

Explaining the perceived justice of disaster relief policy: An empirical study based on the 2008 Wenchuan Earthquake in China

Zhang H. Explaining the perceived justice of disaster relief policy: An empirical study based on the 2008 China Wenchuan Earthquake

The Chinese government issued generous relief policies after the Wenchuan Earthquake. However, according to my survey, 20.32 per cent ($n = 1,949$) of the earthquake victim-survivors felt that they were treated unfairly in receiving government assistance after the earthquake. In the present study, a perceived justice framework was established to explain the victim-survivors' perception of justice of the disaster relief policy in China and several hypotheses were developed. The hypotheses were tested empirically using household survey data of the Wenchuan Earthquake. The empirical study found that perceived justice, which is composed of three dimensions (distributive justice, interpersonal justice and informational justice), could directly assess the effect of the disaster relief policy. The results of the empirical study also demonstrated that the most important principle of the disaster relief policy was 'need distribution', which was also the most important factor of perceived justice. The study concluded that it is imperative to improve victim-survivors' feeling of fairness, policy information delivery and their expectations management when implementing a disaster relief policy.

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China has witnessed numerous natural disasters, many of which have caused deadly damage to its people. The provision of disaster relief has been a main mandate of the Chinese government since 1949. Since the 1980s, the Chinese government has carried out a series of reforms of the disaster assistance system. In particular, the government has allocated an increasing amount of disaster assistance funding since the SARS incident in 2003. However, the level of disaster relief remained relatively low prior to 2008 (Salazar et al., 2011).

The Wenchuan Earthquake resulted in a great change in the disaster relief policy in China. The 2008 Wenchuan Earthquake was one of the most damaging catastrophes in China. According to the official figures, by October 2008, 69,227 people were confirmed dead, 374,643 were injured and 17,923 were listed as missing.¹ An area of 132,596 sq km, with a population of 19.867 million, was extremely badly hit or badly hit

by the earthquake.² Most of the victim-survivors had to rely on disaster relief to maintain a basic living. The substantial losses of life and property in the earthquake attracted extraordinary sympathy and attention from the public. The Chinese government also provided unprecedentedly generous disaster assistance. To protect the basic living standards of the victim-survivors, governments at all levels assembled large amounts of relief material after the earthquake. In particular, the Ministry of Civil Affairs (MoCA) promulgated the temporary life assistance policy for earthquake victim-survivors in the beginning of June 2008.³ According to this policy, people who had lost their home, means of production or source of income in the Wenchuan Earthquake could receive social assistance amounting to 10 RMB and 1

¹ Jintao Hu, The Speech in the National Earthquake Relief Summarizes and Commendation Congress, October 2008.

² The State Council, *The Wenchuan Earthquake Reconstruction Overall Plan*, the State Council [2008] No.31.

³ Ministry of Civil Affairs, Ministry of Finance and State Grain Administration, *The Notice of Implementation of the Temporary Life Assistance to the People in Straitened Circumstances in Wenchuan Earthquake Area*, MoCA [2008] No.66.

Jin (1.11 lbs) of processed grain per day for 3 months. Orphans, single older people and single people with disabilities could receive twice that amount. This policy was subsequently extended for an additional 3 months. By the end of 2008, China's central government had spent 41.794 billion RMB on the Wenchuan Earthquake relief and had helped 9.22 million affected people.⁴ In comparison, the total disaster relief fund of the central government in 2007 was 7.98 billion RMB.⁵

To ensure that the relief policies would have the intended effect, Premier Wen Jiabao particularly stressed that the distribution of relief supplies should be open, fair and just, based on the situation of the affected area; the relief standards, qualification and relief amounts should be made known to the general public; partiality for relatives and close friends as well as gender and age discrimination should be resolutely precluded; and the basic living rights and interests of the victim-survivors should be justly maintained.⁶ The MoCA and other departments published a number of documents to provide guidance and specify the requirements for the implementation of the relief policies; these included 'Distribution Methods of Living Relief Materials for the Wenchuan Earthquake', 'Information Disclosure Methods of the Management and Use of Disaster-relief Materials and Fund for the Wenchuan Earthquake' and 'Notice to Further Improving the Management and Use of Disaster-relief Materials and Funds for the Wenchuan Earthquake'.

The Chinese government's relief policies after the Wenchuan Earthquake were unprecedentedly generous. In addition to the vast amounts of relief resources, decision makers attempted to ensure the fairness of the relief policy procedures and outcomes. Nevertheless, contrary to expectations, some of the victim-survivors who were beneficiaries of the relief policies did not perceive them to be just. In the household survey conducted in the earthquake-stricken area in early July 2008 by the School of Social Development and Public Policy (SSDPP), Beijing Normal University, only 34.48 per cent of the respondents selected the option 'Fair', whereas 45.20 per cent selected 'Neutral' and 20.32 per cent selected 'Unfair' in reply to the following question: 'Do you think the distribution of relief goods was fair?' This was not a desired result for the government. Why did so many of the victim-survivors respond that the distribution was unfair? What factors influenced the victim-survivors' attitude towards

the relief policies? The present study conducted preliminary research using the SSDPP data with the aim of providing an explanation for the victim-survivors' perception of the disaster relief policy as being largely fair or largely unfair.

Both qualitative and quantitative approaches can be used to determine victim-survivors' feeling of fairness. The qualitative approach has the advantage of exploring people's perceptions in depth. I benefited greatly in understanding victim-survivors' feelings and perceptions of justice of the disaster relief policy from field work and interviews that were conducted with a large number of victim-survivors, village cadres, volunteers and government officials in the stricken area from May to August 2008. The quantitative approach enables the testing of the hypotheses deduced from the quantitative data. The present study used mainly a quantitative approach. The approach not only confirmed the author's hypotheses concerning the factors that influenced the victim-survivors' perceived justice of the relief policy, but also provided a rough quantitative comparison of the influences of different factors. The qualitative results of the study could help policy makers improve disaster relief policies and other disaster policies.

The SSDPP data were surveyed with stratified sampling in early July 2008. Data surveying was performed approximately 2 months after the Wenchuan Earthquake, when the victim-survivors had experienced the disaster relief policies and their feelings about such policies remained clear. The data surveying site was Mianyang, the largest prefectural-level area stricken by the Wenchuan Earthquake, which ensured that the data were representative of all of the victim-survivors.

A theoretical framework on perceptions of the justice of disaster relief policies

Fairness is the inherent requirement of public policy (Stone, 2012; Weimer & Vining, 2010). When public policies are formulated and implemented, the government always considers the principle of justice and declares to adhere to it. During the planning and introduction processes of public policies, the government also often meets various demands and challenges from the public, who expect fairness. After implementation, the policy audience's feeling regarding whether the policy is fair is a direct assessment. The feeling with respect to fairness directly influences people's attitudes towards the policy and even their behaviours. Therefore, the policy audience's feeling of fairness is an important influencing factor of the policy's outcome.

Fairness can be divided into two concepts. One is objective fairness or normative justice, a topic that has long been a concern of researchers (Ng, 2000). Normative justice is a problem of ethics, representing ethical-social requirements. The most common arguments of

⁴ http://www.china.com.cn/policy/txt/2009-01/05/content_17054199.htm. Retrieved 18 October 2011.

⁵ Ministry of Civil Affairs, *2007 civil affairs development statistics report*, <http://cws.mca.gov.cn/article/tzgg/>. Retrieved 18 October 2011.

⁶ Retrieved from the Chinese government's website: http://www.gov.cn/ldhd/2008-05/31/content_1000755.htm. Retrieved 18 October 2011.

normative justice are found in the utilitarianism theory of justice, Nozick's theory, Rawls' theory and Sen's theory (Konow, 2003; Nozick, 1974; Rawls, 1971; Sen, 2009). Compared with the aforementioned normative theories, Winslow presented more relevant discussions on disaster relief policy (Winslow, 1982). However, all of these theories are based on an objective judgment of fairness.

The other concept of fairness is subjective fairness or perceived justice, which describes a type of individual feeling of whether 'it is fair to me' or 'I am treated fairly'. This feeling is personal. Therefore, there is no direct causal relationship between perceived justice and normative justice, and different persons may have rather different perceptions of justice for the same treatment or policy. Victim-survivors' feelings are indicative of perceived justice.

Although many social scientists from various disciplines have paid attention to perceived justice with a focus on a wide variety of issues and contexts (see e.g., Cohen, 1986), the main and most successful theoretical framework for explaining perceived justice or the feeling of fairness is organisational justice theory (Colquitt, Greenberg, & Zapata-Phelan, 2005). According to organisational justice theory, perceived justice is divided into four types of subjective distribution: (i) the fairness of outcome distributions or distributive justice; (ii) the fairness of procedures or procedural justice, and the fairness of interpersonal treatment or interactional justice, which is divided into two types, (iii) interpersonal justice and (iv) informational justice (Bies, 2005; Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Colquitt et al., 2005). Researchers who have studied the feeling of fairness have first focused on the distribution of the outcome. Justice derives from the distribution of resources. Adams' equity theory posits that individuals develop a ratio between their own contributions or inputs (such as knowledge, skills, experience etc.) and outputs (Adams, 1965). They then compare the ratio with that of another individual. Thus, they obtain a perception of distributive justice. Apart from the justice standard of the output-to-input ratio and the comparison of ratios, Greenberg and Leventhal's model of justice judgment adds more comparative criteria, such as the equality principle and the need principle (Leventhal, 1976). Porter and Lawler found that expectation impacted distributive justice (Porter & Lawler, 1968). They assumed that the perception and feeling of justice at the workplace were dependent on the difference between the real gain and expected gain of the employee. When the expected gain was higher than the real gain, perceived justice was weak, and vice versa. The authors concluded that the concept of distributive justice ignores the process that occurs before distribution or allocation. Thibaut and Walker proposed a concept of procedural justice (Thibaut & Walker, 1975).

They found that individuals' procedural fairness judgments could be significantly enhanced as long as they had the right to control the procedures, regardless of the final outcomes. Based on distributive justice and procedural justice, Bies and Moag focused on the impact of interaction on perceived justice, that is, 'interactional justice' (Bies & Moag, 1986). Interactional justice concerns the interactional processes between the perceived subject and the source of justice, such as courtesy, sincerity and respect in interpersonal communication. Greenberg further divided interactional justice into 'interpersonal justice' and 'informational justice' (Greenberg, 1990, 1993). Interpersonal justice reflects the degree to which people are treated with politeness, dignity and respect by authorities or by the third parties involved in executing procedures or determining outcomes, that is, the respect received from authorities or supervisors. Informational justice focuses on the explanations provided to people who convey information about why procedures were used in a certain way or why outcomes were distributed in a certain fashion.

There is much controversy regarding the relationships between the four dimensions of perceived justice (Ambrose & Arnaud, 2005; Bies, 2005; Colquitt et al., 2001). The mainstream view of the four-dimensions theory is that perceived justice consists of all four types of justice (Colquitt, 2001). An empirical study of organisational justice in China also supported the four-dimensions theory (Liu, Long, & Li, 2003).

Both the organisational justice and perceived justice of policies indicate the subjective feeling of fairness. They both derive from people's mentality and present similar outward manifestations and therefore have a similar structure in the minds of people. In the field of public policy, few publications discuss people's feeling of fairness. Leung, Tong, and Lind (2007) discussed the effects of perceived procedural justice on the acceptance of political decisions. The authors successfully studied the perceived justice of public policy, although they referred only to procedural justice. Wu, Wang, Xu, and Zhou (2009) studied a similar problem against the background of the Wenchuan Earthquake. Neither of the said two articles distinguished between the four dimensions of perceived justice. Given the purposes of those two articles, the discussion of procedural justice may be sufficient. However, it is not sufficient to merely discuss procedural justice to clearly understand victim-survivors' feeling of fairness, which is the purpose of the present article.

Considering the inherent consistency between the organisational justice and perceived justice of policies, I used a similar theoretical framework of organisational justice to discuss the perceived justice of disaster relief policies. However, the exchange structure of the perceived justice of policies differs from that of perceived justice in an organisation. In an organisation, the giver

typically represents the employer, the receiver represents the employee and the exchange structure is 'contribution-reward', that is, the employee makes a contribution to the employer and receives an appropriate reward. However, in a public policy system, the giver is the policy decision maker/implementer, and the receiver is the policy audience. The exchange structure is more complex and differs according to different categories and contents of policy. In this article, I discuss only the exchange structure of disaster relief policies. Developing a disaster relief policy is the basic responsibility of governments. It is important and necessary to build a social protection system in the wake of disasters because of the unacceptable extra loss of life or miserable situation faced by victim-survivors (del Ninno, 2008; Subbarao, 2005). The disaster relief policy developed by a government is the core pillar of the system (Lustig, 2000; Vakis, 2006). In turn, the all-important agenda of the government is disaster relief after a disaster (Birkland, 1997; May, 1985; Ripley & Franklin, 1991; Stehr, 2006). The core purpose of a disaster relief policy is to satisfy victim-survivors' basic needs to maintain their quality of life at an acceptable level. Therefore, the exchange structure of a disaster relief policy is 'need-assistance', that is, victim-survivors have certain basic needs that are dependent on the government's provision of relief goods in the post-disaster state. The differences between organisational justice and perceived justice of disaster relief policies derive from different exchange structures of 'contribution-reward' and 'need-assistance'.

First, the distributive justice of a disaster relief policy derives from two types of perceptions: victim-survivors' perception of distributive outcomes and victim-survivors' perception of distributive methods. With respect to the former perception, unlike employees in an organisation, victim-survivors do not compare their own contributions and rewards but compare their own relief goods (i) with those of others, (ii) with their own losses in the disaster and (iii) with their expectations for disaster assistances. Regarding the perception of distributive methods, employees are not sensitive because they have more opportunities to participate in the decision-making process. However, distributive methods are indispensable parts of the distributive justice of disaster relief policies. The distributive methods of a disaster relief policy reflect the values or principles on which the policy is based. In the need-assistance structure of a relief policy, the primary policy value must be the need principle. That is, the government must allocate relief materials according to the needs of victim-survivors. If the formulation and implementation of the relief policy is not consistent with the need principle, invoking, for example, the nepotism principle or jungle rule, the perceived justice of victim-survivors is inevitably reduced.

Second, the procedural justice of organisational justice theory focuses mainly on participation, procedural influence (Thibaut & Walker, 1975) and decision-making control (Leventhal, Karuza, & Fry, 1980). The perceived justice of a policy is reflected more by the policy objects' participation in the formulation and decision-making processes. However, the situation is rather special for disaster relief policies. Victim-survivors cannot participate in the formulation and decision-making processes because of the disaster situation. Therefore, disaster relief policies do not or hardly ever involve procedural justice.

Third, interactional justice derives from human interaction in executing procedures; thus, interaction justice has equal effects on organisational justice and the perceived justice of a policy. Both the interpersonal and informational aspects of justice are important. Victim-survivors' perceived justice is affected by the direct interaction between the issuers of relief materials, primarily officials at different levels, and victim-survivors involved in the distributing procedures. If the issuers allocate relief materials with condescending and arrogant attitudes or do not respect the needs of victim-survivors, the victim-survivors' perceived justice is weakened. The purpose of effective communication is to enable information flow. It is important to note that the information flow of a disaster relief policy should emanate both from the government to victim-survivors and from victim-survivors to the government. Therefore, with respect to informational justice, the government should deliver accurate information about its disaster relief policy in a timely manner and effectively collect information on victim-survivors' needs. If victim-survivors are informed about the distributive methods, allocation grounds and appeal approaches of the relief policy in a timely manner, their perceived justice is improved. Perceived justice is also enhanced if the needs of victim-survivors are heard and positive feedback is given in a timely manner.

In sum, the model of perceived justice of disaster relief policies can be constructed as shown in Figure 1.

The aforementioned discussion reveals that the logical structure of disaster relief policies is simpler and clearer than that of organisational justice. According to the general living conditions of victim-survivors after a disaster, governments at all levels introduce relief policies to provide for the daily needs of victim-survivors. The actions of governments include the formulation and implementation of relief policies. Procedural justice is involved in the decision-making process but shows few direct effects on victim-survivors' perceived justice. Regarding distributive justice, the entire implementation process of relief policies determines the distributive outcomes and methods that affect the perceived distributive justice of victim-survivors. During the execution of relief policies,

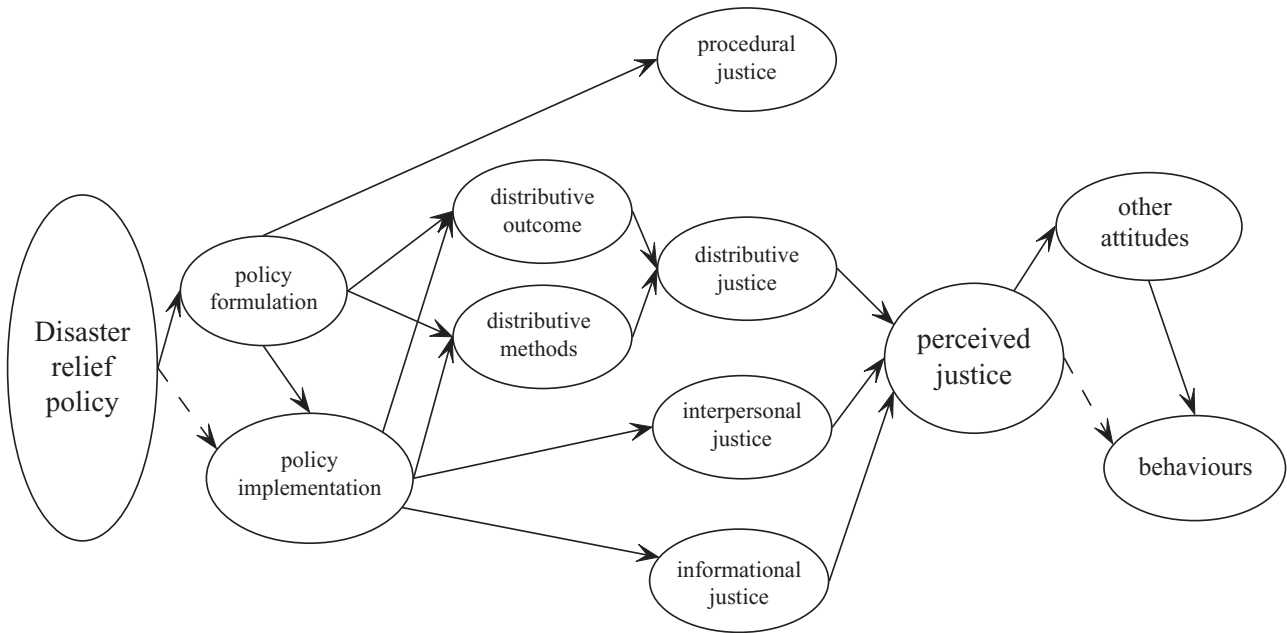


Figure 1. Model of the perceived justice of the disaster relief policy.

interpersonal and informational factors are also sources of perceived justice for victim-survivors. Therefore, distributive, interpersonal and informational justice form a comprehensive system of the perceived justice of disaster relief policies.

In addition, the perceived justice of disaster relief policies is associated with the current perception. That is, the subjective perception of victim-survivors derives from the implementation processes and final results of all disaster relief policies. These policies are introduced as solutions to the disorder and destruction caused by a given disaster. Therefore, they are mainly associated with the impact of disasters and are weakly related to the individual characteristics and pre-disaster socio-economic situations of victim-survivors.

Hypothesis

Perceived justice is a type of psychological state caused by a special objective result or event. Thus, other factors that are not related to the result or event do not affect perceived justice. Therefore, the hypotheses formulated in this study were as follows.

Hypothesis 1-1: The individual characteristics of victim-survivors do not affect the victim-survivors' perceived justice of disaster relief policies.

Hypothesis 1-2: The pre-disaster socio-economic situations of victim-survivors do not affect the victim-survivors' perceived justice of disaster relief policies.

Based on my logical model of disaster relief policies, distributive, interpersonal and informational justice are

three factors that explain perceived justice. Distributive justice can be divided into distributive outcomes and distributive methods. Thus, the hypotheses formulated are as follows.

Hypothesis 2-1: Distributive outcomes affect victim-survivors' perceived justice of disaster relief policies.

Hypothesis 2-2: Distributive methods affect victim-survivors' perceived justice of disaster relief policies.

Hypothesis 2-3: Interpersonal justice affects victim-survivors' perceived justice of disaster relief policies.

Hypothesis 2-4: Informational justice affects victim-survivors' perceived justice of disaster relief policies.

The following hypothesis was developed because the objective of disaster relief policies is need-assistance.

Hypothesis 3: Victim-survivors will feel that the distributive methods of disaster relief policies are fairer when the methods conform to the need principle.

In my theoretical model, I supported a multidimensional perceived justice theory, leading to the following hypothesis.

Hypothesis 4: The model of distributive outcomes, distributive methods, interpersonal justice and informational justice can explain the perceived justice of disaster relief policies better than a model with a single dimension can.

Table 1. Demographic characteristics of the 'victim-survivors'.

		Frequency	Percentage
Gender (<i>n</i> = 1,941)	Male	1,205	62.08
	Female	736	37.92
Marriage status (<i>n</i> = 1,941)	Married	1,704	87.79
	Widowed	130	6.70
	Divorced	12	0.62
	Unmarried	95	4.89
Ethnicity (<i>n</i> = 1,950)	Han	1,518	77.85
	Qiang	431	22.10
	Others	1	0.05
Religion (<i>n</i> = 1,885)	None	1,671	88.65
	Buddhist	188	9.97
	Christian	22	1.17
	Others	4	0.21
Education (<i>n</i> = 1,951)	None	414	21.22
	Elementary	735	37.67
	Junior high school	594	30.45
	Senior high school or above	186	9.53
	Still in school	22	1.13
Household registration status (<i>Hukou</i>) (<i>n</i> = 1,951)	Agricultural	1,590	81.50
	Non-agricultural	361	18.50
Age group (<i>n</i> = 1,950)	39 and below	614	31.49
	40 to 50 years	501	25.69
	50 to 60 years	439	22.51
	60 and over	396	20.31
Household size (<i>n</i> = 1,954)	Mean	3.7 persons	

Data and methods

This study used the household survey conducted in July 2008 by SSDPP, BNU in Mianyang, the largest prefecture-level stricken area of the Wenchuan Earthquake. Mianyang is located in the northwest of Sichuan. It has a total area of 20,249 km² and has nine counties. Three of the counties were among the extremely badly hit areas, including Beichuan which had the largest number of casualties; five were badly hit areas; and one was a normal-hit area. Therefore, the surveyed area is reasonably representative.⁷ The survey adopted stratified sampling. Two communities or temporary settlements of tents were randomly selected in each county, and 100 households were randomly selected in each community or settlement. To focus greater attention on the extremely badly hit areas, four temporary settlements of tents were selected in Beichuan. The total number of valid households

interviewed was 1,954. Table 1 presents the demographic characteristics of the respondents.

The respondents to the household survey were typically the householder or the most important family member at home because they knew well the information about the whole family and were regarded as the natural representative by the other family members. Thus, the respondents included a high percentage of males (62.08%), a very high percentage (87.79%) of married individuals and individuals of older average age (48 years). However, when considering all family members (sample size = 7,252), the percentage of males was 51.16 per cent, the percentage of married individuals was 65.74 per cent and the average age was 38 years old. By the end of 2007, the population of Mianyang was 5.38 million, and the percentage of males was 51.85 per cent.⁸ Overall, the sample is representative. Because the respondents held a high position in the family, they were more likely to experience or know the entire process of how the family received assistance after the disaster. Thus, their answers may better represent the opinions of the whole family. However, their answers may be more conservative, political and ambiguous, such that the measurement of fairness may have tended to be higher than it actually was.

⁷ The disaster area of the Wenchuan Earthquake is quite large, including 10 counties of the hardest-hit areas, 47 counties of hard-hit areas and 186 counties of normal-hit areas. The population of the hardest-hit and hard-hit areas was 19.867 million by the end of 2007. The population of the eight hardest-hit or hard-hit counties in Mianyang was 4.731 million, or 24 per cent of all stricken populations. Therefore, Mianyang is representative as a sampling area of the Wenchuan Earthquake.

⁸ Data resource: Sichuan Statistics Yearbook 2008.

Socio-economic conditions before a disaster are important characteristics in determining a sample's representativeness. However, it is difficult to accurately measure socio-economic conditions in household surveys. In China, *Hukou* (household registration status) is one of the fundamental and primary socio-economic variables and is typically accurate. The percentage of non-agriculture *Hukou* was 18.50 per cent in the SSDPP data, whereas the percentage of non-agriculture *Hukou* was 24.76 per cent in Mianyang at the end of 2007.⁹ Another variable that could be accurately measured was 'if the family lives below the poverty line'. In the SSDPP data, the percentage was 31.38 per cent in urban *Hukou* and 7.75 per cent in rural *Hukou*,¹⁰ whereas the percentage of families living below the poverty line in urban areas was 11.74 per cent in Mianyang at the end of 2007¹¹ and estimated to be approximately 5 per cent in rural areas.¹² Both *Hukou* and the poverty rate showed that the socio-economic situation of the sample was lower than that of the general population. A possible explanation is that wealthy people may be more likely to leave the stricken area after a disaster. However, as wealthy people were not the target of the disaster relief policy, excluding wealthy people did not affect the representativeness of the data.

Some stricken areas of the Wenchuan Earthquake include Qiang¹³-inhabited areas. For example, Beichuan is the only Qiang autonomous county in China. However, the Qiang population is very small. The percentage of the Qiang population in Mianyang is less than 3 per cent.¹⁴ In the SSDPP survey, 400 households were randomly selected in Beichuan and 200 households were selected in eight other counties. Therefore, the percentage of Qiang was 22.10 per cent in the data.

The household survey data do not include direct measurement variables of the different dimensions of perceived justice. Therefore, I used indirect variables to measure the various justice dimensions. First, I used the independence test to preliminarily determine the relation between different variables and perceived justice

and to select the suitable variables for cause–effect testing. Second, I used ordered logistic regression to determine the cause–effect relations between different dimensions and perceived justice.

Results

Independence test of personal characteristics and pre-disaster family socio-economic situation in relation to perceived justice

I hypothesised that personal characteristics would not affect the perceived justice of disaster relief policies. I used the χ^2 statistic to test the independence between the respondents' characteristics and perceived justice.¹⁵ As shown in Table 2, most of the personal characteristics were not significant. Despite the significance of ethnicity and age group, both χ^2 values were very small. Overall, the impact of personal characteristics on perceived justice was limited, verifying H1-1.

Table 2 also presents the result of the independence test between the pre-disaster socio-economic situations of the interviewed family and the interviewees' perceived justice.

As demonstrated in Table 2, all variables were significant to varying degrees. The pre-disaster socio-economic situations of the interviewed families had a certain impact on the perceived justice of the disaster relief policy. However, these impacts were limited except for the *Hukou* because all other χ^2 values were very small. The results roughly verify H1-2.

Independence test of different justice dimensions in relation to perceived justice

Distributive outcomes. The victims' perception of distributive outcomes was based on the following three references: equal standard in comparison with other victim-survivors' relief goods; loss standard in comparison with each victim's family losses caused by the disaster; and expected standard in comparison with each victims' expectation for assistance. There were some difficulties in operating these standards and finding direct measurement variables. Thus, distributive justice could be indirectly investigated only via losses caused by the disaster, the real value of obtained relief goods and the expected assistance value. It is reasonable to expect that: (i) as losses increased, perceived justice decreased; (ii) as assistance increased, perceived justice increased; and (iii) as expectations increased, perceived justice decreased.

The victim-survivors' losses included life and property. Family casualties were measured directly from the

⁹ Data resource: Sichuan Statistics Yearbook 2008.

¹⁰ The urban minimum living guarantee and rural minimum living guarantee are two different policies in China. The rural minimum living guarantee was introduced later than the urban minimum living guarantee. The former's payment standard is far lower than that of the latter, but the two describe the relative similar socio-economic conditions in a community.

¹¹ Data resource: Sichuan Statistics Yearbook 2008.

¹² No publicly available publications reported data regarding the rural minimum living guarantee of Mianyang. I estimated the percentage based on information gathered from an interview with a Mianyang civil affairs bureau official.

¹³ Qiang is one of China's ethnic minorities, and their total population is approximately 300,000.

¹⁴ Data resource: Sixth national population census of China.

¹⁵ The crosstabs between different variables and perceived justice are listed in the Supporting Information.

Table 2. χ^2 test of personal characteristics and family pre-disaster socio-economic situation.

Variables	Variable categories	<i>n</i>	χ^2	Pr	Tendency
Personal characteristics					
Gender	Male, female	1,936	0.937	0.626	NA
Marriage status	Unmarried, married, widowed, divorced	1,936	3.151	0.790	NA
Ethnicity	Han, others	1,945	18.59	0.000	Han people feel more unfairly treated.
Religion	None, Buddhist, Christian, others	1,880	9.364	0.154	NA
Education	None, elementary, junior high school, senior high school or above, still in school	1,946	9.389	0.311	NA
Age group	0–39, 40–49, 50–59, 60 and above	1,945	20.614	0.000	The older people feel more fairly treated.
Family pre-disaster socio-economic situations					
<i>Hukou</i>	Agriculture, non-agriculture	1,946	44.621	0.000	Respondents from an agriculture <i>Hukou</i> feel more fairly treated
Below the poverty line	Yes, no	1,235	6.219	0.045	Respondents living above the poverty line feel more fairly treated.
Pre-disaster economic conditions	Very good, good, middle, bad, very bad	1,938	20.402	0.009	Respondents with the worse pre-disaster economic condition feel more fairly treated.
Pre-disaster employment	Self-employed, employed, unemployed	1,860	10.697	0.030	Employed respondents before disaster feel more unfairly treated.

NA, not applicable; Pr, probability.

respondents. However, loss of property was difficult to measure. For example, how can different types of property damages be compared? Moreover, the use of absolute or relative value assessment caused problems. Generally, houses were the most important property of victim-survivors, and damage to houses was the most severe property damage caused by the earthquake. Therefore, I selected damage to houses as the measure of property damage in the disaster. In the questionnaire, this variable has four categories: ‘completely damaged’, ‘mostly damaged and needs to be re-moved’, ‘partly damaged and needs some reinforcement’ and ‘slightly damaged’. Because 50.38 per cent of the interviewees selected ‘completely damaged’, the variable was re-classified into a new variable with two categories: ‘completely damaged’ and ‘others’. Relief goods distributed to victim-survivors were measured using two variables: one was the total relief cash that the respondent family received and the other was a two-category variable based on relief cash (0–RMB1000 and RMB1000–above).

Victim-survivors’ expectations were measured with respect to their attitudes regarding how the government aided the construction of permanent homes. The questionnaire has the following six options: ‘The government should undertake all costs’; ‘The government should undertake part of the costs’; ‘The government should provide interest-free/low-interest loans’; ‘The government should provide ordinary loans’; ‘Self-built, no governmental help’; and ‘Others’. To perform the analysis, these options were divided into the following three groups: high expectation = ‘The government should undertake all costs’, medium expectation = ‘The government should undertake part of the cost’ and low expectation = other options.

The results of the independence test between the distributive outcomes and the interviewees’ perceived justice are listed in Table 3.

As shown in Table 3, the distributive outcomes from victim-survivors’ losses, relief cash and expectation did not pass the independence test. The results show that respondents who lost family members reported more unfairness and that respondents whose houses were completely damaged reported more unfairness. These results support my expectation about the impact of losses on perceived justice. The result that respondents who received more relief cash reported more fairness supports my expectation about the impact of assistance on perceived justice. The result that respondents who had high expectations for the assistance provided reported more unfairness supports my expectation about the effects of victim-survivors’ expectations of perceived justice. However, the χ^2 of relief cash was not very large and did not correlate with perceived justice. The victim-survivors’ losses and expectations had more direct impact on the perceived justice of disaster relief policy, whereas the impact of the amount of relief goods on perceived justice was limited.

Distributive methods. For victim-survivors, intuitive feelings about distributive methods are indicative of how officials distribute relief materials. The corresponding question in the questionnaire is ‘How were relief materials distributed in your village/community?’, and it has nine options. For better analysis, these options were re-classified into four categories according to the principle of policy value. The first category was ‘equal distribution’, with the classified option of ‘All families are similar’. The second was ‘need distribution’, with the classified options of

Table 3. χ^2 test of different justice dimensions.

Variables	Variable categories	<i>n</i>	χ^2	Pr	Tendency
Distributive outcomes					
Whether family member was lost	Yes, no	1,925	30.737	0.000	Respondents who lost family members feel more unfairly treated.
Whether house was destroyed	Completely damaged, Mostly damaged and needs to be removed; partly damaged and needs some reinforcement; little damaged	1,856	113.566	0.000	Respondents whose houses were completely damaged feel more unfairly treated.
Whether house was destroyed	Completely damaged, others	1,856	110.191	0.000	Respondents whose houses were completely damaged feel more unfairly treated.
Relief cash	0, 1–1,000, $\geq 1,000$	1,849	14.224	0.007	Respondents who received more relief feel more fairly treated
Victim- survivors's expectations	High, medium, low	1,883	56.134	0.000	Respondents with high expectation feel more unfairly treated.
Relief cash	M = 585.24	1,849	$R^2 = 0.0003$	0.492	NA
Distributive methods					
How the relief material was distributed	Equal distribution; need distribution; loss distribution; unreasonable distribution	1,900	583.713	0.000	Respondents receiving need and loss distribution feel more fairly treated. Respondents of unreasonable distribution feel more unfairly treated.
Interpersonal justice					
Whether you participated in relief activities	Yes, no	1,942	14.934	0.001	Respondents who participated in organised relief activities have a stronger perception of both fairness and unfairness.
Evaluation of the government's relief work	Very good, good, normal, bad	1,931	237.436	0.000	Respondents who have a higher evaluation feel more fairly treated
Evaluation of the government's relief work	Good, bad	1,931	94.187	0.000	As above
Informational justice					
Information channels	Mass communication, social network, officials, other relief people, not-know policy	1,706	108.111	0.000	Respondents informed via mass communication and officials feel more fairly treated. Respondents informed via social network feel more unfairly treated.

NA, not applicable; Pr, probability.

'Those with more family members get more assistance' and 'The poor get more assistance'.¹⁶ The third category was 'loss distribution', with the classified option of 'The greater are the losses, the more assistance victim-survivors receive'. The last category was 'unreasonable distribution', with the classified options of 'Those with stronger economic strength receive more assistance', 'Those with more power receive more assistance', 'Those with more social relationships receive more assistance', 'Complaints receive more assistance' and 'First come, first served'. These four categories accounted for 25.00, 55.05, 10.16 and 9.79 per cent, respectively. The χ^2 value of the four categories of distributive methods and perceived justice was 583.713 (see Table 3). This result demonstrates that these two variables are significantly relevant. Compared with others, the respondents who chose 'need distribution' and 'loss distribution' felt that the relief

policies were fairer. The respondents who chose 'unreasonable distribution' significantly felt that the policies were less fair. Therefore, distributive methods have a great impact on the perceived justice of disaster relief policies.

This result demonstrates that problems existed in the implementation of the relief policy after the Wenchuan Earthquake and caused unfairness to the victim-survivors. The provision of a more generous disaster relief policy by the central decision maker was challenging to implement in that the local executing officials had different understandings of the purpose of the disaster relief policy because of their understandings of previous policies; these differing interpretations affected the selection of the distributive methods.

Interpersonal justice. Interpersonal justice reflects the degree to which subordinates are treated with politeness, dignity and respect by supervisors and implementers involved in executing procedures or determining outcomes. For disaster relief policy, interpersonal justice reflects the degree to which victim-survivors are treated with politeness, dignity and

¹⁶ The poor indicates people who were poor before the earthquake. It is more difficult for the poor to make a living in a disaster environment.

respect by officials involved in allocating relief materials. There were no directly relevant questions in the questionnaire concerning distributors' attitudes towards the victim-survivors. However, the questionnaire contained the following question: 'Have you participated in relief activities, such as patrol, ruins-clearing and supplies transportation?' Apparently, when victim-survivors were involved in relief work and had more frequent connections with policy implementers, they had clearer perceptions about the degree to which they were treated with politeness, dignity and respect by officials. Another indirect indicator of interpersonal justice was respondents' evaluation of the government's relief work. This evaluation, to some extent, was based on the degree to which respondents were treated with respect by policy implementers.

Table 3 presents the results of the independence test between the aforementioned variables and the interviewees' perceived justice. Correlations were found between participating in organised relief activities and perceived justice. Interestingly, both the respondents who participated in relief work and those who indicated that they were treated fairly or unfairly demonstrated higher correlations than those who did not participate in such work. Therefore, although this variable does not measure the degree to which victim-survivors were treated with politeness, dignity and respect by officials, it may indicate an impact of interpersonal demeanour on perceived justice. The two χ^2 values between the evaluation of the government's relief work and perceived justice were very large. The respondents who provided a higher evaluation felt that the relief policy was fairer, and those who provided a lower evaluation felt the relief policy was less fair. The victim-survivors' evaluation of the government's relief work is not a measurement of the degree of officials' politeness, dignity and respect; however, if it is assumed that the officials' manner affected the victim-survivors' evaluation, the results may demonstrate the correlation between interpersonal justice and the perceived justice of the disaster relief policy.

However, more evidence was not provided on the impact of interpersonal justice on the perceived justice of the disaster relief policy due to the limitation of the data. Thus, further research is required.

Informational justice. Informational justice focuses on whether proper information is conveyed to the people involved. For disaster relief policies, informational justice is reflected mainly in victim-survivors' access to the contents of the relief policies. Generally, there are two issuing channels of public policies. One is the indirect channel via mass communication, such as through TV, radio and newspapers. The other channel relies on officials at all levels to directly announce policies. Concerning the question of how respondents

learned of the relief policies, 63.80 per cent selected mass communication, including TV, radio, newspapers and Internet news; 4.62 per cent selected social network, including relatives, friends and short messaging service; 7.70 per cent selected officials; 10.21 per cent selected other people or social organisations who participated in the relief work; and 13.68 per cent did not know the relief policies. In the face of different levels of access to relief policies, informational justice should vary. The 'Don't know policy' is a special category and reduces informational justice. Mass communication channels convey actual and accurate policy information and thus enhance informational justice. By contrast, the social network channel often transmits inaccurate and biased policy information and thus reduces informational justice. The channels of officials and other people who participated in the relief work also provide generally true policy information but are often less accurate or integrated than mass communication; thus, they enhance informational justice but weakly compared with mass communication.

The last section of Table 3 presents the results of the independence test between informational justice and interviewees' perceived justice. The χ^2 value between the information channels and perceived justice was very large, which verifies that the five categories of information channels have different means of perceived justice. The respondents who received policy information via mass media and officials felt the policies were fairer, and those who received policy information via social network felt the policies were less fair. In this instance, the theoretical expectations were met. Therefore, I concluded that informational justice has an impact on perceived justice.

Due to the data limitations, I did not determine the impact of the information flow from victim-survivors to policy implementers on perceived justice. Future research on this impact is required.

Ordered logistic regression

The said discussion shows that distributive justice, interpersonal justice and informational justice impacted the perceived justice of the disaster relief policy, whereas the personal characteristics and pre-disaster family socio-economic situation had no or limited impact. However, were these dimensions independent of each other? Can they be distinguished? How was the impact of these factors estimated? To answer these questions, I used ordered logistic regression. The dependent variable was perceived justice, as a three-ordered categorical variable. I constructed seven models to determine the most explanatory model.

The independent variables were selected based on the value of χ^2 with perceived justice. As a rule, the

Table 4. Variables used in the models.

Variables	Name	Description	Categories	Comment	Prediction	
Dependent variable	p_ju	Perceived justice	(Unfair = 1, Normal = 2, Fair = 3)	Subjective evaluation	NA	
Independent variables						
Personal characteristics	Age_1	39 and below	(Yes = 1)	Age groups	-	
	Age_2	40–49	(Yes = 1)		Reference	
	Age_3	50–59	(Yes = 1)		+	
	Age_4	60 and above	(Yes = 1)		+	
Pre-disaster socio-economic situation	Hukou	Household types	(Agricultural = 1)	Urban–rural dual structure is the most important socio-economic situation.	+	
Distributive justice	Distributive methods	p_eq	Equal distribution	(Yes = 1)	All families are similar	+
		p_ne	Need distribution	(Yes = 1)	The distribution is according to the needs of the victim-survivors.	+
Distributive outcomes	Distributive outcomes	p_lo	Loss distribution	(Yes = 1)	The distribution is according to the losses.	+
		p_ur	Unreasonable distribution	(Yes = 1)	The distribution is affected by economic status, power and social relationships.	Reference
		d_as	Relief cash	Continuous	Major assistance	+
		House	House was destroyed	(Fully destroyed = 1, Others = 0)	Destruction of the house is the primary loss.	-
		d_ex1	High expectation	(High = 1)	The higher the expectation, the lower the perceived justice.	-
d_ex2	Medium expectation	(Medium = 1)	Reference			
d_ex3	Low expectation	(Low = 1)	+			
Interpersonal justice		h_pr	Participated in organised relief activities	(Participated = 1)	Respondents who participated in organised relief activities have more perceptions.	?
		h_ge	Evaluation on the government's relief work	(Good = 1, Bad = 0)	Whether respondents were treated with respect directly affects their evaluation of the government's relief work.	+
Informational justice		i_mc	Mass communications	(Yes = 1)	Policy information transmitted via mass communication was more objective and accurate.	+
		i_sn	Social network	(Yes = 1)	Policy information transmitted via the social network was often inaccurate and biased.	-
		i_of	Officials	(Yes = 1)	Policy information transmitted via officials was true but less accurate.	+
		i_op	Other relief people	(Yes = 1)	Policy information transmitted via other relief workers was often similar to that of the officials.	+
		i_uk	Not-know policy	(Yes = 1)	Respondents who did not know what were the relief policies tended to feel distrust.	Reference

+, positive; -, negative; ?, unknown; NA, not applicable.

value of χ^2 was not less than 20 only if the variable was irreplaceable. Table 4 presents all of the variables.

Table 5 presents the regression results. In all of the models, the dependent variable is perceived justice, which is a three-ordered categorical variable. In Model I, personal characteristics and pre-disaster socio-economic situation were included as the independent variables. In Models II to VI, the distributive methods, distributive outcomes, distributive justice, interpersonal justice and informational justice were added separately to Model I. In Model VII, all independent variables were included.

As demonstrated in the regression results, all seven models passed the Wald test. All of the significant independent variables followed the same direction as the predictions, except for age_4 in Model IV. Model I further tested the impact of personal characteristics and pre-disaster socio-economic situation on perceived

justice. The results show that personal characteristics had little influence on perceived justice, further verifying H1-1. The significance of *Hukou* demonstrates that the socio-economic difference between urban and rural *Hukou* impacted perceived justice. However, it was the only factor of pre-disaster socio-economic situation that affected the perceived justice of the disaster relief policy. Model II tested the impact of the distributive methods on perceived justice. Model III tested the impact of the distributive outcomes on perceived justice. Model IV tested the impact of two dimensions of distributive justice on perceived justice. Model V tested the impact of interpersonal justice on perceived justice. Model VI tested the impact of informational justice on perceived justice. Model VII tested the impact of all dimensions on perceived justice. The variables of each dimension were significant in Models II, III, V and VI. These models verified hypotheses H2-1,

Table 5. Regression results.

Independent Variables	Model I (n = 1,946) Odds ratio	Model II (n = 1,897) Odds ratio	Model III (n = 1,708) Odds ratio	Model IV (n = 1,665) Odds ratio	Model V (n = 1,923) Odds ratio	Model VI (n = 1,704) Odds ratio	Model VII (n = 1,456) Odds ratio
Age_1	0.945	0.902	0.894	0.866	0.980	0.924	0.878
Age_2							
Age_3	1.188	1.007	1.094	0.952	1.148	1.150	0.900
Age_4	1.061	0.846	0.960	0.779*	1.021	1.069	0.781
Hukou	2.049***	1.676***	1.992***	1.659***	1.986***	2.199***	1.806***
p_eq		28.423***		26.321***			31.001***
p_ne		42.330***		36.062***			40.012***
p_lo		46.754***		33.107***			33.061***
p_ur							
d_as			1.000**	1.000**			1.000**
house			0.403***	0.495***			0.535***
d_ex1			0.675***	0.651***			0.721**
d_ex2							
d_ex3			1.033	1.039			0.970
h_pr					1.109		1.117
h_ge					1.962***		1.690***
i_mc						2.596***	1.796***
i_sn						0.681	0.463**
i_of						2.298***	1.560*
i_op						1.213	1.552*
i_uk							
cut1	-0.772	2.005	-1.282	1.464	-0.337	-0.100	2.422
cut2	1.276	4.477	0.812	3.968	1.755	1.940	4.949
Wald chi ²	46.53	339.70	163.81	363.28	86.29	137.03	344.68
Prob > chi ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000

* at the 0.1 level of significance; ** at the 0.05 level of significance; *** at the 0.01 level of significance.

H2-2, H2-3 and H2-4. In all justice dimensions, the distributive method was more explanatory than the other dimensions. The distributive outcomes, informational justice and interpersonal justice were also important impact factors of the perceived justice of the disaster relief policy, and the effects of the three dimensions declined. In Models IV and VII, two-dimensional and four-dimensional models explained more perceived justice than did the single-dimension model. This finding verified H4. Among the four variables of distributive methods, ‘equal distribution’, ‘need distribution’ and ‘loss distribution’ were significant, and their odds ratios were all greater than 1. In Model VII in particular, ‘need distribution’ was the primary factor that affected the perceived justice of the disaster relief policy. This finding verified H3. In sum, the perceived justice of the disaster relief policy can be interpreted as being composed of distributive justice, interpersonal justice and informational justice. Distributive justice was divided into distributive outcomes and distributive methods. Moreover, these four dimensions of perceived justice were independent and empirically distinguished from each other.

Further discussion

The relief efforts provided by the Chinese government after the Wenchuan Earthquake were unprecedented. However, in terms of perceived justice, relief policy

did not receive high recognition from the victim-survivors. The present study provided an explanation for this observation.

The study found that details of the policy-making and policy-implementing procedures cannot be ignored. Among the dimensions of perceived justice, distributive methods have the greatest impact. When the local government adopted ‘equal distribution’, ‘need distribution’ and ‘loss distribution’, respondents selected fairness 30–40 times more often compared with ‘unreasonable distribution’. Therefore, any deviation of the relief policy had a negative impact on perceived justice. In addition, there were differences between the impacts of ‘equal distribution’, ‘need distribution’ and ‘loss distribution’. ‘Need distribution’ was more acceptable to the victim-survivors, which is in line with a needs-assistance structure and the conclusion of the theoretical analysis. Thus, the need principle should be regarded as the guiding principle of disaster relief policies.

The victim-survivors did not completely reject the ‘equal distribution’ and ‘loss distribution’ principles; however, ‘need distribution’ had a larger odds ratio in regression Model VII. In fact, 43.01 per cent of victim-survivors selected ‘fair’ in the ‘loss distribution’ group (10.16% of respondents) and 40.82 per cent of victim-survivors selected ‘fair’ in the ‘need distribution’ group (55.05% of respondents) in the crosstab between distributive methods and perceived justice. Clearly,

providing compensation for disaster losses entails far more than simply meeting victim-survivors' basic needs. 'Loss distribution' was a better choice for the victim-survivors if only considering absolute amount. However, for disaster relief policies, 'loss distribution' is never an alternative policy principle. In fact, disaster relief as a governmental responsibility has only a short history (Birkland, 1997). In China, disaster assistance from the government was quite low before the Wenchuan Earthquake because of a lack of financial resources and a defective social protection system, even though the Chinese government was an unlimited government to a certain extent and professed to have full responsibility for the people (Salazar et al., 2011). After the Wenchuan Earthquake, the Chinese government greatly improved its level of disaster relief. This great policy change caused some confusion regarding disaster relief among the policy executors and policy audiences (Zhang, Zhang, & Lu, 2008). In the long run, confusing need and loss principles certainly reduces victim-survivors' perceived justice of a disaster relief policy. Therefore, training both policy executors and victim-survivors to understand policy goals and the principles of disaster relief is valuable (Skarlichi & Latham, 2005).

Generally, distributive outcomes are regarded as an important impact factor of perceived justice. However, the regression results showed that relief cash had little impact on perceived justice, whereas home loss had a great impact. Respondents with high expectations had lower perceptions of justice than those with intermediate expectations. However, the perceptions of justice of respondents with low expectations and intermediate expectations did not differ significantly. I concluded that when one's home is destroyed by an earthquake, relief policies that only provide the necessities of life are insufficient. The differences in assistance based on such policies had little impact on perceived justice. By contrast, victim-survivors' expectations of home rebuilding had a greater impact on perceived justice. One result of the empirical study was that loss distribution was an acceptable distributive method in the view of the victim-survivors. However, the inner structure of loss distribution is 'loss-compensation' rather than 'need-assistance'. In general, the goal of a relief policy is not to compensate for disaster losses, and the relief materials provided are never sufficient compared with victim-survivors' losses. If loss distribution is taken as a policy principle, victim-survivors' expectations are inappropriately increased. Therefore, loss distribution is an inappropriate distributive method. By contrast, to manage the expectations of victim-survivors, the victim-survivors must be informed that 'need distribution' is the only distributive criterion and that 'loss distribution' does not exist in relief policies.

Interpersonal justice is also important for perceived justice. However, I used only a variable concerning the evaluation of the government's relief work. It is difficult to represent all interpersonal factors; thus, further research is required.

Informing victim-survivors of relief policies is important for improving their perception of justice. Compared with not knowing the relief policies, learning about the policies via mass communication best improved the victim-survivors' perceived justice. Information transmitted via public officials and relief personnel had a similar, although slightly weaker, effect on improving perceived justice. However, biased or wrong policy information reduced perceived justice. The regression results demonstrated that the social network information channel had a negative impact. Respondents who obtained policy information via their social network felt that relief policies were less fair. This result is easy to understand because people tend to believe information that they obtain from relatives and friends, but these information channels are more prone to bias and distortion. It is noteworthy that 28.41 per cent of the surveyed families could not watch TV, 45.00 per cent could not listen to the radio and 75.36 per cent could not read recent newspapers. By contrast, only 5.41 per cent did not have a mobile phone or telephone. Thus, access to policy information is not only a matter of the subjective choices of victim-survivors but is also determined by victim-survivors' objective conditions.

In summary, based on the victim-survivors' perceived justice of the relief policies after the Wenchuan Earthquake, disaster relief policies can be improved in the following respects. First, governments should clearly state that the goal of a disaster relief policy is to maintain the victim-survivors' basic needs. Accordingly, the relief policy should be designed and executed only to resolve the living difficulties of victim-survivors after a disaster. Thus, policy making and policy implementation must be consistent with the need principle. Second, the supervision of policy implementation should be strengthened to prevent misconduct by grass root officials. Third, victim-survivors' expectations should be appropriately managed to reduce unreasonable expectations. In particular, it should be stressed that the distribution principle does not include distribution in accordance with losses. Fourth, the intensity and breadth of information transmission via mass media and government officials should be enhanced. Other relief personnel, such as volunteers and rescue workers, are also important information channels for spreading information on relief policies to victim-survivors. More victim-survivors can have access to, and are more willing to believe, policy information transmitted through these channels. Finally, the attitudes of local officials towards victim-survivors should be improved. Officials should not consider relief policies as charity work.

Conclusions

Justice is one of the most important goals of public policy. However, its specific meaning is always linked to certain values. If values are diverse or the mainstream value is not clear in a society, there will be many difficulties in realising the justice of public policies in practice. Apart from objective standards of the justice of public policies, research should be conducted on policy audiences' perceptions of justice. Perceived justice not only constitutes the social assessment of a public policy, but also influences the behaviours of policy audiences. Thus, it becomes a decisive factor in the practical implementation of a policy.

Based on organisational justice theory, the present study constructed a model of perceived justice of disaster relief policies and conducted empirical research on the Wenchuan Earthquake. The results demonstrate the following:

- Individual characteristics of victim-survivors have a very limited impact on the perceived justice of disaster relief policies. The impact of the pre-disaster socio-economic statuses of victim-survivors is manifested mainly according to rural or urban identities. Therefore, perceived justice is mainly relevant to policy content and policy implementation.
- Distributive outcomes and distributive methods, informational justice and interpersonal justice all have a significant correlation with the perceived justice of disaster relief policies. This result demonstrates that the model of perceived justice of disaster relief policies constructed in this study is effective and helps determine the perceived justice of disaster relief policies.
- The perceived justice of disaster relief policies is composed of distributive justice, including distributive outcomes and distributive methods, informational justice and interpersonal justice. These three dimensions are not fully interchangeable and can be empirically distinguished.

This study has clear implications for future policy making. First, because distributive methods have a great impact on perceived justice, need distribution is the most suitable principle for disaster relief policies. Second, due to the importance of informational justice, the strength and breadth of information transmission, especially via mass media, should be enhanced to improve victim-survivors' perceived justice. Third, because of the large gap between loss and assistance, distributive justice should place greater emphasis on the management of victim-survivors' expectations. Finally, the attitudes of policy implementers towards victim-survivors significantly affect the perceived justice of disaster relief policies.

Overall, this study demonstrates that perceived justice has important theoretical and practical value for the study of the justice of public policy. In evaluating the effects of public policy, perceived justice is an important factor. In particular, it is an effective evaluation tool for disaster social policies that have more policy-making constraints and face the direct needs of victim-survivors. Perceived justice is a rather complex concept, and it should be noted that this study is only a preliminary investigation. Further research should refine the means for measuring perceived justice to provide for a greater understanding and more detailed discussion.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Crosstab between gender and perceived justice.

Table S2. Crosstab between marriage status and perceived justice.

Table S3. Crosstab between religion and perceived justice.

Table S4. Crosstab between education and perceived justice.

Table S5. Crosstab between age group and perceived justice.

Table S6. Crosstab between household (*Hukou*) and perceived justice.

Table S7. Crosstab between enjoying the minimum living guarantee and perceived justice.

Table S8. Crosstab between pre-disaster economic conditions and perceived justice.

Table S9. Crosstab between pre-disaster employment and perceived justice.

Table S10. Crosstab between family member losing and perceived justice.

Table S11. Crosstab between victim-survivors' house situation (4 categories) and perceived justice.

Table S12. Crosstab between victim-survivors' house situation (2 categories) and perceived justice.

Table S13. Crosstab between relief cash group and perceived justice.

Table S14. Crosstab between victim's expectation and perceived justice.

Table S15. Crosstab between distributive methods and perceived justice.

Table S16. Crosstab between victim-survivors' participation and perceived justice.

Table S17. Crosstab between victim-survivors' evaluation (4 categories) and perceived justice.

Table S18. Crosstab between victim-survivors' evaluation (2 categories) and perceived justice.

Table S19. Crosstab between information channels and perceived justice.