Resource Loss and Depressive Symptoms Following Hurricane Katrina: A Principal Component Regression Study

Review Article

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Abstract

To understand the relationship between the structure of resource loss and depression after disaster exposure, the components of resource loss and the impact of these resource loss components on depression was examined among college students (N=654) at two universities who were affected by Hurricane Katrina. The component of resource loss was analyzed by principal component analysis first. Gender, social relationship loss, and financial loss were then examined with the regression model on depression. Financial loss was a significant predictor of depression. Social relationship loss did not predict depression significantly. In predicting depression, resource loss was more important for females than for males.

Keywords: Hurricane Katrina; Resource Loss; Depression; Principal Component Analysis; Regression.

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Introduction

In August of 2005, Hurricane Katrina struck the American Gulf Coast, affecting 9.7 million people in Louisiana, Mississippi, and Alabama. The hurricane devastated 80% of New Orleans, and more than 250,000 people were displaced by the hurricane. Property damage was estimated at $81 billion and at least 1,836 people died [19]. The effects of Hurricane Katrina, including economic cost, environmental change, and psychological trauma, were devastating. Despite its negative consequences, this hurricane provided a better understanding of disaster exposure psychological aftereffects. A natural disaster often leads to long-term mental health problems, including post traumatic stress disorder (PTSD) and general psychological distress (GPD) [1].

The Conservation of Resource (COR) stress theory [7] has been applied to explain mental health problems after disaster exposure, and we also employed the COR stress theory in our study of depression after Hurricane Katrina. Based on the COR stress theory, many previous studies have linked trauma exposure to mental health problems [1, 3, 7, 11, 15, 16, 18, 26, 29]. Among previous literature predicting psychological health after the disaster, psychosocial and financial resource losses have been identified as important predictors of psychological health [1, 4, 12, 26].

The current study aims to examine the effects of Hurricane Katrina on depression in a college student sample in Mississippi and Louisiana. In addition, the present study analyzes the structure of resource loss and examined the role of resource loss on depression after Hurricane Katrina. Especially, we focus on gender difference on resource loss in predicting depression.

The COR Stress Theory

The Conservation of Resources (COR) stress theory [7] is a model for understanding the function of resources in the relationship between environmental systems and individual cognitive response to stress. The COR stress theory explains that individuals strive to retain, acquire, and protect their resources in order to increase or maximize positive reinforcement. Resources are defined as those things (such as objects, personal characteristics, or conditions) that are highly valued by individuals [7]. Examples of resources are personal relationships, money, cars, self-esteem, socioeconomic status, and mastery [7]. The four categories of resources [7] are:(1) objects (e.g., house, car, furniture, clothing), (2) conditions (e.g., marriage, seniority, tenure, sense of community), (3) personal characteristics (e.g., self-esteem, occupational skills), and (4) energies (e.g., money, insurance, time, credit). Disasters such as Hurricane Katrina can cause loss of resources from these four categories.

According to the COR theory, because people strive to retain, acquire, and protect their valued resources, psychological stress occurs when there is: (1) the threat of resource loss, (2) actual

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resource loss, or (3) lack of resource gain. The difference between the COR stress theory and other stress theories is the third condition, or lack of resource gain [10]. For example, based on Lazarus's (1990) [17] stress theory, when a person appraises a stressful event, coping resources will be brought into the relationship between people and environment. On the other hand, the COR stress theory posits that for the goal of protecting and obtaining resources, people should have their resources repertory to reduce probable resource loss during disasters. For example, people purchase insurance for future protection against resource losses. Therefore, according to the COR theory, stress occurs when investments do not produce significant resource gain.

The Relationship between Resource Loss and Depression

Holahan et al. (1999) offered strong support for the relationship between resource loss, resource gain, and depressive symptoms. Their results showed that over a 10-year period resource loss had a significant positive relationship with depressive symptoms, whereas resource gain had a significant negative relationship with depressive symptoms. The change in resources was associated with the change in the intensity of depressive symptoms. Johnson et al. (2009) specifically studied on the relationship between terrorism exposure and depression. They noted that exposure to terrorism and violence influenced depression by weakening psychosocial and economic resources, that is, the loss of these resources contributed to increased depression. Tracy, Hobfoll et al. (2008) showed that material resource loss during terrorism had a strong association with depression, and specifically, economic loss had a strong relationship with the intensity of depression. This relationship between resource loss and depression can also be seen in natural disaster research and is well-documented in the literature. A cross-national study of Hurricane Hugo by Sattler et al. (2002) indicated that depression in people from Puerto Rico and the Dominican Republic was related to the loss of social support and personal characteristics. According to their investigations, Puerto Rico and the Dominican Republic suffered the most damage to property and the most disruption in services. Therefore, the residents in those two locations experienced psychological distress symptoms due to severe resource loss. Sattler et al. (2006) studied the relationship among resource loss and depression four and seven weeks after the El Salvador Earthquake among college students and people in the community. In this population the loss of resources was associated with depression. The findings indicated that for college students, lack of social support and loss of personal characteristics contributed to depression, whereas for people of the community, object resource loss was associated with psychological distress and depression.

Psychosocial Resource Loss and Depression

The above-mentioned studies show that loss of particular resources had a stronger relationship with depression than the loss of other resources. In the contemporary research of stress and coping styles, psychosocial resources such as social support and personality are critical due to their abilities to buffer against stress. People's adaptive ability and resilience during the stress process are emphasized by stress resistance research, which focuses on the relationship between psychological adaptive ability and mental health [13]. The COR stress theory posits that an increase of psychosocial resources is the vital mechanism in adaptation [7, 14]. Resource change happens because stressful events could destroy people's resources and people would offset this destruction by mobilizing resources. Since resource loss affects people more than resource gain, resource loss serves a more important role in the face of challenge. Social resources (e.g., social support, assistance and help from family, social interactions and relationships) are vital to stress resistance [13]. Receiving social support can impact the intensity of psychological distress after disasters [9, 26]. In addition, personal resources (e.g., personal characteristics, personal control, personal self-confidence, an easy-going disposition) are important resources to resist stress. For example, a positive and calm disposition and the retention of personal control can help individuals respond to disasters quickly, adapt to stressful events better, and adopt relevant coping strategies. Therefore, psychosocial resource loss has a strong relationship to psychological distress after disasters. Several studies have examined the role of psychosocial resource loss in predicting psychological distress, and showed that psychosocial resource loss, such as loss of personal characteristics and lack of social support has a positive relationship to depression [12, 24-26].

Financial/Economic Resource Loss and Depression

Freedy et al. (1994) mentioned that mental health risk factors were categorized as subjective risk factors and objective risk factors, and that they were both related to psychological distress. Within the context of the COR stress theory, objective risk factors include object resources and energy resources. Energy resources, including time, money, and knowledge, are needed often, because for protecting and retaining their home after disaster exposure, people must invest money and time in rebuilding their homes [8]. Therefore, as one type of energy resource, financial resources are an important factor in predicting mental health after disaster. Financial resources refers to socioeconomic status, income condition, and financial support from family and friends [15, 23, 27]. Additionally, according to the second principle of the COR stress theory, after disaster exposure, individuals invest more resources to offset the loss of resources. Therefore, financial resources or economic resources are important to survivors due to their intrinsic value and the value in acquiring the other kinds of resources [7]. For this reason, in addition to psychosocial resources, financial resources or economic resources may be associated to mental health after traumatic events. In a cohort study investigating predictors of depression during the Al Aqsa Intifada [27], individuals who earned a lower income had more severe depressive symptoms than people with higher income. They also found that material resource loss after terrorism was significantly related with depression, and that economic loss was the primary risk factor in predicting depression. Minimizing financial stressors could reduce the severity of depressive symptoms during the traumatic events. Johnson et al. (2009) reported that economic resource loss could significantly predict mental health condition following terrorism in Israel. The results showed that economic resource loss was associated with psychological distress. These studies show that financial resource loss impacts individuals' mental health after traumatic events.

Gender Difference

The literature indicates that women are more susceptible to depression than men [28]. Under the same vulnerable situations after disaster exposure, resource losses may impact women's depression more, compared to men. Robertson et al. (2009) studied

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the relationship between financial resource loss and depression for female juvenile offenders after Hurricane Katrina. They found that financial assistance could mitigate women's depressive symptoms. Family financial assistance was associated with fewer symptoms of anxiety and depression. Ehrlich et al. (2008) examined the relationship between resource loss and depression among 209 women who were pregnant during or shortly after Hurricane Katrina. They found that both tangible/financial loss of resource and non-tangible/psychosocial loss of resource were significantly correlated with depression. These previous studies used only female participants, and gender differences are yet to be examined regarding the effects of resource loss on depression.

The Current Study

The review of literature strongly supports the application of the COR stress theory to mental health problems. Resource loss related to stressful life events can lead to post traumatic stress symptoms and psychological distress. Despite the influence of resource gain, resource loss has a central role in predicting psychological distress after a disaster. The current study makes use of data collected after Hurricane Katrina to investigate the components of resource loss using principal component analysis and to examine the relationship between resource loss and depression. Psychosocial and financial resources are thought to be the two components related to depressive symptoms. The current study assesses symptoms related to depression as the measure of psychological distress. Based on the COR stress theory and previous research on the association between multiple factors predicting mental health after a disaster, the purpose of this study is to examine relationship between resource loss and depression in two ways. First, the component of resource loss is examined. Second, the impact of resource loss on depressive symptoms related to Hurricane Katrina is evaluated.

The current study distinguishes itself from previous studies with respect to the following:

Broader definition of resource loss

Almost all of the previous works investigating stress after Hurricane Katrina [1, 4, 23] focused on only financial resources. On the other hand, our study treat resource loss more broadly, including not only the financial resources but also resources associated with psychosocial relationships.

Large sample size

Compared with the previous studies (e.g., $N = 208$ for Ehrlich et al., 2010), much larger sample size ($N = 654$) is available for our research. As a result, the results from our study are likely to be more stable with smaller standard errors, and also, it allows us to conduct multivariate statistical analysis such as principal component analysis, which is known to require a large sample size. Consequently, we can investigate the phenomena of resource loss and depression at the level of components, beyond the original observed variables. Also, the sample sizes were sufficient to allow us to do analysis for males and females separately.

Use of both genders

Both Robertson et al. (2009) and Ehrlich et al. (2010) employed only female samples, though they investigated the relationship between resource loss and depression as we do. Blaze and Shwalb (2009) dealt with post-traumatic stress but not depression, though he used a sample from both genders. To the best of our knowledge, our study is unique in that we investigate the relationship between resource loss and depression using a sample from both genders.

More specifically, we investigate the following three hypotheses in the relationship between resource and depression.

[1]. Psychosocial resource loss is related to depressive symptoms. Loss of social relationship will be significantly related to increased depressive symptoms.
[2]. Financial resource loss is related to depressive symptoms. Financial/economic loss will be significantly related to increased depressive symptoms.
[3]. Resource loss will be a more important predictor of depression for females than for males.

Method

Participants

Participants included 654 college students at two universities affected by Hurricane Katrina, the University of New Orleans (UNO) and the University of Southern Mississippi (USM). The participants were students who were forced to leave their home, but who had been able to remain enrolled in their current universities. The sample was comprised of 505 women (78.1%), 142 men (21.9%), and seven participants who did not report their gender. The mean age was 22.34 years (SD = 5.03), ranging from 18 to 55 years of age. Of those who responded to the question about ethnicity, the majority identified as either "Caucasian" (60.9%), or "African American" (36.6%). The remaining respondents identified as follows: "Asian/Asian American" (.7%); "Hispanic" (.3%); "African" (.3%); "Native American/Alaska Native" (.15%);"Pacific Islander" (.15%); and "Others" (.9%).

Procedures

Each participant was informed that participation was voluntary and they had the right to withdraw from the research. After briefly describing the study, researchers distributed questionnaires which assessed a number of constructs including resource loss and depression. After the students completed all the materials, researchers explained that the study focused on the role of resource loss on depression after the hurricane, that the results of the study would allow researchers to better understand the impact of resource loss after traumatic events on mental health problems, and that the results of the study would have clinical applications on depression after disaster exposure.

Predictor Variables

Resource loss: The Conservation of Resources Evaluation (COR-Evaluation) [10] was designed to examine and investigate the participants' resources. This scale defines resource loss and resource gain well and shows adequate test-retest reliability and construct validity [6]. This evaluation includes a loss scale and a gain scale (each scale contains the same number of items), measuring resource loss and resource gain over the past month. In the loss scale and the gain scale, the instruction is "To what extent have you lost the following resource during the past month". Then par-

ticipants were to indicate on a Likert-type scale, the amount of loss they have experienced during the past month, from -1 (little loss) to -4 (very great loss), and the amount of gain they have experienced during the past month, from 1 (little gain) to 4 (very great gain). If there was no loss or gain, the participants report "0". The total score of the scale reflects the overall resource loss and resource gain.

Criterion Variables

Depression: Among the scales for measuring depressive symptoms, Center for Epidemiologic Studies Depression Scale (CES-D) is the most widely applied [2]. As a useful instrument in the mental health field, this scale has good internal consistency in different populations [21, 22] and discriminant validity for major depression [2].

The CES-D scale is a self-report instrument, consisting of 20 items about symptoms associated with depression in a community setting. It is "designed to measure current level of depressive symptomatology, with emphasis on the affective component, depressed mood" [22]. Participants are asked to indicate the frequency that they feel those symptoms during the past week on a scale of 1-4 [1=rare or none of the time (less than one day), 4=most or all of the time (5-7 days)]. The potential range of the total score is 0-60, and a higher score indicates more severe depressive symptoms. The Cronbach's alpha, a measure of internal consistent reliability was .90 for the original study [22], and the cut-off score to differentiate "normal" and "clinical depression" is 16. For the current study, the Cronbach's alpha was .80.

Statistical Analysis and Results

Principal component analysis (PCA) with promax rotation was used to analyze resource loss items using IBM SPSS Version 21. Based on the scree plot and the COR theory, four interpretable components were extracted from the 60 COR-Evaluation scale items. Table 1 shows the component loadings taken from the pattern matrix after the promax rotation. The extracted four components corresponded to the following elements of resource loss: (1) social relationship, (2) household, (3) finance, and (4) time. The "finance" refers to financial resource, and the "social relationship" refers to psychosocial resource.

Table 2 presents descriptive information concerning depression scale (CES-D) and the four components found by the PCA:(1) social relationship,(2) finance, (3) household, and (4) time. Both female and male participants showed moderate levels of depressive symptoms, far exceeding the cut-off values of 16, and female participants ($M = 37.66$, $SD = 7.27$) reported higher level of depressive symptoms than male participants ($M = 35.57$, $SD = 7.23$), $t = 2.91$, $p = .004$. With regard to financial resource loss, participants reported loss of finance ($M = -2.99$, $SD = 9.39$). However, for psychosocial resource loss, participants reported gains in social relationship ($M = 10.03$, $SD = 13.96$).

Table 1. Fours Components and Factor Loadings.

Component 1: Social Relationship(Explained 19.29% of variance)	Component 2: Household(Explained 9.26% of variance)	Component 3: Finance(Explained 5.72% of variance)	Component 4: Time(Explained 3.87% of variance)
Affection from others (.785)	Necessary appliances for home (.773)	Money for "extras" (.806)	Time for adequate sleep (.678)
Support from friends at school (.703)	Sentimental possessions (.768)	Adequate income (.800)	Feelings that I am accomplishing my goals (.609)
Companionship (.689)	Furniture, appliances, and household contents (.748)	Financial stability (.778)	Free time (.598)
A good relationship with my family or children (.675)	Adequate furnishing for home (.729)	Money for transportation (.698)	Time to get things done (.572)
Closeness with one or more family members (.666)	Adequate clothing (.651)	Money for living expenses (.659)	Feeling independent (.532)
Loyalty of friends (.659)	Home that is more than what I need (.631)	Savings or emergency money (.626)	Personal health (.515)
Ability to communicate well (.658)	Clothing that is more than what I need (.602)	Adequate credit (.624)	Time with loved ones (.466)
People I can learn from (.656)	Housing that suits my needs (.560)	Stable employment (.412)	Advancement in my education or training (.392)
Support from co-workers (.599)	Personal transportation (.517)	Help with tasks at work or school (.343)	Health of family/close friends (.292)
Intimacy with at least one friend (.593)	Financial assets (stocks, property, etc.) (.393)	Acknowledgement for accomplishment (.338)	Water or something to drink (.251)
Closeness with at least one friend (.581)	Necessary tools or supplies for work or school (.357)	Adequate food (.327)	A positively challenging routine (.248)
Opportunity to help other(.568)	Children's or family's health (.317)	Essentials for children (.307)	Help with children (.181)

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Feeling valuable to other(.519)	Animal or family pet (.307)	Status/seniority at work (.285)
Intimacy with spouse or partner (.431)	Involvement in organizations with others who have similar interests (-.263)	"Extras" for my children (.269)
Understanding from my employer/boss (.430)	Spouse/partner's health (.154)	
Family stability (.413)		
A role as a leader (.385)		
Opportunity to attend church or religious services (.342)		
Help with tasks at home (.323)		

Table 2. Means and Standard Deviations for Depression, Social Relationship, Finance, Household, and Time by Gender.

Variables	Women		Men		Total	
	M	SD	M	SD	M	SD
Depression	37.66	7.27	35.57	7.23	37.18	7.31
Social Relationship	10.19	13.8	9.52	14.51	10.03	13.96
Finance	-3.05	9.27	-2.8	9.82	-2.99	9.39
Household	-2.39	7.94	-2.44	8.91	-2.4	8.17
Time	-1.73	7.97	-1.42	9.26	-1.65	8.28

Secondly, bivariate correlations were performed to address relationships between gender, depressive symptoms, social relationship, finance, household, and time (Table 3). When the two variables are both continuous, the Pearson correlation was used, and when one of the variables was gender (coded 1 for males and 0 for females), the point-biserial correlation was used. The results showed that there was a significant negative correlation between gender and depression ($r = -.121$, $p < .01$) indicating that being female was associated with higher level of depressive symptoms than being male. However, gender did not show any significant correlations with all four components of resource loss. Concerning associations between depression and resource loss, finance had a significant negative correlation with depression indicating that participants with poor financial conditions showed higher levels of depressive symptoms than those with good financial conditions ($r = -.126$. $p < .01$). Concerning the association among types of resource loss, there were significant positive correlations between four components, indicating that participants with good finance had a better social relationship ($r = .363$. $p < .01$), more household ($r = .490$. $p < .01$), and more time ($r = .505$. $p < .01$) than those with poor finances.

Next, a multiple regression was conducted to analyze the importance of social relationship and finance in predicting depressive symptoms. Because gender had a significant negative association with depression, it was considered as a control variable and was included in the analysis with resource loss. The criterion variable was depressive symptoms as measured by the CES-D, and predictor variables were gender, social relationship, and finance (because social relationship and finance are the main focus in the current study). Table 4 presents these results. The three predictors combined accounted for 2.6% of depression variance, $F = 5.006$, $p = .002$, and the effect size was .027. Finance was significantly associated with depression negatively ($t = -2.697$, $p = .007$); however, social relationship did not predict depression significantly ($t = 1.553$, $p = .121$). Also, as predicted, being a female significantly increased the mean level of depression; equivalently, being a male significantly decreased the mean level of depression ($t = -2.604$, $p = .009$).

To further test our third hypothesis on gender difference, a multiple regression was performed for women and men separately (Table 5). For women, both finance and social relationship were

Table 3. Correlations Among Gender, Depression, Social Relationship, Finance, Household and Time Variables.

	Variable	1	2	3	4	5	6
1.	Gender[a]	—	-.121**	-0.043	0.008	0.011	0.018
2.	Depression		—	0.026	-.126**	-.165**	-.181**
3.	Social Relationship			—	.363**	.283**	.445**
4.	Finance				—	490**	.505**
5.	Household					—	.484**
6.	Time						—

Notes.[a]0 = Female, 1 = Male. Point-biserial correlation was computed when the correlation involved gender.
* $p < .05$. **$p < .01$.

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Table 4. Prediction of Depression by Gender, Social Relationship, and Finance.

Model	B	SE B	β	t	p
Constant	37.015	0.453	—	—	—
Gender[a]	-1.888	0.725	-0.109	-2.604	0.009
Social Relationship	0.035	0.022	0.069	1.553	0.121
Finance	-0.091	0.034	-.120	-2.697	0.007
Total				$F = 5.006$	$p = .002$

Note.[a]0 = Female, 1 = Male

Table 5. (A). Prediction of Depression by Social Relationship and Finance for Women.

Model	B	SE B	β	t	p
Constant	36.925	0.472	—	—	—
Social Relationship	0.048	0.025	0.096	1.92	0.056
Finance	-0.072	0.038	-0.095	-1.916	0.057
Total				$F=3.367$	0.058

(B). Prediction of Depression by Social Relationshipand Finance for Men.

Model	B	SE B	β	t	p
Constant	35.349	0.883	—	—	—
Social Relationship	-0.004	0.052	-0.007	-0.077	0.942
Finance	-0.14	0.077	-0.188	-1.83	0.07
Total				$F = 2.402$	0.095

nearly associated with depression ($t = -1.916$, $p = .057$ and $t = 1.920$, $p = .056$, respectively), but for men, neither finance nor social relationship were significant predictors of depression ($t = -1.830$, $p = .070$ and $t = -.077$, $p = .942$, respectively), though finance was relatively close to be negatively associated with depression.

The standardized beta coefficients indicated the relative importance of the predictor variables in predicting the criterion variable. For the entire sample with men and women combined, higher levels of depressive symptoms were associated with being female (β= -.109), and poor finance (β = -.120). The value of the beta coefficients indicate that finance is the most important variable in predicting depressive symptoms.

Discussion

In this study, we examined the relationship between resource loss and depression with college students affected by Hurricane Katrina. Consistent with the COR stress model and the second hypothesis, financial resource loss was significantly associated with depressive symptoms, and was the most important predictor in predicting the levels of depression consistent with the resource loss model. Financial loss has a positive relationship with depressive symptoms, indicating that people with financial resource losswould show more depressive symptoms. This finding supports the COR stress model and is consistent with previous research [4, 15, 27].

In contrast, the hypothesis that social relationship would be a predictor for depression that was also derived from the COR stress model was not supported by the results from the data with both males and females combined. There was no significant correla-

tion between depressive symptoms and social relationship in the bivariate correlations, thus social relationship was not a significant predictor of depression in the resource loss model. The possible explanations for this result could be that social relationships already had some effect on levels of depressive symptoms, as a result of which these were less important in times of stress compared with financial resource loss. As previously mentioned, in the study of Hurricane Georges in 2002, Sattler et al. found that social support had a negative relationship with psychological distress. They interpreted the finding that the disaster caused damage to people's social network and did not examine the specific relationship between social support and depression. Instead, based on common sense and the COR stress theory, they argued that people with more social support should show fewer mental health problems than those with less social support. What is inconsistent with previous studies and the COR stress model is the finding from the current study that social relationships are not necessarily associated with depressive symptoms. The possible explanation for this outcome is that after a disaster, people may develop more social relationships (e.g., the care of family, social support from social workers, psychological intervention from therapists, etc.) than before. However, this may be true only to an extent because, compared with social relationship, people may suffer more fromfinance resource loss (i.e., money, house, car, etc.).

Regarding our third hypothesis on gender difference, it was partially supported. First of all, our bivariate correlation analysis found that gender and depression was significant ($p< .01$) which indicates that females are more strongly associated with depression. Furthermore, our multiple regression results were consistent with the bivariate correlation result. In addition, when we used the combined sample, gender was still a significant predictor of depression even after controlling for social relationship and finance.

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However, when we conducted multiple regression analysis with males and females separately, both social relationship and finance were nearly significant for females, but not for males. This implies that the connection between resource loss/gain and depression could be stronger for females than males. In summary, for women, the resource loss model very nearly predicted depression, but strongly supported social relationship and finance as the important predictors of depressive symptoms. In contrast, for men, the resource loss model did not predict depression significantly.

In the current study, not all hypotheses were supported. However, the results in general indicated that the whole resource loss model could predict depression. This study is helpful in understanding the important role of the COR stress model in predicting depression. The current study extends previous findings on the relationship between resource loss and depression by examining the associations between specific factors of resource loss and depression in response to Hurricane Katrina. Another strength of this study is its large sample size. To the best of our knowledge, among research focused on the relationship between resource loss and depression, our sample size of N = 654 is the largest. It is a sample large enough to be considered as a good representation of the students impacted by Hurricane Katrina. As a consequence of the large sample size, our results are likely to be stable with small standard errors. Also, because of the large sample size, we were able to make separate regression analysis with only males and also only females.

We need to mention that our study has several limitations as well. First of all, student participants limited the generalizability of the results to other victims of the hurricane. We have no intention of claiming that the general population has the same results that we obtained from our student sample. The sample consisted of generally young people attending school and it was probable that the substantial portion of financial resources came from their parents and family after the disaster exposure. On the other hand, it was likely that the majority of students' social relationship resources were their friends at school. Therefore, students probably regained their social relationship resources once they resumed attending classes. Of course, their student friends would not have offered them financial resources, given that most of the students still depended on their parents and family financially. This separation between relationship resources and financial resources may explain why only financial resources were significant predictors for the entire sample when both genders were combined. As for the gender difference, the reason might be that for female students, relationships are more important than for male students, which reflected as nearly significant effects of social relationship for females, but not males.

Second, all variables were measured using self-report scales, which were likely to be affected by some subjective biases. Unfortunately, we did not have an access to interview data and had to completely rely on the questionnaire results. Third, students with depressive symptoms before the hurricane could have a negative bias toward themselves, their family members, and the hurricane. We could not evaluate their mental conditions before the hurricane. Future research should ideally control initial depression when they study the relationship between resource loss and depression. In addition, although the resource loss model predicted depression significantly, the predictors only accounted for 2.6% of depression variance, and the effect size was small. The remaining 97.4% of depression variance could be explained by coping styles, personal

characteristics, and support from counseling services etc. These factors need further research.

In spite of these limitations, the current results have some important implications. The research highlights the need for interventions after disaster. These interventions should focus on helping victims to retain financial resources which can reduce the impacts of depression after the hurricane. Financial assistance and relevant services are needed to reduce the depressive symptoms [23]. Although the results showed that social support was not an important predictor of depression for the sample in our study, the improvement of social networks and community-wide support services are needed to preserve support resources after any disaster. From a public health prospective, counseling interventions are also needed to encourage people to retain hope for the future, and reduce the occurrence of depression. In this study, female participants showed significant higher levels of depressive symptoms than male participants, which may suggest that counseling services should particularly highlight the need of female victims.

Overall, the findings of the current study suggest the important role of financial resourceloss in predicting depression following Hurricane Katrina. This finding was consistent with previous findings from disaster research that economic resource loss could significantly predict mental health [15]. This indicated that protecting and retaining financial resources could strengthen people's resistance to the damage of disaster and reduce the level of depressive symptoms.

Acknowledgment

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