwang, 2001).

Pediatric asthma is usually considered as a negative event for families and it could be a trigger of shame experience for caregivers with high proneness to shame. To begin with, the decrease in socioeconomic status because of the big medical costs for the illness could be a source of shame. Secondly, individuals with high proneness tend to attribute negative events to internal and stable factors (Shi & Qian, 1998). Such caregivers might attribute the symptoms to their failure to take good care of the child, which may lead them to feel ashamed. Furthermore, in the Chinese cultural context, the experience of shame is a group concern rather than an individual concern: People feel ashamed not only by behaviors of themselves but also by behaviors of their families, friends, and relatives (Li, Wang, & Fischer, 2004; Stipek, 1998). Having a child who is weak and needs special care might lead the caregivers to feel ashamed. For the reasonings listed above, for those caregivers with high proneness to shame, the asthma of the child could elicit a shame-related experience, with both cognitive and behavior patterns, including negative emotions, avoidance or hiding behaviors, and self-deprecation.

As previous research has revealed, shame proneness is associated with a variety of mental disorders, such as depression (O'Connor, Berry, Inaba, Weiss, & Morrison, 1994; Zhong, Li, & Qian, 2003; Zhu, Wang, & Qian, 1999) and anxiety (Zhong et al., 2008). Hence, it is reasonable to propose the proneness to shame as a potential risk factor for caregiver mental health in pediatric asthma.

## Overview of the Present Study

The present study aimed to examine the effects of SES, asthma symptoms control, family functioning, and proneness to shame on caregiver mental health in pediatric asthma in a Chinese sample.

As low SES and poor symptoms control are objective stressors that cause financial, physical, and emotional burdens, we hypothesized that both of them would be positively correlated with caregiver depression and anxiety. As a cultural specific risk factor, we also hypothesized that proneness to shame could predict caregiver depression and anxiety positively. Consistent with the Conservation of Resource theory and previous research on the role of family functioning, we proposed that family functioning would mediate and moderate the effects of proposed risk factors above. The hypothesized model is presented in Figure 1.

## METHODS

### Participants

Participants were recruited from the pediatric department of a general hospital in a midsize city in Northern China. The inclusion criteria were (1) the child had been diagnosed with asthma and (2) participants were the patient's primary or regular caregivers. Two hundred and thirty-five caregivers who fulfilled the requirements volunteered to participate in the study, but only 200 of them provided complete data for all measures used in the analyses. In the final sample, most of the participants ( $n = 192$ ) were parents, six respondents were grandparents, and two respondents did not specify their relationship with the child. One hundred and sixty-three families came from urban areas, whereas 37 families were from rural areas. The mean age of participants was 34.15 ( $SD = 6.95$ ) years. Their highest educational attainment varied between junior high school and below

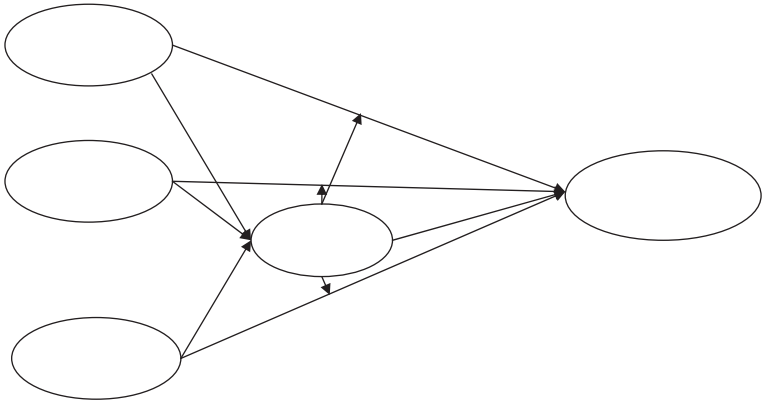


FIGURE 1. Hypothesized Effects of SES, Asthma Symptoms Control, Caregivers' Proneness to Shame, and Family Functioning on Caregivers' Mental Health

( $n = 40$ , 20%), senior high school ( $n = 37$ , 18.5%), college ( $n = 78$ , 39%), bachelor's degree ( $n = 43$ , 21.5%), and postgraduate degree ( $n = 2$ , 1%). Regarding the children involved in the study, 112 (56%) were boys and 88 (44%) were girls. Their mean age was 5.92 years ( $SD = 3.47$ ).

### Measures

#### *Family SES*

A demographic questionnaire was used to obtain information about family SES including family residence, family income, and the education level of the caregiver.

#### *Asthma symptoms control*

Participants were asked to fill in the length of time since diagnosis as well as the number of acute episodes and number of hospitalizations in the last 12 months, which were used as indices of the child's asthma symptoms control.

#### *Caregiver's proneness to shame*

The Shame Scale (Qian, Andrews, Zhu, & Wang, 2000) is a 29-item questionnaire which was used to measure caregivers' proneness to shame. The questionnaire includes four subscales with the personality shame subscale measuring individuals' experience of shame regarding their personality and behavior patterns, the behavior shame subscale measuring individuals' avoidance behavior related to shame, the body shame subscale measuring one's shame regarding to his/her body shape, and the family shame subscale measuring how individuals feel ashamed by behaviors of family members. The scale's structural validity has been examined in a Chinese sample and its internal reliability in the present study ranges from .86 to .89.

#### *Family functioning*

The General Functioning subscale of the McMaster Family Assessment Device (FAD) was used in the present study to measure family functioning. There has been evidence that this 12-item subscale is highly correlated with total scores on FAD and can be taken as representative of overall family functioning (Kabacoff, Miller, Bishop, Epstein, & Keitner, 1990; Ridenour, Daley, & Reich, 1999). Participants were asked to rate items on a 4-point Likert-like scale, with higher scores indicating greater family dysfunction. The internal reliability is .84 in the present study.

### *Caregiver mental health*

Caregiver anxiety was measured using the Self-Rating Anxiety Scale (SAS). There are 20 items which participants rate on a 4-point scale, with higher scores indicating more anxious symptoms. The Chinese version of the SAS has been validated and widely used in China (Tao & Gao, 1994). The internal consistency in the present study was .85.

The Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977) was used to measure depressive symptoms. It is a 20-item 4-point scale, with higher scores indicating higher levels of depression. Its reliability and validity has been examined in Chinese samples (Lin, Wei, Yi, Xiao, & Yao, 2008) and the internal consistency was .88 in the present study.

### **Procedure**

Participants were approached in the waiting hall of the pediatric department. After checking for inclusion criteria and explaining the goal of the study, the questionnaire packages were administrated and collected within 1 hour.

### **Data analysis**

Correlation analysis was first conducted to examine the correlations between family SES, asthma symptoms control, caregiver's shame proneness, family functioning, and caregiver anxiety and depression. Structural equation modeling analyses were run to test the proposed hypotheses.

## **RESULTS**

### **Preliminary analysis**

Means and standard deviations of main variables involved are displayed in Table 1. We first compared levels of anxiety and depression of this sample with the norms in China. Results revealed that the anxiety level of caregivers of children with asthma ( $39.75 \pm 8.66$ ) was higher than the average level in China ( $29.78 \pm 0.46$ ), with  $p < .01$  (Wu, 1999). However, the difference between the depression level in this sample ( $32.09 \pm 7.52$ ) and the norm ( $31.26 \pm 9.82$ ) was not significant ( $p = .11$ ) (Zhang, et al., 2010).

As demonstrated in Table 1, indices of SES, symptoms control, proneness to shame, and family functioning were interrelated. Family income was negatively correlated with personality shame ( $r = -.22, p < .01$ ) and family dysfunction ( $r = -.22, p < .01$ ). Length of time since diagnosis had positive correlations with behavior shame ( $r = .19, p < .01$ ) and personality shame ( $r = .15, p < .05$ ). Times of hospitalization showed a small negative correlation with body shame ( $r = -.15, p < .05$ ). And family dysfunction was positively correlated with behavior shame ( $r = .20, p < .01$ ), body shame ( $r = .15, p < .05$ ), personality shame ( $r = .40, p < .01$ ), and family shame ( $r = .25, p < .01$ ).

Regarding correlations with caregivers' mental health, family income, proneness to shame, and family functioning showed moderate correlations with caregiver depression and anxiety, but indices of asthma symptoms control only had significant correlations with anxiety.

### **Model testing**

To examine the hypothesized model on the effects of family SES, asthma symptoms control, caregivers' shame, and family functioning on caregivers' mental health, we first test

TABLE 1  
*The Means, Standard Deviations, and Correlations among Variables*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Family income	3667.57	2079.83	—										
2. Length of time diagnosed with asthma	2.14	2.63	-.02	—									
3. Asthma episodes	2.39	2.42	-.03	.11	—								
4. Times of hospitalization	0.92	1.21	-.07	-.06	.24**	—							
5. Behavior shame	18.12	5.13	-.04	.19**	-.05	-.12	(.89)						
6. Body shame	6.01	2.39	.03	.12	.02	-.15*	.41**	(.86)					
7. Personality shame	20.75	5.76	-.22**	.15*	.10	-.09	.71**	.48**	(.88)				
8. Family shame	5.98	2.38	-.13	.00	-.07	-.03	.35**	.37**	.38**	(.89)			
9. Family dysfunction <sup>a</sup>	2.01	0.41	-.22**	.04	.07	-.05	.20**	.15*	.40**	.25**	(.84)		
10. Depression	32.09	7.51	-.33**	.12	.11	-.02	.25**	.19**	.44**	.29**	.63**	(.88)	
11. Anxiety	39.75	8.66	-.28**	.18*	.18**	.07	.13	.34**	.36**	.11	.47**	.56**	(.85)

*Note.* Cronbach's  $\alpha$  of each subscale is listed in the diagonal in boldface type.  
\*Indicates correlation is significant at the .05 level.  
\*\*Indicates correlation is significant at the .01 level (two-tailed).  
<sup>a</sup>Because higher FAD scores indicate greater family dysfunction, the label 'family dysfunction' is used here for convenience.



the moderating model with family functioning as the moderator and then examine its mediating effects.

*Moderating effects of family functioning*

We tested a series of SEM models that included three exogenous variables (SES/caregiver's proneness to shame/children's asthma symptoms control, family functioning, and the interaction term) and one endogenous latent factor (caregiver's depression/anxiety). The calculation of the latent interaction was followed by methods recommended by Marsh, Wen, and Hau (2004). For example, to obtain the latent interaction term of family functioning and SES, products of family functioning and the three indices of SES were put into a latent construct. Confirmatory factor analysis was applied to examine the goodness of fit and loadings of indices in the interaction term. The product of family functioning and residence was removed because of its low loading ( $\lambda = .29$ ). The same procedure was used to obtain the interaction term of family functioning and caregiver's shame and that of family functioning and children's asthma symptoms control.

Results of SEM yielded significant moderating effects of family functioning in the SES-caregiver depression link,  $\chi^2(10, N = 185) = 23.54, p < .01$ , CFI = 0.95, GFI = 0.96 and RMSEA = 0.08 and  $\gamma_{\text{interaction}} = -0.25, p < .01$ , and caregiver's shame-depression link,  $\chi^2(31, N = 200) = 61.92, p < .001$ , CFI = 0.95, GFI = 0.94 and RMSEA = 0.07 and  $\gamma_{\text{interaction}} = 0.22, p < .01$ . However, the moderating effects of family functioning in the asthma symptoms control-depression link and all the models with anxiety as the outcome variable were not significant.

To further analyze the moderating effect of family functioning in the relationship between SES and caregiver's depression, a simple slope test was conducted. The sample was divided into a high-functioning family group ( $<1 SD$  below the mean) and a low-functioning family group ( $\geq 1 SD$  above the mean). Results indicated that although correlations between SES and caregiver depression in both groups were significant, with  $t = -7.79, p < .01$  and  $t = -10.57, p < .01$ , respectively, the correlation between SES and caregiver depression in families with high family functioning was less pronounced than that in families with low levels of family functioning (Figure 2).

Similarly, a simple slope analysis on moderating effects of family functioning between caregiver's shame and depression was conducted. Results indicated that the correlation between caregiver's shame and depression in families with low family functioning was significant ( $t = 2.81, p = .006$ ), while that in families with high family functioning was not

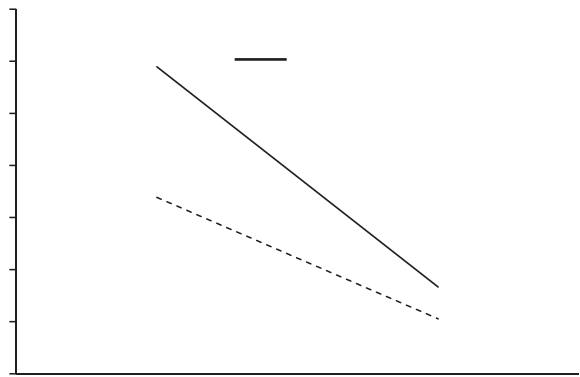


FIGURE 2. The Correlations between Family SES and Caregiver's Depression in High and Low Family Functioning Groups

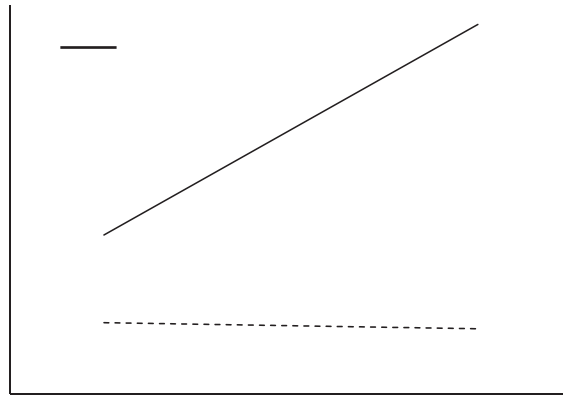


FIGURE 3. The Correlations between Caregiver's Proneness to Shame and Depression in High and Low Family Functioning Groups

significant ( $t = -0.13, p = .91$ ). The correlations between caregiver's proneness to shame and depression in high and low family functioning groups are depicted in Figure 3.

#### *Mediating effects of family functioning*

To test the hypothesized mediating effects of family functioning, the method recommended by Baron and Kenny (1986) was used. There are four steps to establish a mediation effect. First, the correlation between the predictor and the outcome variable must be significant. Second, the predictor must be significantly related to the mediator. Third, the mediator must be significantly related to the criterion. Finally, the effect of the predictor on the criterion should be significantly weaker after including the mediator in the model. Therefore, before testing the mediation effects of family functioning on the relationships of SES, children's asthma symptoms control, and caregiver's proneness to shame to caregiver's mental health, we first checked these three prerequisites.

Results showed that SES predicted caregiver's depression ( $\gamma = -0.46, p < .01$ ) and anxiety significantly ( $\gamma = -0.26, p < .01$ ). Caregiver's shame also predicted caregiver's depression ( $\gamma = 0.45, p < .01$ ) and anxiety significantly ( $\gamma = 0.36, p < .01$ ). However, children's asthma symptoms control only predicted caregiver's anxiety ( $\gamma = 0.21, p < .05$ ). In addition, family functioning was significantly related to SES ( $\gamma = 0.22, p < .01$ ), caregiver's shame ( $\gamma = 0.40, p < .01$ ), and caregiver's depression ( $\gamma = 0.63, p < .01$ ) and anxiety ( $\gamma = 0.47, p < .01$ ), whereas it did not significantly correlate with children's asthma symptoms control ( $\gamma = 0.04, p > .05$ ). Hence, the prerequisites for establishing the mediation effects of family functioning on the asthma symptoms control-caregiver's depression link and the symptoms control-caregivers' anxiety link were not fulfilled, and asthma symptoms control was excluded from the mediation models.

Two models with family SES and caregiver's proneness to shame as predictors, family functioning as a mediator, and caregiver depression/anxiety as the outcome variable were examined.

For the model predicting caregiver depression, the data fit the model well,  $\chi^2(23, N = 185) = 71.22, p < .001$ , CFI = 0.92, GFI = 0.93, and RMSEA = 0.08. Path coefficients of the mediation model are presented in Figure 4. Although the path coefficients from SES and caregiver's shame to caregiver's depression were both significant ( $\gamma = -0.29, p < .01$ ,  $\gamma = 0.20, p < .01$ , respectively), the magnitude of the direct association was reduced significantly: for SES (from  $-0.38$  to  $-0.29$ ),  $z = -2.21, p < .05$ , and for caregiver's shame (from



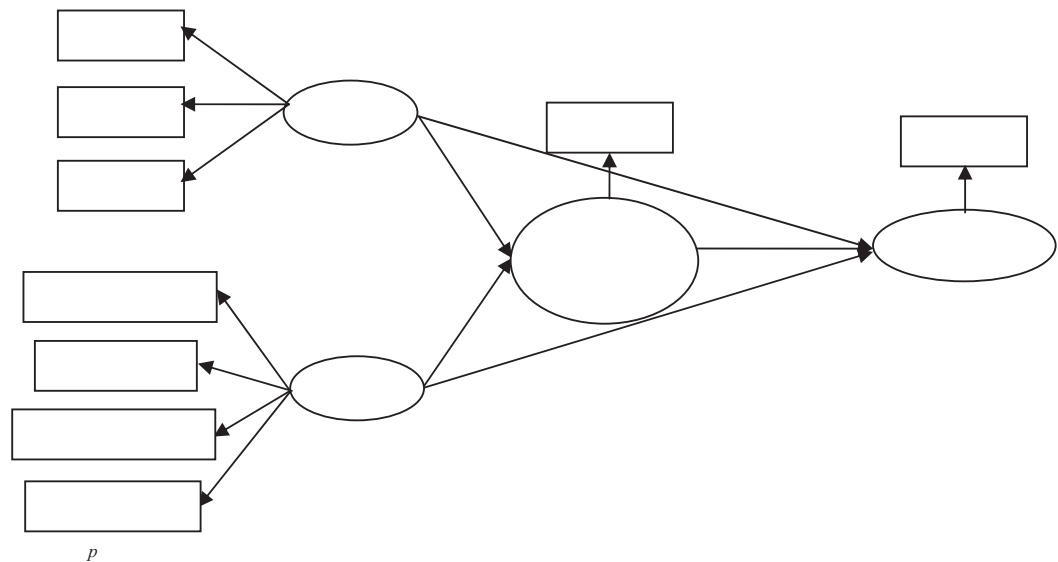


FIGURE 4. Mediation Effect of Family Functioning in the Association between SES and Caregiver's Proneness to Shame with Caregiver's Depression

TABLE 2  
Mediation Effects of Family Functioning

Predictor	Criterion	df	$\chi^2$	RMSEA	CFI	GFI	Causal effect	
							Direct	Indirect
SES shame	Depression	23	71.22	0.08	0.92	0.93	-0.38**	-0.09**
							0.37**	0.17**
SES shame	Anxiety	23	86.93	0.10	0.88	0.92	-0.22**	-0.07**
							0.31**	0.15**

Note. \*\*  $p < .01$ .

0.37 to 0.20),  $z = 3.80$ ,  $p < .01$  (Table 2). Therefore, these findings support the partial mediation effects of family functioning on the associations between family SES and caregiver's shame with caregiver depression.

The same analytic procedure was conducted to examine the anxiety model. Detailed indices of the model's goodness of fit are listed in Table 2 and path coefficients are presented in Figure 5. The addition of family functioning in the model reduced the magnitude of the direct association between SES and anxiety (from 0.22 to 0.15,  $z = -2.12$ ,  $p < .05$ ), as well as the association between caregiver's shame and anxiety (from 0.31 to 0.16,  $z = 3.66$ ,  $p < .01$ ). The mediation effect of family functioning on the relationship between SES and caregivers' shame on caregiver anxiety was supported.

### DISCUSSION

The present study focused on the mental health of the caregivers of children with asthma and aimed to clarify factors contributing to the mental health problems of such caregivers in the Chinese social context.

As the results revealed, caregivers of children with asthma showed heightened levels of anxiety, but not depression compared with the norms. It may be related to the nature of



The current findings provide additional information about caregivers' proneness to shame and its association with their mental health. As indicated in the results, high proneness to shame is related with low family SES, family dysfunction, as well as long course of pediatric asthma. The result is consistent with the argument that low social status is a vital source of shame in the Chinese cultural context (Hwang, 2001). Also, the long course of illness of the child might aggravate the shame of caregivers. The reasons may lie in the self-blaming of inappropriate care and symptoms management or the social stigma of having a child with illness. For the correlation between shame and family dysfunction, it may be that individuals with high proneness to shame are more likely to withdraw and hide feelings which might hinder effective communication within the family, and in turn do harm on family functioning (Qian, Liu, & Zhang, 2003; Shi & Qian, 1998). The reverse is also possible. In families which are full of judgment and criticism, while lacking in warmth and support, individuals' self-esteem might rely much on external evaluation and they are more likely to feel ashamed (Yi, 2001).

Consistent with previous research on the associations between shame and psychopathology, our results suggest that the higher a caregiver scored on proneness to shame, the more depressive and anxious symptoms he or she experienced (Tangney, Wagner, & Gramzow, 1992; Qian, Liu, & Zhu, 2001; Zhong, Li, & Qian, 2003). Low self-esteem has been found as a mediator between the relationship between proneness to shame and depression (Zhu, Wang, & Qian, 1999). The internal and stable attribution style and avoidance coping style which relate with shame proneness also make individuals more vulnerable to external stress (Shi & Qian, 1998).

The hypotheses on the moderating and mediating effects of family functioning are also supported. As indicated by the results, family functioning is a buffer but also a vulnerable mediator in the association between stressors (low family SES and high proneness to shame) and caregiver mental health. On one hand, functional families are an important resource for caregivers dealing with stressors such as childhood asthma. In families with high functioning, the negative effects of external stressors, such as low SES, and internal vulnerabilities, such as shame, become dramatically less pronounced. This is consistent with previous research suggesting that spousal support buffers the effects of child-related stress on parental depression (Jackson, 1992). On the other hand, risk factors such as low family SES and high proneness to shame also have a negative impact on this coping resource. Consistent with the Conservation of Resources theory, as well as a previous study (Mitrani et al., 2006), family functioning is a mediator by which SES and proneness to shame do harm to caregivers' mental health.

The findings from the present study have important implications for interventions designed for children with asthma in China. As suggested by the results, caregivers of children with asthma suffer from greater anxiety than average. Reducing anxiety level of caregivers should be an important part in the interventions. Providing resources directly should be a way to help them obtain the sense of mastering and decrease anxiety. For example, for those families living in rural places, it is important to provide information on medical resources available. For families with low SES, financial support might be a key to improve caregivers' mental health. However, it is also possible to stimulate energy within the family itself. As indicated by this study's results, decreasing the experience of shame and improving family functioning might be beneficial for the caregivers, especially for those from families with low SES. Psycho-education on shame proneness, family functioning, and their relationship with the caregiver's mental health and the child's symptoms control could be conducted, and a booklet containing suggestions on release from experience of shame and maintaining functional family dynamics when dealing with the child's illness could be sent out to the caregivers. Family therapy is also an option for the affected families. There has been evidence that systemic family therapy is effective in

reducing the depression symptoms of caregivers of patients with chronic disease (Eisdorfer et al., 2003), and that it is helpful in controlling the symptoms of children with asthma (Onnis et al., 2001).

It is also important to acknowledge the limitations of the present study. First, this is a caregiver-report investigation which lacks objective measures of asthma symptoms control. The indices of asthma symptoms control used in the present study might be not sensitive enough to detect its effect on caregivers' mental health. Second, although we found that family functioning can help caregivers deal with the stress associated with pediatric asthma, precisely which aspects of family functioning are relevant remains unclear. Third, we recruited participants in a hospital, which means the sample is more representative of caregivers whose children are in an acute episode rather than the whole population of caregivers of children with asthma. The sampling bias might affect the generalizability of the results.

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