

# Posttraumatic Recovery to Distress Symptoms Ratio: A Mediator of the Links Between Gender, Exposure to Fire, Economic Condition, and Three Indices of Resilience to Fire Disaster

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Received: 13 July 2013 / Accepted: 28 April 2014 / Published online: 14 May 2014  
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**Abstract** This study investigated the direct and indirect effects of demographic predictors on level of resilience following a potentially traumatic event. We hypothesized that the direct effects of three variables (exposure to fire hazards, gender, and economic condition) on resilience following a fire disaster would be mediated by the proportion of posttraumatic recovery to post-fire distress symptoms. The sample consisted of 234 Israeli Druze youth whose hometown was endangered and damaged by the Mount Carmel fire disaster in December 2010. Results partially supported the research hypotheses.

**Keywords** Community resilience · Posttraumatic recovery to distress symptoms ratio · Sense of coherence · Gender · Exposure to stress · Druze

## Psychological Resilience

Psychological resilience has often been defined by the pathogenic approach, in terms of low level of distress symptoms following potentially traumatic events (Hadi et al. 2006). A different definition of resilience maintains that it reflects individuals' "capacity for successful adaptation ... despite high-risk status, chronic stress, or following

prolonged or severe trauma" (Egeland et al. 1993, p. 517). In line with this position Antonovsky's (1987) salutogenic model explores the origins of individual health following stressful events. A central element of this model is the concept of *sense of coherence* (SOC) which is a psychologically based stress-resistance resource. SOC is comprised of three major resilience resources: perceiving one's world as *comprehensible, manageable, and meaningful*.

Another perspective concentrates on community resilience (Walsh 2006), which is the ability of a community to take a positive trajectory of adaptation after severe stress or adversity (Cacioppo et al. 2011). It portrays community's ability to readjust to changing conditions innovative ways (Friedland 2005). Communities with stronger community resilience are more likely to prevail in highly stressful situations compared to those with a low level of this resilience (Kimhi et al. 2013).

A low sense of discrimination is a third potential marker of resilience of a minority, which experienced a trauma. Perceived prejudice may harm sense of wellbeing of minority groups (Schmitt et al. 2014), and may generate psychiatric symptoms. Minority adjustment to a potential trauma correlated negatively with its feeling of being prejudiced. Failure of authorities to prevent fire disasters are likely to be regarded by minority members as an indicator of prejudice against them, and may reduce their psychological resilience. We argue that these three resilience fostering indices will be predicted by demographic variables (Fig. 1).

## Predictors of Posttraumatic Resilience

### Gender

Several studies have found that males showed a higher level of SOC compared to females (Heiman 2004), whereas females

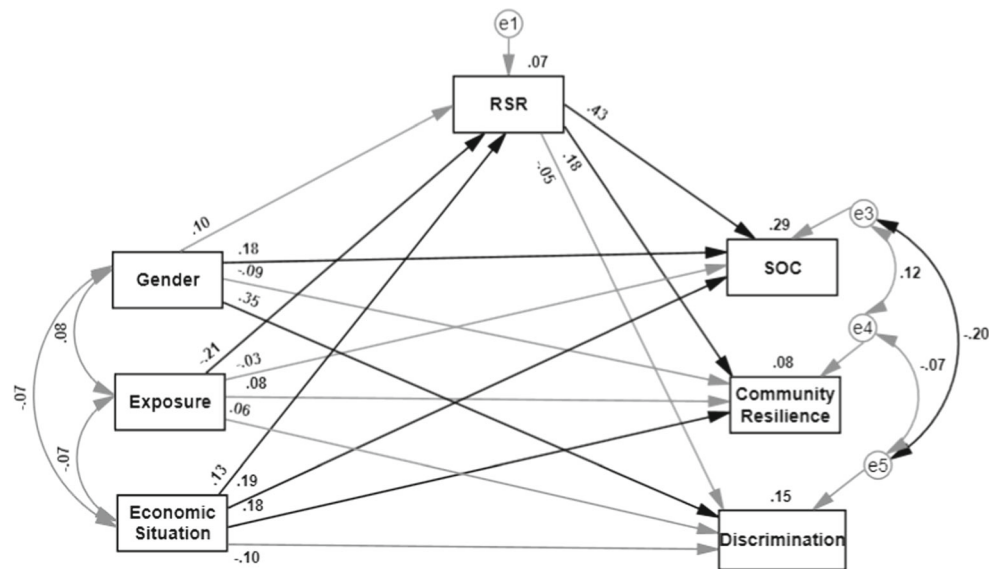
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**Fig. 1** Path analysis model of the research variables



\*Numbers above the mediator and the three dependent variables represent  $R^2$ . Bold paths/correlations are significant:  $p < .05$

exhibit a greater number of psychological and physical symptoms when faced with a major fire (Parslow et al. 2006).

#### Economic Condition

Smith et al. (2003) have found that skilled workers showed higher SOC than unskilled workers. SOC also correlated positively with economic status among Japanese urban residents (Tsuno and Yamazaki 2007).

#### Exposure to Distressing Experiences

SOC has been linked to a wide range of adversities such as chronic diseases (Delgado 2007), hostile experiences (Surtees et al. 2006), and displacement of Kovasers (Roth and Ekblad 2006), and Eritreans (Almedom et al. 2007). Higher exposure of firefighters to fire disasters has been linked with lower SOC (Benedek et al. 2007), and employees subjected to violence showed lower levels of SOC compared to peers who were not subjected to aggression (Hogh and Mikkelsen 2005).

#### Mediators of Demographic-Resilience Relations

Baron and Kenny (1986) have claimed that a variable constitutes a mediator of the relationship between two variables if it helps to explain how or why they are related to each other. In line with a previous study (Eshel et al., submitted) we hypothesize that the direct links between the three demographic variables and indicators of post-fire resilience will be mediated by the balance of recovery to distress symptoms ratio (RSR).

There are ample data indicating that distress symptoms are negatively correlated with resilience. PTSD symptoms among firefighters (Dudek and Koniarek 2000), level of stress among chronic patients (Delgado 2007), and distress following displacement (Almedom and Glandon 2007), have all been correlated negatively with indices of resilience. Subica et al. (2012) have demonstrated further that PTSD symptoms mediate the relationships between trauma and both mental and physical health in persons with severe mental illnesses. This finding supports the idea that distress symptoms may constitute (negative) coping strategies which will mediate the demographic-resilience relations in the general population.

A beneficial variable that may serve to mediate these relationships is one's capacity to recover following a potentially traumatic experience. Tedeschi and Calhoun (1996) have termed such recuperation "posttraumatic growth". Kimhi and Eshel (2009) have termed it "posttraumatic recovery". Their results show that this recovery represents a beneficial psychological resource that reduces posttraumatic distress. Posttraumatic recovery may be achieved by being able to find something to hold onto following acute stress, even when the previous psychological adjustment level has not been restored (Eshel and Kimhi 2011).

The investigated demographic factors are also related to posttraumatic growth. This growth is correlated positively with economic condition and correlated negatively with exposure to war experiences (Kimhi and Eshel 2009). Furthermore, posttraumatic recovery of elderly Israeli civilians, after the 2006 Lebanon war, was related to their level of public resilience.

We hypothesize that the effects of the three demographic variables on indices of resilience will be mediated

by posttraumatic recovery to symptoms ratio (RSR). This ratio represents the current balance of individuals' salutogenic and pathogenic coping responses. Higher RSR will be associated with higher resilience to major stressors (Eshel et al., submitted).

These issues are investigated in the present study using a sample of Israeli Druze minority youths, who experienced the Mount Carmel fire disaster in December 2010. This fire disaster has threatened to destroy their hometown, claimed the lives of 44 people, led to the evacuation of roughly 25,000 people from their homes, devastated over 12,000 hectares of Mount Carmel forests, and caused great damage to property.

The following hypotheses were examined:

1. Being a male will be positively associated with SOC, community resilience, and sense of discrimination. Exposure will be negatively linked with SOC as well as community resilience, and positively correlated with perceived discrimination. Economic conditions will be positively correlated with SOC and community resilience, and will be negatively related to sense of discrimination.
2. RSR will mediate the effects of the biographic predictors on resilience. Higher RSR will predict higher resilience scores, and a lower sense of discrimination.

## Method

### Participants

The sample included 234 Druze high school students (37 % males and 63 % females, (mean age  $M = 16.73$ ,  $SD = .84$ ), two months after their hometown was endangered and damaged by the Mount Carmel fire disaster. This sample included all students of the only high-school of the town, who studied in three grade levels (10, 11, 12), and were present in their classes when the study took place. Seventeen students either chose not to participate or submitted incomplete questionnaires.

### Instruments

#### *Sense of Coherence (SOC)*

Individual resilience was assessed by the SOC scale (Antonovsky 1987, 1993). Responses to this 13-item instrument were rated on a 7-point scale. Thus, for instance, answers to the item "Doing the things you do every day is", ranged from (1) "a source of pain and boredom" to (7) "a source of deep pleasure and satisfaction". The SOC

scale has been grounded in robust cross-cultural research (e.g., Almedom and Glandon 2007). Validity and reliability data for this scale are presented in Antonovsky (1993). The scale's current reliability was  $\alpha = .72$ .

#### *Community Resilience*

Community resilience was assessed by a 24-item instrument, based on an earlier version of the scale (Kimhi and Shamai 2004) pertaining to community leadership, cohesiveness, and commitment to the community. The five-point response scale ranged from 1 (very low or not at all) to 5 (very high). Example: "How satisfied are you of living in your community?" The reported reliability of the original scale was  $\alpha = .90$ . Validity data for this scale are presented in Shamai and Kimhi (2006). Reliability for the present sample was  $\alpha = .92$ .

#### *Sense of Discrimination*

Perceived bigotry was measured by Hocoy's (1993) 13-item perceived discrimination scale. Example: "Sometimes I feel discriminated against because I am not a Jew". Its rating scale ranged from 1 (does not agree at all) to 6 (completely agrees). The scale's reported reliability ranged from  $\alpha = .85$  to  $\alpha = .88$ . In the present study it amounted to  $\alpha = .91$ .

#### *Exposure to Fire Disaster*

This 4-item scale, constructed by Kimhi et al. (2010a) for studying the effects of war experiences, was rephrased to fit exposure to a fire disaster. It referred to distressing fire experiences, damage to one's home, damage to the home of a relative or a friend, and level of perceived personal threat. A seven-point scale was employed (1 = "Not at all", 7 = "Very much"). This scale was positively correlated with posttraumatic distress symptoms and negatively linked to posttraumatic recovery in a large sample of Israeli adolescents (Kimhi et al. 2010a). The reliability of the scale in the present sample was ( $\alpha = .73$ ).

#### *Economic Conditions*

Economic situation was measured by 3 items: economic situation before the war, economic situation today, and family income compared to average family income in Israel. The response scale ranged from 1 ("very bad") to 5 ("very good"). Previous data indicated that this measure is positively correlated with posttraumatic recovery and negatively associated with distress symptoms (Kimhi et al. 2010a). Its current reliability was  $\alpha = .57$ .

### Distress Symptoms

The short version of the Brief Symptom Inventory (BSI, Derogatis and Savitz 2000), relating to anxiety, depression, and somatization symptoms was utilized. This 19-item instrument is scored on a Likert scale ranging from “not suffering at all” (1), to “suffering to a great extent” (5). Validity and reliability of this scale have been substantiated in several studies (Gilbar and Ben-Zur 2002). The internal reliability of the total scale in the present study was ( $\alpha = .93$ ).

### Posttraumatic Recovery

Perceived recovery from fire disaster was assessed by a scale devised by Kimhi and associates (Kimhi et al. 2009; Kimhi and Shamai 2004, 2006). In this eight-item scale respondents compared their present situation with their pre-fire situation in the following domains: physical health, morale, social activity, school work, hobbies or sports, emotional state, level of optimism, and hope for a better future. The response scale ranged from 1 “much worse than before the fire” to 5 “much better than before the fire”. A higher score indicated a higher level of recovery. The scale’s reported internal reliability was  $\alpha = .85$ , and it correlated negatively with levels of distress symptoms, and positively with levels of economic conditions (Kimhi et al. 2010b). The reliability in the present sample was  $\alpha = .74$ .

### Posttraumatic Recovery to Distress Symptoms Ratio (RSR)

In line with the reasoning presented above and previous findings (Eshel et al., submitted), RSR was studied as a mediator of the effects of the biographic variables on indicators of postwar resilience. Mean individual post-traumatic recovery score was divided by mean of distress symptoms (BSI) score. As indicated above, we submit that this ratio represents the proportion of positive coping strategies to negative coping strategies. Higher RSR is expected to have greater positive effects on resilience.

### Procedure

Questionnaires were administered in class. Anonymity of the participants as well as the right of students not to participate in the study was assured. The school served as a trustee of the parents in consenting to the students’ participation in this study. This procedure has been endorsed by the Israeli Ministry of Education. All scales included in this study were back-translated into Arabic by bilingual experts.

### Results

Pearson correlations were computed between pairs of the research variables. Table 1 presenting these data shows that the resilience indicators are generally correlated with the predicting factors, and that RSR is associated with most of the investigated variables. A path model (AMOS 18; Arbuckle 2007) was employed to disentangle these results, and to estimate direct, indirect and total effects of the three demographic predictors on the three indices of resilience, as well as the role of RSR as a mediator. Gender significantly predicted sense of discrimination ( $\beta = .35$ ) and SOC ( $\beta = .18$ ). Males scored higher than females on SOC as well as on perceived discrimination. Economic status positively predicted SOC ( $\beta = .19$ ) and community resilience ( $\beta = .18$ ). More affluent people scored higher on individual as well as higher on community resilience. Exposure had no significant direct effect on the predicted variables. These data partly support hypothesis 1. The model explained 29 % of the variance in SOC, 8 % of the variance in community resilience, and 15 % of the variance in sense of discrimination. RSR was positively affected by economic conditions ( $\beta = .13$ ), and was negatively affected by exposure to fire hazards ( $\beta = -.21$ ). RSR positively predicted SOC ( $\beta = .43$ ), and community resilience ( $\beta = .18$ ). All these regressions were significant at the .05 level or above it.

A bootstrapping analysis ( $N = 2,000$ ) with 95 % confidence intervals estimated the mediating effect of RSR

**Table 1** Pearson correlations among the study variables, means and standard deviations ( $N = 232$ )

Variable	1	2	3	4	5	6	7
1. Gender	–	.073	.08	–.07	.20**	–.08	.35***
2. RSR		–	–.21**	.14*	.47***	.18**	–.06
3. Exposure			–	–.07	–.12	.02	.11
4. Economic condition				–	.24***	.21**	–.14*
5. SOC					–	.20**	–.15*
6. Community resilience						–	–.12
7. Discrimination							–
<i>M</i>	0.37	1.77	2.43	3.47	4.30	3.00	2.78
<i>SD</i>	0.48	0.92	1.30	0.94	0.84	0.66	0.95

\* $p < .05$ ; \*\* $p < .005$ ;  
\*\*\* $p < .001$

**Table 2** Standard and bootstrap estimates and confidence intervals for mediation effect of RSR—study 2

IV	DV	Effect (standardized)			Bootstrap 95 % CI
		Direct	Indirect	Total	
Gender	SOC	.181	.042	.224	-.009; .094
	Community resilience	-.089	.018	-.072	-.004; .053
	Discrimination	.347	-.005	.342	-.029; .011
Exposure	SOC	-.028	-.090	-.117	-.148; -.038
	Community resilience	.076	-.038	.038	-.078; -.006
	Discrimination	.065	.011	.076	-.021; .047
Economic situation	SOC	.191	.054	.245	-.002; .115
	Community resilience	.181	.023	.204	-.002; .061
	Discrimination	-.104	-.007	-.111	-.038; .012

Italicized numbers represents significant indirect effects

(see Table 2). Gender, exposure, and economic status *have a significant indirect effect on SOC and community resilience, but not on sense of discrimination. These results give partial support to hypothesis 2 on the role of RSR as a mediator of the relations between biographic predictors and indicators of resilience.*

## Discussion

The present study defines resilience to adversity of the general public in terms of health-promoting factors within the individual (Egeland et al. 1993). It was argued that this resilience is supported by positive as well as by negative coping responses to potentially traumatic event (Fletcher and Sarkar 2013). We hypothesized that demographic factors would predict the investigated indices of resilience, and that their effects would be mediated by RSR, in a non-clinical sample which was exposed to hazards of fire. The data generally support this mediation model.

As expected, gender (Nilsson et al. 2010), exposure (Hogh and Mikkelsen 2005), and economic status (Tsuno and Yamazaki 2007) affected one or more of the predicted variables. RSR, or the balance between the individual's recovery and vulnerability following highly distressing events, partly but substantially mediated the direct effects of the demographic factors on the three indices of resilience.

Bonanno and Mancini (2012) as well as Masten (2011) indicate that several prototypical trajectories characterize responses to potentially traumatic events, before a relatively stable trajectory of healthy functioning is achieved. We submit that these trajectories may reflect differences in RSR, that is, in the relative strength of recovery ability to level of symptoms. When the level of symptoms substantially outweighs the level of recovery “chronic dysfunction” and PTSD may occur. “Resilience” is characterized by recovery strategies which are initially stronger than the pathogenic elements, and positive adaptation is achieved

despite the adversity. “Gradual recovery” reflects a balance of recovery to distress symptoms in which recovery strategies increase progressively compared to level of distress symptoms. The opposite is true when distress symptoms overpower recovery strategies progressively with time. Changed RSR balance may explain the development of these pathways, although they may be affected by additional life circumstances.

It appears that returning to normal functioning after a potentially traumatic experience reflects the level of detrimental responses to this adversity as much as the availability of beneficial responses that are strong enough to counter these pathogenic effects. Furthermore, the present data show that besides mediating the effects of demographic variables on resilience, the concurrent effect of beneficial and detrimental coping strategies, that is RSR, is the best predictor of resilience indices.

## Limitations of This Study

The present results are based on cross-sectional data. Future research may benefit from longitudinal research designs in order to strengthen causal inferences pertaining to posttraumatic resilience. Longitudinal studies are strongly advocated by Kraemer et al. (2008) since they would enable researchers to use the more appropriate “MacArthur approach” to determining mediating variables. Such a longitudinal design may also contribute to a deeper understanding of the effects of coping processes in the period of time which elapsed between potentially traumatic event and establishment of resilience. It is obvious that additional research is required to disentangle the process of posttraumatic recovery and to help traumatized individuals and communities regain normal functioning following an adversity.

The unique contribution of the present study is the construct of RSR which emphasizes that struggling with adversity is based on the balance of ameliorative as well as detrimental coping strategies. Traumatic experiences do



not eliminate all one's resourcefulness, flexibility in responding to new conditions, or hopes and their effects cannot be characterized, therefore, by distress symptoms (Hobfoll et al. 2009). Chances of regaining normal healthy functioning therefore, to a large extent, reflect psychological resources that may withhold pathogenic and counter-productive outcomes of this adversity.

### Implications for Coping

The present findings have several implications for coping with potentially traumatic experiences, which seem to be relevant for treating pathologic cases as well as for helping the general public following adversity. We assume that any trajectory of adaptation after stress or adversity is mediated by positive and negative coping processes. It seems, therefore, that rather than concentrating mainly on the symptomatic profiles of affected people, psychologists treating traumatized individuals should also make an effort to identify and enhance positive recovery processes. Enhancing positive responses in the process of preventing detrimental outcomes of stress before they develop constitutes a major tool in enhancing resilience (Masten 2011). At the individual level this may take the form of helping people to increase perceived control (Helgeson 2003), promote optimism (Carver and Scheier 2003), foster competence and well-being (Nation et al. 2003), and challenge counterproductive thinking (Reivich et al. 2011). Positive coping strategies are particularly valuable for psychologists working with traumatized communities. The accumulated data shows that enhancing close social relationships, and strengthening social support and community cohesiveness constitute important resources for coping with major mass traumas (Brennan 2008; Walsh 2006).

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