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Anger and hostility in the aftermath of a wildfire disaster in Greece

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ABSTRACT

Previous studies reported that anger and hostility are often presented in the victims of a disaster. This study investigates the symptoms of anger and hostility after a wildfire disaster in a rural area of Greece. Cross sectional case control study of adult population (18 - 65 years old). Face to face interview. Data collected were demographic, Symptom Checklist 90-Revised for assessment of hostility, type and number of losses, trust in institutions personal and social attitudes. It was found that more of the victims of the wildfires reported symptoms of hostility compared to controls but this difference was disappeared when we adjust for other variables. Risk factors for development of hostility among the victims were mistrust in military forces and media, high levels of anxiety and distress, younger age and having higher education. It was concluded that anger and hostility after a disaster perhaps are not only related to disaster but other factors concerning demographic and personal characteristics may play an important role.

Keywords: Disaster, Greece, Hostility, Anger, Trust, Wildfires

1. INTRODUCTION

Hostility and anger have been reported as often presented in the victims of a disaster. Glass [1], in his seminal work has classified hostility in the last phase of a disaster (the post-impact period). In this phase hostility and anger appears against those possible responsible, against society and against its leaders. [2].

The terms “anger” and “hostility” are often used synonymously in disasters literature, but the two constructs can be distinguished. Anger has been described as a negative feeling, an emotional state ranging from irritation to rage; anger is an emotional expression of hostility. On the other hand hostility has been described as a general cognitive personality trait consisting of enmity, denigration, and ill will [3-5]. Hostility is a multidimensional trait but the two key components are cynicism, (the belief that others are motivated by selfish concerns), and mistrust, (the belief that other people will tend to be hurtful) [5]. However there are not yet standard definitions and Barefoot [6] viewed hostility as an “antagonistic interpersonal attitude”, in relation to cognitions (cynicism and hostile attributions), affect (hostile emotions), and behaviour (aggressiveness).

Although there is a bulk of theoretical work where often has been reported that hostility and anger are common in the aftermath of a disaster there is a lack of empirical evidence which examine the prevalence and the factors contributed in the appearance of hostility in the victims of a natural disaster [7]. This perhaps due to that research in natural disasters is focused more on Post-Traumatic Stress Disorder (PTSD) than other symptoms or disorders [8,9] and also to that PTSD incorporates symptoms of irritability and anger. There is evidence, however, that anger and hostility may be distinguished from other symptoms of PTSD in following a more protracted course [10,11].

Hostility has been seen in individuals or may be collective and organised and may be directed towards individuals or groups [12]. Often relief workers maybe the focus of hostility of the victims whom they help [13], however, recent research has showed that relief workers also can develop elevated levels of anger and hostility especially those with more severe symptoms of PTSD [7,14,15].

Moreover, hostility after a disaster may have severe implications for the recovery. Individuals with hostility less often visited medical clinics in the aftermath of a disaster [16], although they are in higher risk for cardiovascular problems [17], they may have higher levels of lipids in their blood, [18,19], their cortisol levels are

increased [20] and they are in higher risk of all-cause mortality independently of other risk factors (e.g., smoking, cholesterol levels) [4,21]. In addition it has been suggested that severity of anger and hostility is a risk factor of family violence and substance abuse [22], and also that is a factor for maintenance of psychological problems and mostly PTSD [7]. On the other hand, it has been proposed that in some cases the return of anger and hostility can be a sign of a return to normal [23].

Besides, different kind of disaster may have a different impact on mental health and especially in the hostility symptom [24], and it has been suggested [8] that it is important to distinguish continuing situations from time-limited, acute disasters. Likewise different cause of disasters can have impact on the development and expression of hostility and anger. Purely natural disasters (e.g. earthquakes, tsunamis, tornados) can be seen as an uncontrollable event or "act of God" affecting everyone, and fate can determine who is affected. On the other hand human made or technological disasters may evoke more easily anger, hostility and blaming behaviour as they due to human error or miscalculation [25-28]. Hostility and anger can become dominant as victims blame what they perceive to be the responsible agent, [25] and they disagree over acts to stop or remediate the event or over relief or rescue methods [25,26]. However, there is not clear distinction of manmade and natural in the case of wildfire disasters. Wildfires can be caused from human error or deliberately but also can be caused accidentally from natural causes (lighting, weather conditions) [29].

In a previous analysis of our data [30] where we examined only the psychopathology we have found that those victims of the disaster without losses were more hostile compared to those with losses. We had speculated that those with damages were in priority to receive most of the support and so they may were less hostile. However, given that hostility is a personality trait and given that hostility and anger can be affected by other social, demographic, and personal attitudes, as above reported, hostility may pre-existed the disaster and perhaps disaster may exacerbated it. Similarly, other factors like personal attitudes, believes, and trust which were not examined in the previous study may influence hostility and anger. Consequently, in the present study we hypothesised that hostility after a disaster may is not only related to the disaster but perhaps socio-demographic and personal factors contribute as well. The present study is a post-hoc analysis of collected data after a wildfire disaster.

Therefore the aims of the present study are threefold: a) to estimate the time prevalence of hostility symptoms in the victims of a disaster, b) to investigate risk factors for hostility, and c) to evaluate the associations of losses, demographic and social factors with hostility symptoms.

2. METHODS

2.1. History

In August of 2007 an intense wildfire broke out in the Peloponnesus peninsula in Greece. This was the worst of a century in Greece. Sixty to eighty people were reported killed and 5392 people affected from the disaster [31]. About 1500 square kilometers of forests, olive trees, farmland, and villages were burned in these fires and the economic damages were estimated around 1,750,000 (×1000) US$.

2.2. Design of the Study

This study was a cross sectional case control study. Cases and controls were closely matched for gender, age, educational, marital and regional distributions. The design, procedure, and the measures for this study are more fully described in a previous study [30].

2.3. Participants

Residents aged from 18 years to 65 years old who lived in the five prefectures designated by the Hellenic Republic Ministry of Interior to be disaster areas served as cases and residents from nearby non affected areas as controls. The number of respondents surveyed in each prefecture was proportional to its adult population.

2.4. Measurements

1) Demographic characteristics (age, gender, educational background, marital status, occupation).

2) Symptom Checklist 90-Revised (SCL-90-R) [32]. A Greek validated version of SCL-90-R was used [33]. The SCL-90R has 90 items, which measure the degree of distress experienced the individual during the last 7 days, using a 5-point scale (0 to 4) that ranges from "not at all" to "extremely." The SCL-90R can be scored for nine symptom dimensions. In addition to the nine dimensions, there are three global indices that are computed. The Global Severity Index (GSI), which reflects both the number of symptoms endorsed and the intensity of perceived distress. The Positive Symptom Total (PST) which is a measure of the number of symptoms endorsed and can be interpreted as a measurement of symptoms span, and the Positive Symptom Distress Index (PSDI), which is a measure of "intensity" corrected for the number of symptoms. According to SCL-90-R caseness is defined when a respondent has a GSI score greater or equal to a T score of 63, or if any of two dimensions scores are greater than or equal to a T score of 63.

3) Hostility: To measure hostility the 6 questions of hostility dimension of the SCL-90-R were used. Those

are “feel easily annoyed or irritated”, “temper outbursts that you cannot control”, “have urges to beat, injure or harm somebody”, “have urges to break or to smash things”, “have frequent arguments”, “shouting or throwing things”. The hostility dimension of SCL-90-R reflects thoughts feelings or actions that are characteristics of anger. The six questions of SCL-90-R asses quantities such as aggression, irritability, rage, and resentment [32].

4) Number and type of losses as a result of the fire including: a) damage to property, b) complete damage and loss of property, c) personal injury or injury of a close family member, and d) deaths of close family members.

5) A questionnaire which examines the trust of respondents in 12 institutions/ establishments/ organizations namely: Government, Church, Military, Local government, Private sector, Trade-unions, Non Governmental/Voluntary organizations, Justice, Education, Police, Political parties, and Media.

6) A questionnaire with 21 social values in which the participants could choose which were most important for them. Among the social values were Prestige, Devotion, Autonomy, Ostentation of power, Mutual Help, Modesty, Wealth, Equality, Tradition, Public recognition, Safety, and others.

2.5. Procedure

Data were collected in face-to-face interviews conducted during a 14-day period beginning 6 months after the outbreak of the wildfires (March 2008). The interviewers were qualified psychologists and social workers, who had a previous training for the use of SCL-90-R. Households in designated disaster areas and in the nearby undamaged by fire areas were selected randomly from residency data provided by the municipalities surveyed. Participants were given cards upon which the survey questions were printed. Because educational levels in this region are relatively low, each question was read out loud by the interviewer as well, who recorded the participants’ responses.

2.6. Ethics

The study has been approved by the Ministry of Health and informed consent was obtained from each participant.

2.7. Statistical Analysis

The Q Local v 2.1.11, (NCS Pearson Inc, MN, USA), was used for the estimation of the standardized T scores from the raw data for the SCL-90-R scale. Data were analysed with PASW (SPSS) v18, using appropriate bivariate statistics. For the non-normally distributed data, non-parametric tests were used. To identify risk factors for hostility caseness a logistic regression analysis was performed.

3. RESULTS

3.1. Demographics

The initial sample consisted of 800 participants: 409 cases (victims from the disaster) and 391 controls. Because of missing data, uncompleted questionnaires, and exclusion of individuals who gave the same rate (0 or 4) in all the questions in the SCL-90-R, the final analysed sample here consisted of 615 participants (353 cases and 262 controls). The finally analysed two groups were closely matched regarding gender, age, education, occupation and regional characteristics. (See **table 1**).

3.2. Caseness According to SCL-90-R (Psychopathology Dimensions).

Those who had a T score of 63 and above in each psychopathology dimension of SCL-90-R defined as caseness. **Table 2** shows the caseness’ actual numbers and percentages in each psychopathology dimension for cases (victims) and controls.

3.2.1. Hostility

Those participants who had T scores of 63 and above in the hostility dimension of SCL-90-R defined as hostile (caseness). By this definition 110 participants (18%) of the sample (N = 615) were found to have increased the dimension of hostility (T scores $\geq$ 63). Using X^2 tests we compared the two populations (those with hostility and those without) in terms of socio-demographic characteristics (age, gender, marital status, occupation, education), sampled group (controls or victims from the disaster), losses (number of losses, property damages, complete damages of property, injuries of self or relatives, death of close relative), trust in institutions/establishments (Government, Church, Military, Local government, Private sector, Trade-unions, Non Governmental/Voluntary organizations, Justice, Education, Police, Political parties, Media), and Social values and Personal attitudes (Dialogue/communication among people, Stable social rules, Ostentation of power/wealth, Autonomy, Mutual support, Modesty, Wealth, Variety, Equality, Compliance with law, Adventure, Leisure, Nature, Prestige, Creativity, Devotion, Public recognition, Safety, Having a good time, Tradition, State). No differences were found in the two groups with the exception in the variables showed in **Table 3**. Thus, victims of the wildfire, those who did not trust the police and the justice system, and those who value more nature and leisure but not modesty as a per- sonal value had statistically significant increased the dimension of hostility.

Table 1. Demographic characteristics of sample.

		Cases N = 353(%)	Controls N = 262(%)	Pearson X^2
Gender	male	182(51.6)	131(50.0%)	$X^2 = 0.15$, $df = 1$, $p = 0.7$ (NS)
	female	171(48.4)	131(50.0)	
Age group	18 - 25	59(16.7)	36(13.7)	$X^2 = 1.32$, $df = 4$, $p = 0.86$ (NS)
	26 - 35	79(22.4)	59(22.5)	
	36 - 45	72(20.4)	59(22.5)	
	46 - 55	76(21.5)	55(21.0)	
	56 - 65	67(19.0)	53(20.2)	
Education	Primary school	101(28.6)	72(27.5)	$X^2 = 5.6$, $df = 2$, $p = 0.06$ (NS)
	Secondary school	222(62.9)	152(58.0)	
	College/university	30(8.5)	38(14.5)	
Marital status	married	240(68.0)	180(68.7)	$X^2 = 0.043$, $df = 3$, $p = 0.98$ (NS)
	single	99(28.0)	72(27.5)	
	divorced	4(1.2)	3(1.1)	
	windowed	10(2.8)	7(2.7)	
Occupation	professional occupation	59(16.7)	46(17.6)	$X^2 = 0.50$, $df = 2$, $p = 0.78$ (NS)
	sales and customer service occupation	57(16.1)	47(17.9)	
	elementary occupation	237(67.2)	169(64.5)	

Table 2. Caseness according to SCL-90-R.

		Cases N = 353(%)		Controls N = 262(%)	
		Count	Row %	Count	Row %
SOMATIZATION	NO	290	55.3%	234	44.7%
	YES	63	69.2%	28	30.8%
OBSESSIVE-COMPULSIVE (OC)	NO	253	55.7%	201	44.3%
	YES	100	62.1%	61	37.9%
INTERPESONAL SENSITIVITY (IS)	NO	261	56.0%	205	44.0%
	YES	92	61.7%	57	38.3%
DEPRESSION	NO	247	53.2%	217	46.8%
	YES	106	70.2%	45	29.8%
ANXIETY	NO	273	55.3%	221	44.7%
	YES	80	66.1%	41	33.9%
HOSTILITY	NO	279	55.2%	226	44.8%
	YES	74	67.3%	36	32.7%
PHOBIC ANXIETY	NO	287	55.2%	233	44.8%
	YES	66	69.5%	29	30.5%
PARANOID	NO	228	53.1%	201	46.9%
	YES	125	67.2%	61	32.8%
PSYCHOTISM	NO	278	55.4%	224	44.6%
	YES	75	66.4%	38	33.6%
GSI	NO	250	53.8%	215	46.2%
	YES	103	68.7%	47	31.3%
PSDI	NO	224	56.9%	170	43.1%
	YES	129	58.4%	92	41.6%
PST	NO	276	54.2%	233	45.8%
	YES	77	72.6%	29	27.4%

3.2.2. Logistic Regression. (Predictors of Hostility).
To control for the confounding variables a logistic regression model were conducted with dependent variable the hostility (outcome yes/no) and independent variables all the above measured variables plus the psychopathology dimensions of SCL-90-R and the three indices (GSI, PST, PSDI). The backward stepwise (Wald) method was used. The final more parsimonious model is presented in **Table 4**. The final model predicts overall correctly 86.5% of participants and the prediction in creases for those without hostility for whom the model classify correctly 94 % while the prediction for the hostility drops to 51%.

Thus, those of the participants who scored higher (pathological) levels of hostility were those in youngerage groups (18 - 55 years old), those who did not trust the military forces and the media, those who had higher levels of anxiety (pathological) and they had a broader and more intensive number of symptoms (PST and PSDI).

3.2.3. Predictors of Hostility in the Victims of the Disaster.
Further we analyse only the victims of the disaster. From the 353 victims the 74 (21%) had increased hostility. Doing the same analysis as above on the victims' sample (logistic regression) we found that those hostile victims were those who did not trust the military forces and the media. Although overall age and education did not contribute significantly to the model those in the 26 - 55 groups ages were more hostile compared to older group age (56 - 65 years old group). Similarly with education, overall education did not have any effect on hostility but those with higher education (college/university), appears to be more hostile compared to those who finished pri mary school. As with the entire sample, victims with increased hostility had also increased levels of anxiety and they had more intensive and wider number of symptoms. **Table 5** shows the final model with the predictive variables. The final model predicts overall correctly the 84% of the victims and for those without hostility classifies correctly the 94% while those with hostility the model classifies correctly the 44.5%.

4. DISCUSSION

This study addresses the relationship between a natural disaster (wildfires) and the hostility symptom of psychopathology. Although, bivariate analysis showed that the victims of the wildfires had increased hostility compared to controls, after adjusting for other sociodemographic factors neither the impact of disaster nor the losses caused by it, had any effect on the symptom of hostility. In other words the symptom of hostility was independent by both disaster and losses caused by the

Table 3. Hostility (Bivariate statistics).

		Hostility		
		NO (%)	**YES (%)**	**Pearson X^2**
participants	victims	279(55.2)	74(67.3)	$X^2 = 5.3$, $df = 1$, $p = 0.02$
	controls	226(44.8)	36(32.7)	
Trust in Justice	NO	465(92.1)	108(98.2)	$X^2 = 5.29$, $df = 1$, $p = 0.021$
	YES	40(7.9)	2(1.8)	
Trust in Police	NO	462(91.5)	92(83.6)	$X^2 = 6.23$, $df = 1$, $p = 0.013$
	YES	43(8.5)	18(16.4)	
Modesty	NO	401(79.4)	100(90.9)	$X^2 = 7.91$, $df = 1$, $p = 0.005$
	YES	104(20.6)	10(9.1)	
Nature	NO	257(50.9)	38(34.5)	$X^2 = 9.67$, $df = 1$, $p = 0.002$
	YES	248(49.1)	72(65.5)	
Leisure	NO	422(83.6)	82(74.5)	$X^2 = 4.97$, $df = 1$, $p = 0.026$
	YES	83(16.4)	28(25.5)	

Table 4. Predictors of hostility.

							95% C.I.for EXP(B)	
	B	S.E.	Wald χ^2	*df*	Sig.	Exp(B)	Lower	Upper
Age group			14.089	4	0.007			
18 - 25	1.671	0.470	12.625	1	0.000	5.316	2.115	13.359
26 - 35	1.230	0.446	7.626	1	0.006	3.423	1.429	8.196
36 - 45	1.296	0.464	7.805	1	0.005	3.654	1.472	9.069
46 - 55	1.363	0.449	9.220	1	0.002	3.908	1.621	9.422
Trust in military	1.122	0.472	5.649	1	0.017	3.071	1.217	7.744
Trust in media	1.404	0.637	4.862	1	0.027	4.071	1.169	14.178
PST	–1.046	0.369	8.047	1	0.005	0.351	0.171	0.724
PSDI	–1.357	0.271	25.029	1	0.000	0.257	0.151	0.438
Anxiety	–2.017	0.347	33.783	1	0.000	0.133	0.067	0.263
Constant	–2.165	0.836	6.703	1	0.010	0.115		

Table 5. Predictors of hostility only in the victims.

							95% C.I.for EXP(B)	
	B	S.E.	Wald χ^2	*df*	Sig.	Exp(B)	Lower	Upper
Age group			8.484	4	0.075			
18 - 25	0.759	0.623	1.482	1	0.223	2.135	0.630	7.241
26 - 35	1.454	0.563	6.657	1	0.010	4.279	1.418	12.912
36 - 45	1.226	0.590	4.317	1	0.038	3.407	1.072	10.830
46 - 55	1.405	0.564	6.205	1	0.013	4.074	1.349	12.305
Education			4.842	2	0.089			
Primary school	–1.443	0.664	4.731	1	0.030	0.236	0.064	0.867
Secondary school	–0.802	0.552	2.107	1	0.147	0.449	0.152	1.324
Trust in military	1.670	0.635	6.916	1	0.009	5.314	1.530	18.456
Trust in media	2.325	1.185	3.848	1	0.050	10.228	1.002	104.386
Safety	–0.601	0.338	3.166	1	0.075	0.548	0.283	1.063
PST	–1.634	0.483	11.458	1	0.001	0.195	0.076	0.503
PSDI	–1.352	0.341	15.729	1	0.000	0.259	0.133	0.505
Anxiety	–1.549	0.466	11.061	1	0.001	0.212	0.085	0.529
Constant	–2.012	1.522	1.746	1	0.186	0.134		

disaster. In addition younger age, mistrust in the military forces and the media and high levels of anxiety and distress were predictors for the symptom of hostility. It is important to note here that the military forces were the most important aid for the relief of the victims but also they had played a crucial role in the fire-fighting to stop the catastrophic event.

Literature on exposure to other types of natural disaster (floods) indicates increased hostility in the victims [22]. Similarly, Bland [34] reported increased hostility in male residents of Pozzuoli following an earthquake compared to non-residents and further analysis showed that hostility was more increased in those relocated and in those victims with financial losses. In manmade disasters (technological) it was reported the surprising finding that employees in the damaged nuclear plant in the Three Mile Island accident had lower scores on the hostility and mistrust than other residents of the area [35]. However, surrounding circumstances of the Three Mile Island accident (initial failure of plant operators to recognize the situation, and the release of the film The China Syndrome few days before the accident) may explain this finding.

Therefore, although hostility has been observed in the victims of a disaster other reasons may contribute as well. The above reported studies did not control for other factors and they found that victims are more hostile compared to controls (like in the present study, when bivariate analysis was used). However, a study of survivors of the Beverly Hills Supper Club fire of 1977 (Green [36]) in which regression analysis was used, reported that hostility was predicted from the stress caused by the fire and demographic factors (particularly age). Although direct comparison of Green *et al.*'s study with the present one is difficult, because of the different type of disaster, different methodology, and different measured variables, the Green et al study further supports the indication that hostility and perhaps other symptoms of psychopathology are not only related to victim/control distinction, but they may related also to other factors concerning social and personal attitudes. Similarly, emotional and psychological support, supportive network, close family ties may influence the outcome of trauma. However, it is important to consider both the positive and negative consequences of social involvement because it was found for instance that spouse support may reduce male symptomatology but this is associated with increased symptomatology in exposed to disaster females. Very strong social ties may be more burdensome than supportive in extreme stress [37]. Nevertheless, including other variables such as social may add more to predictive outcome than a simple comparison of victims/controls psychopathology or distress.

It has been argued that manmade disasters are phenomenologically and etiologically different from natural disasters [38], and as above reported wildfires sometimes can be in the middle. During the time of wildfires in Greece there was a political campaign for the national election. There was a suspiciousness that the fires might have been set by political extremists, to disrupt political campaign. This suspiciousness was not only among laymen but also the Prime Minister in a nationally televised address suggested it. [39]. Media spread it as well [40], but six months later when this study was carried

out nobody has been held responsible. This could explain to some degree the mistrust to the media.

However, general the lack of trust has also been reported in other studies investigating victims of disaster e.g. [41]. Previous studies have showed that trust is essential component of resilience, and individuals and communities can effectively respond to a disaster by gathering together trust, and social support, to either re-establish a previous state of equilibrium or develop a different but still adaptive state e.g. [42-46].

A previous study has shown that Greeks have a low level of trust in the most public institutions [47]. Similarly, a more recent survey on younger Greek population (18 to 28 years old) also reported a low trust in public institutions and politics. In addition, the same survey reported that more than half (53%) of the Greek young people are unconcerned about others and only 21.5% trust others to some degree [48].

Mistrust and a negative attitude toward others are essential components to hostility [49]. Thus, it is very likely that in both cases and controls the mistrust and the negative attitude pre-existed to the disaster and so we do not find any effect from the disaster because it was confounded with pre-disaster attitudes. Alternatively, if the disaster had provoked mistrusts and disbelief to others we should find that victims were more hostile than controls. In addition to our hypothesis that hostility pre-exists to disaster is that hostility is rather a personality trait and an attitude that may be derived from negative interpersonal experiences and thus it is more likely to be a long standing symptom rather than a symptom caused instantly after the disaster [50]. Moreover, biological (serotonergic system) and genetic factors regulate so many of the behavioural and psychosocial characteristics. Research on genes has focused on variants in genes encoding for proteins involved in the regulation of serotonergic function. It is suggested that the serotonin 1B receptor gene play an important role in phenotypes of personality domains related to anger and hostility [51,52].

A rather surprising finding of this study was that hostility in the victims of wildfire was associated with higher education. Generally educated people report less hostility and anger toward others but when worried, anxious, or tense, they are more likely to report anger along with it [53]. A previous study of explosive anger in post-conflict victims showed that among others, higher levels of education is negatively associated with anger [11]. However, not all the studies in disasters have found that education has a protective effect on hostility e.g. among survivors of the Oakland/Berkeley firestorm [54], on individuals exposed to a flood in South Africa [55]. There is no obvious explanation for this finding. A speculation is this suggested by Gibbs [56]. Considering that higher education is associated with higher income and possible higher social class when those individuals were equally affected by disaster as lower class individuals, it may be that higher social class individuals have more to lose in the disaster. Their expectations and the standards of living may be higher and more crudely disrupted than the expectations of lower class or less educated individuals. Although, in the present study, we did not find any effect of the type or the number of losses in the hostility dimension, it is possible that more educated people may have greater expectations than less educated, and thus they are perhaps more hostile than the less educated. A second possibility is that hostility effects of a traumatic experience may affect more those educated who may have more pressure and responsibilities compare to others and perhaps take also responsibilities for other non-educated people.

4.1 Limitations of the Study

Culture and milieu may have influenced the relationship of hostility and victims of the wildfire disaster. Although SCL-90-R estimate psychopathology based in the last 2 weeks there is possibility of recall bias or influences in the other measurements as well, since the study was conducted 6 months after disaster. We did not use other measures of hostility. However, SCL-90-R is a good measurement of hostility as it evaluates hostility as a spectrum from anger to aggression.

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