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Running head:
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Introduction

The disaster literature describes vast impacts of disasters on mental health of affected populations (Rodin & Van Ommeren, 2009; see for reviews, e.g., Norris, 2002a, 2002b, 2006; Neria, 2007; Leon, 2004). Yet, scholars have questioned the wider meaning of the enormous mental health figures that are reported in disaster surveys (Rodin & Van Ommeren, 2009; de Jong & Komproe, 2003), because among other reasons the disaster literature is characterized by a paradox. On the one hand the disaster literature has shown a principal interest in psychiatric consequences (Miller *et al*, 2006) in both the immediate (e.g., Math *et al*, 2008; Soldatos *et al*, 2006; Johnsen *et al*, 1997) and long term aftermath of disasters (e.g., Brier & Eliot, 2004). On the other hand, disaster scholars have primarily used screening instrument (e.g. Norris, 2002a, 2002b, 2005) that do not allow establishing rates of psychiatric diagnoses. Within the contrast between desired claims and instruments used, an empirical vacuum is created which leaves room for debate about what symptoms constitute psychological distress and what symptoms constellate mental disorders. Within this discourse, several scholars typified mental health symptoms in the wake of disasters (e.g., feeling anxious, or sleeping problems) as an appropriate and normal response to stressful circumstances (Hobfoll *et* al, 2007; Horwitz, 2007; Rae, 2006; Summerfield, 1999), whereas a mental disorder implies not acting in appropriate ways in given contexts (Horwitz, 2007). The results of mental health screening instruments encompass a proportion of false positives, i.e. individuals that experience psychological distress rather than disorders, and Horwitz (2007) has argued that disaster scholars are at risk of misinterpreting symptoms of normal distress for symptoms of mental disorders. This arguable misinterpretation may have led to an overestimation of mental illness in epidemiological surveys (Rodin & Van Ommeren, 2009; Horwitz & Wakefield, 2006). Importantly, symptoms of psychological distress require a different type of mental health intervention than psychiatric symptoms (IASC, 2007; van Ommeren, Saxena, & Saraceno, 2005; de Jong, 2002), and because the distinction between the two is not clear in the disaster literature, disaster mental health figures are not easily translated into the planning of mental health interventions (Miller *et al*, 2006; cf. Miller *et al*, 2008). It is thus critical to use a method that distinguishes between psychological distress and mental illness in disaster situations when using screening instruments.

The obvious solution would be to entirely abandon the use of screening instruments, and rely on diagnostic instruments or clinical judgment of symptoms by professionals in disaster surveys. However, both methods prove to be too resource intensive in practice. Thus, we have to reside to another more realistic solution. In therapeutic practice the clinical significance of symptoms is used to distinguish between normal 'understandable' distress and symptoms that comprise disorders (American Psychiatric Association, 2000). Yet, despite the prominence of clinical significance in diagnostic criteria (American Psychiatric Association, 2000), there is no consensus on how it should be defined or measured (Narrow *et al*, 2002). Narrow and colleagues (2002) demonstrated the need to include proxy measures of clinical significance. They showed that including proxy measures for clinical significance – respectively life interference, help seeking, or use of medication – reduced the national prevalence rates in the USA were reduced by almost 20%. De Jong (2002; de Jong & Komproe, 2003) recommends including measures of disability as a proxy of clinical significance in epidemiological mental health surveys. The presence of a relation between disability and mental health symptoms would imply pathology, but to date proxy measures of clinical significance have been rarely used in disaster mental health research (see for an exception, Van Kamp *et al*, 2006).

Yet, whereas the relation between mental health symptoms and disability is germane for the 'normal' situation in which an individual experiences a traumatic event in a relatively stable context (e.g. a car accident), the mere relation between disability and mental health symptoms seems overly simplistic in disaster situations. Beyond the direct potential traumatizing effect of disasters on mental health and functioning, the vast destruction of the material and social context to a vast extent is an inherent part of disasters (Galea *et al*, 2009; Picou *et al*, 2004). For example, disasters destroy shelters, diminish crops and livestock, impede the access to prior existing health care, and weaken or destroy traditional social

support systems (Kawachi & Subramanian, 2006; Harpham *et al*, 2008; Hobfoll *et* al, 2007; de Jong, 2002). This stressful recovery environment in turn negatively affects mental health and functioning of individuals (Sattler *et al*, 2002; Freedy, Shaw, Jarell & Masters, 1992; Freedy, Saladin, Kilpatrick, Resnick & Saunders, 1994). Thus in the immediate aftermath of disasters mental health and functioning are likely to be highly determined by stressors in the recovery context in which individuals reside (cf. Miller *et al*, 2008; 2009). As a result of this contextual influence the typical interrelation between mental health symptoms and functioning is likely to be weaker than in a 'normal' situation in which the context is relatively untouched (American Psychiatric Association, 2000). Such a finding would give weight to the claim is that mental health symptoms in the immediate wake of disasters comprise the realm of a normal reaction, i.e. psychological distress, to a stressful context, rather than the domain of mental disorders (Hobfoll *et* al, 2007; Horwitz, 2007; Rae, 2006; Summerfield, 1999).

The present study examines the relation between mental health symptoms based on screening instruments and functioning in a disaster-affected and a non-affected population. We investigated early mental health consequences in the aftermath of recurrent floods among a population that resides in the rural district of Bahraich, Uttar Pradesh, India, compared to a population in the same region that is not affected. Floods are a recurrent phenomenon in the Bahraich district and in the year 2008, the district Bahraich was struck by floods twice, first in the month of July and again in the month of September, which led to large scale damage to houses and erosion of agricultural land in the area. The aims of the study are twofold: First, we will investigate the impact of the flood on mental health outcomes (anxiety, depression, and distress), and daily functioning. We expect a large impact of the flood on mental health and functioning in the immediate aftermath. Second, in statistical terms we expect the disaster condition to *moderate* the relation between mental health and functioning in the entire sample. In specific, we expect a weaker relation between mental health and functioning in the disaster-affected group than in the control group, as mental health and functioning of disaster affected individuals will be largely determined by changes in the context.

Method

Subjects

A cohort survey was carried out in the district of Bahraich, Uttar Pradesh, India, from October 1st to 15th in 2008. The Bahraich region in India is annually hit by floods, and in July and September 2008 the region was again severely hit by floods. Within Bahraich, the four most flood affected Gram Panchayats (the local name for the smallest political unit in the region) were chosen on the basis of impact of the flood and their geographical location between the river and the embankment that made them most vulnerable upon discussions with the district officials and with several NGOs in the region. The sampling frame for the control group consisted of the Gram Panchayats that are situated on the other side of the embankment. It was made sure that these Gram Panchayats were not at all affected by the floods meaning that neither the houses were damaged nor the agricultural land was eroded due to floods. Four such Gram Panchayats situated directly opposite to the affected Gram Panchayats were selected.

A list of all the households in the specific Gram Panchayats was obtained according to the name of the head of the household. We aimed to administer the interview to 330 households in the affected group and 330 households in the control group. We took into account a proportion of approximately 15% of migrated households as a result of the flood. Thus, we randomly sampled 380 flood-affected households. We randomly sampled 330 households in the control group. No respondents refused to participate in the survey exercise. However, due to migration within the sample of affected households and as a result of absence of households in both the affected and the control group, we were able to administer the interview to the head of the 318 affected respondents (83.7%) and 308 control respondents (93.3%).

Demographic information of the samples is summarized in Table 1. In the affected sample 39.0% of the sample was female and 61.0% of the sample was male. In the control group, 44.1% was female and 54.9% was male. The mean age was 46.03 years (SD=15.74) in the affected group and 47.23 years (SD=13.92) in the control group. Of the affected group 64.1% was literate and 35.9% was illiterate. In the

control group 52.6% was illiterate and 47.4% was literate. In the affected group 72.8% had no education, 10.5% had primary education, 10.8% had secondary education, 4.3% had higher secondary education, and 1.5 % were graduates. In the control group 65.4% had no education, 16.1% had primary education, 10.2% had secondary education, 7.2% had higher secondary education, and 1.0% were graduates. The mean years of education was 2.17 (SD=3.70) in the affected group and 2.45 (SD=3.65) in the control group. In the affected sample 92.1% was Hindu, 7.5% was Muslim, and .3% had a religious affiliation other than Hindu or Muslim. In the control sample, 71.7% was Hindu and 27.3% was Muslim.

Table 1. Demographics

	Flood affected sample (n=318)	Control sample (n=297)
Gender (%)	39.0% Female	44.1% Female
	61.0% Male	54.9% Male
Mean age (SD)	46.03 (15.74)	47.23 (13.92)
Literacy (%)	64.1% Illiterate	52.6% Illiterate
	35.9% Literate	47.4% Literate
Education (%)	72.8% No education	65.4% No education
	10.5% Primary education	16.1% Primary education
	10.8% Secondary education	10.2% Secondary education
	4.3% Higher secondary educ.	7.2% Higher secondary educ.
	1.5 % Graduate	1.0% Graduate
Year of education (SD)	2.17 (3.70)	2.45 (3.65)
Religion (%)	92.1% Hindu	71.7% Hindu
	7.5% Muslim	27.3% Muslim
	.3% other	

Note: SD = Standard Deviation

Instruments

Symptoms of anxiety and depression were assessed by the Hopkins Symptom Checklist-25 (HSCL-25). The HSCL-25 derived from the 90-item Symptom Checklist (SCL-90; [1;2]), and is a screening tool designed to detect symptoms of anxiety and depression. It is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored from 'not at all' (1) to 'extremely' (4). We had to preventively omit an item concerning sexual interest because of the taboo associated with talking about sexual issues. The period of reference is the last month. The HSCL-25 has widely been used in studies among refugees in both western (e.g. [3]) and non-western settings (e.g. [4;5]). In the vicinity of North India, the HSCL has been used among Tibetan refugees in India [6] and among Nepalese internally displaced persons [7]. The HSCL-25 has been used previously in disaster research [8]. Although the cutoff score of 1.75 has become widely accepted in cross-cultural research [9;10], the HSCL-25 has never been validated as a screening instrument for depression and anxiety in India. Therefore, we report on mean scores of anxiety and depression, rather than prevalence rates. Three scores were calculated: The anxiety score is the average of the 10 anxiety items; the depressive symptoms score is the average of the 14 depression items; and the total distress score is the average of all items. The internal consistency of the scales was acceptable to good. In the affected sample the Cronbach's alphas of anxiety, depression, and the total distress score were respectively .81, .69, and .80. In the control sample the Cronbach's alphas of anxiety, depression, and the total distress score were respectively .90, .89, and .94.

Functioning was assessed by using the Short Form-12 (a shortened version of the Medical Outcome Study 36 Item Short-Form Health Survey [SF-36; [11;12]), one of the most extensively used assessments of functioning worldwide [13]. The SF-12 assesses respondents' functioning during the previous 4 weeks, using 12 items along two summary scales (Mental Health Component and Physical Health Component), each comprising 4 subscales. The mental health summary measure encompasses items on the subscales role-emotional functioning, mental health, vitality, and social functioning (e.g.,

Feeling calm and peaceful, during the past 4 week). The physical health summary score consists of items focusing on physical functioning, role-physical functioning, pain, and perceived general health (e.g., How much pain interfered with normal work including both work outside the home and housework, over the preceding 4 weeks.). Following recommended scoring algorithms, the items were converted into *z*-scores, weighted, and summed to form mental health and physical health summary scales [14]. This algorithm was designed so that scales would range from around 0 (worst health) to around 100 (best health), have a mean close to 50, and have a standard deviation close to 10. Some scholars have put the utility of the summary scores into question [15], but most researchers find that these measures have good validity and reliability (e.g., [16-18]). The internal consistency of the scales was acceptable to good. In the affected sample the Cronbach's alphas of the mental health component and the physical health component were respectively .68 and .80. In the control sample the Cronbach's alphas of the mental health component and the physical health component were respectively .73 and .71.

Procedures

Students of the University of Delhi and the Lucknow University familiar with the local sociocultural context and dialect administered the survey under the close supervision of the local principal investigator Joshi (author). They received two days of training in the administration of the instrument. All respondents gave their informed consent prior to their inclusion in the study. If possible written informed consent was obtained. In case of illiteracy verbal informed consent and thumb impression was attained and recorded by a witness.

Although the HSCL-25 is already available in many languages, it had not yet been translated into the local language spoken in Northern India (Hindi). We translated the questionnaire by means of backtranslation. This involved translation from English into Hindi. The Hindi version was then taken to the field and adopted according to the local dialect and use of words. Thereafter, the Hindi version was translated to the original English by back-translation. Finally, the original English version was compared with the backtranslated English version. No important differences between the original and the translated version were found.

The ethical clearance for the study was obtained from the ethical committee of the Department of Anthropology, University of Delhi. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki [19].

Statistical analyses

Eleven respondents within the control group had a substantial amount of missing values, which rendered analyses of their results useless (for these respondents approximately half or more of the values were missing). These 11 respondents were excluded from the analyses. Among the remaining respondents, individual scale scores were obtained by computing the average of the completed subscale items. For no one of the remaining respondents more than 2 items were missing per subscale.

To check for differences in demographic factors between the affected and control group, binary logistic regression analyses were conducted in which demographic factors were used to predict the condition (disaster versus control group). Religion, Educational Status, Years of Education, Main Occupation, and Income Level predicted membership to the group significantly. Subsequently, ANOVAs with post hoc analyses were conducted to examine significant differences between categories of Religion, Educational Status, Main Occupation, and Income Level on outcomes of mental health and functioning, Anxiety, Depression, Mental Health Functioning, and Physical Functioning respectively. We examined the Pearson Correlation for a relation between Years of Education and outcomes of mental health and functioning. To account for the problem of capitalization on chance as a result of the large number of analyses, we applied the Bonferroni correction.

We conducted student t-tests for means to investigate differences between the affected and control group and between women and men in mental health outcomes (Anxiety, depression, and Total Distress) and summary scales (Mental Health Component and Physical Health Component) and subscales (Vitality, Social functioning, Role-emotional, Emotional well-being, Physical functioning, Role-physical, Bodily Pain, and General Health) of Functioning. Additionally, we calculated effect sizes.

According to Cohen [20] effect sizes of < .10 are close-to-zero, of .11 - .35 are small, .36 - .65 are moderate, of .66 – 1.00 are large and of > 1.00 are very large.

Hierarchical regression analyses were performed to examine predictors including the interaction between the condition (disaster versus control group) and mental health, on the two measures of functioning: the Mental Health Component and the Physical Health Component. We added relevant demographics (Gender, Age, Literacy, Years of education, and Socio-economic class) in Step 1, Anxiety and Depression in Step 2, and the interaction between the standardized variable of condition (disaster versus control group) and the standardized variable of Anxiety and Depression in Step 3. To avoid the problem of endogenity, Total Distress was not added in hierarchical regression analyses as it is embodied by Anxiety and Depression. If an interaction was present, we conducted hierarchical regression analyses separately for the affected and the control group to explore the relation between indicators of mental health and functioning, with the relevant demographics in Step 1, and Anxiety and Depression in Step 2. To check that the data met the assumptions of linearity, homoscedasticity and normality of residuals, the plots of the standardized residuals against the standardized predicted values, and the P–P plot of the residuals were inspected for each multiple regression model tested.

Data were analyzed in SPSS for Windows, version 16.0.

Results

The ANOVAs with post hoc analyses revealed no significant differences between categories of Religion, Educational Status, Main Occupation, and Income Level. Further, we found no significant relation between Years of Education and indicators of mental health and functioning. Hence, the results allowed us to compare group difference on indicators of mental health and functioning.

Differences in mental health outcomes and functioning between the affected and control group

Table 2 shows that the affected group scores significantly higher than the control group on the scales Anxiety (M=2.52; SD=.63 and M=1.92; SD=.67 respectively; t(623)=11.43; p<.001), Depression (M=2.48; SD=.40 and M=1.89; SD=.56 respectively; t(529)=13.77 ; p<.001), and Total Distress (M=2.54; SD=.40 and M=1.90; SD=.57 respectively; t(515)=14.77 ; p<.001). The effect sizes show a large difference for Anxiety (d = .92), and very large differences for Depression (d = 1.22) and Total Distress (d =1.30) between the affected group and the control group. The affected group scored higher than the control group on all symptoms (data not shown).

The affected group scores significantly lower on the Mental Health Component as an indicator of Functioning (M=37.95; SD=23.78) than the control group (M=45.59; SD22.52) (t(611)=9.91; p < .001). The subscales of the mental health summary scale revealed significant differences between the affected and the control group on Vitality (M=41.57; SD=26.22 for the affected group and M=47.23; SD=26.97 for the control group; t (612)=2.64; p < .01), Social Functioning (M=44.34; SD=26.70 for the affected group and M=59.54; SD=28.44 for the control group; t (612)=6.83; p < .001), Role-Emotional (M =17.92; SD=36.09 for the affected group and M=40.85; SD=44.24 for the control group; t (611)=7.05; p < .001), and Emotional well-being (M=29.97; SD=19.42 for the affected group and M=50.71; SD=22.15 for the control group; t (612)=12.36; p < .001). The difference between the flood-affected and the control group was small for the summary measure 'mental health component' (d = .33). For the subscales of the mental health component the difference between the flood-affected group and the control group was small for Vitality (d = .21), moderate for Social Functioning (d = .55) and Role-emotional (d = .57), and large for Emotional well-being (d = 1.00).

The affected group scores significantly lower on the Physical Health Component as an indicator of Functioning (M=33.45; SD=17.79) than the control group (M=49.57; SD=22.34) (t(612)=4.08; p < .001). The subscales of the Physical Health Component revealed no significant difference between the affected and the control group on Physical functioning, and significant differences between the affected and the control group on Role-physical (M=26.57; SD=41.39 for the affected group and M=39.52; SD=44.63 for the control group; t(612)=3.73; p < .001), Bodily Pain (M =48.19; SD=32.55 for the affected group and M=60.98; SD=32.25 for the control group; t(612)=4.89; p < .001), and General health (M=23.03; SD=27.41 for the affected group and M=27.20; SD=24.52 for the control group; t(612)=1.98; p < .05). The difference between

the flood-affected and the control group was large for the summary measure 'Physical Health Component' (d = .80). For the subscales of the physical health component the difference between the flood-affected group and the control group was close-to-zero for physical functioning (d = .02), small for Role-physical (d =.30) and General health (d = .16), and moderate for Bodily Pain (d = .39).

Table 2. Mean and standard deviations of Anxiety, Depression and Total Distress in the affected and control group, and for the summary measures and subscales of Functioning for the affected and the control group.

	Flood affected sample (n = 318)	Control sample (n = 297)	d
Anxiety (SD)	2.52 (.63)*	1.92 (.67)*	.92
Depression (SD)	2.48 (.40)*	1.89 (.56)*	1.22
Total Distress (SD)	2.54 (.40)*	1.90 (.57)*	1.30
Mental health component (SD)	37.95 (23.78)*	45.59 (22.52)*	.33
Vitality (SD)	41.57 (26.22)**	47.23 (26.97)**	.21
Social functioning (SD)	44.34 (26.70)*	59.54 (28.44)*	.55
Role-emotional (SD)	17.92 (36.09)*	40.85 (44.24)*	.57
Emotional well-being (SD)	29.97 (19.42)*	50.71 (22.15)*	1.00
Physical health component (SD)	33.45 (17.79)*	49.57 (22.34)*	.80
Physical functioning (SD)	54.01 (32.05)	54.65 (31.72)	.02
Role-physical (SD)	26.57 (41.39)*	39.52 (44.63)*	.30
Bodily Pain (SD)	48.19 (32.55)*	60.98 (32.25)*	.39
General health (SD)	23.03 (27.41)***	27.20 (24.52)***	.16

Note: SD = Standard Deviation. *p < .001; **p < .01; ***p < .05

Hierarchical regression analyses of mental health on functioning

The data met the assumptions of hierarchical linear regressions (linearity, homoscedasticity and normality of residuals).

We first conducted a regression analyses for the entire sample, including both the affected and control group (see Table 3). In the first step Age was a significant predictor of the Mental Health Component, this effect subsided in subsequent steps. Step 2 shows that Anxiety, Depression, the Disaster Experience, are significant predictors of the Mental Health Component (ΔR^2 =.51, F(8, 538) = 23.40, p < .001). Step 3 demonstrated the interaction effect of the Disaster Experience and Anxiety to be a significant predictor of the Mental Health component, in addition to Anxiety, Depression, the Disaster Experience (ΔR^2 =.05, F(10, 536) = 23.39, p < .001). For the Physical Health Component, Age was a significant predictor in all three steps. Higher age was associated with less physical functioning. In step 2, Anxiety and Depression were additional significant predictors of the Physical Health Component (ΔR^2 =.38, F(8, 539) = 11.68, p < .001). In step 3, the interaction effect of the Disaster Experience and Anxiety revealed to significantly predict the Physical Health Component in addition to Anxiety and Depression, (ΔR^2 =.38, F(10, 537) = 10.50, p < .001).

Next in order to explore the meaning of the interaction effects, we conducted regression analyses for the affected and control group separately (see Table 4). For the affected group, the hierarchical regression analyses showed that there were no significant predictors of the Mental Health Component and the Physical Health Component of Functioning: neither socio-demographic variables, nor mental health outcomes (Anxiety and Depression) predicted the Mental Health Component (R^2 = .03, F(8, 207) = .73, n.s.) and Physical Health Component of Functioning (R^2 = .04, F(8, 209) = .79, n.s).

For the control group, the hierarchical regression analyses revealed Age as a significant predictor of the Mental Health Component of functioning in the first step in which the socio-demographic variables were included. Higher Age was associated with lower Mental Health Functioning. In the second step, in which Anxiety and Depression were added, Anxiety predicted mental health functioning. Higher

Anxiety was associated with lower Mental Health Functioning. With the inclusion of Anxiety and Depression, the contribution of Age decreased substantially. Further, in the control group Age and Religion predicted Physical Functioning in the first step. Higher age was associated with lower physical health functioning and Muslims reported less Physical Functioning than Hindus. In the second step, Age continued to be significant and in addition Anxiety predicted Physical Functioning. Higher age and higher Anxiety was associated with lower Mental Health Functioning. After the second step, with all independent variables in the equation, $R^2 = .35$, $F(8, 209) = 13.76$, $p < .001$, for the regression with Mental Health Functioning as the outcome and, $R^2 = .29$, $F(8, 210) = 10.55$, $p < .001$, for the regression with Physical Health Functioning as the outcome (see Table 4).

Table 3. Main affected and interactions of mental health and the experience of the disaster on indicators of functioning

	Mental health component			Physical health component		
	B	SE B	β	B	SE B	β
Step 1						
Gender	.33	1.88	.01	-.40	2.01	-.02
Age	-.10	.05	-.10*	-.15	.05	-.13**
Years of education	.42	.36	.07	-.14	.38	-.02
Literacy	-3.40	2.70	-.08	-2.50	2.89	-.05
Socio economic class	-.02	1.12	.00	-1.32	1.19	-.05
Step 2						
Gender	.15	1.65	.00	-1.39	1.91	-.03
Age	-.06	.04	-.06	-.10	.05	-.09*
Years of education	-.18	.32	-.03	-.47	.37	-.07
Literacy	-1.18	2.36	-.03	-1.50	2.72	-.03
Socio economic class	-.50	.98	-.02	-1.50	1.12	-.05
Anxiety	-4.61	1.15	-.21***	-5.12	1.33	-.22***
Depression	-4.30	1.18	-.20***	-3.87	1.36	-.16**
Condition (disaster versus control group)	-4.52	.93	-.21***	-.44	1.08	-.02
Step 3						
Gender	.47	1.61	.01	-1.22	1.90	-.03
Age	-.06	.04	-.06	-.10	.05	-.09*
Years of education	-.25	.31	-.04	-.51	.36	-.08
Literacy	-1.21	2.29	-.03	-1.52	2.70	-.03
Socio economic class	-.34	.95	-.01	-1.42	1.11	-.05
Anxiety	-5.52	1.18	-.26***	-5.75	1.40	-.25***
Depression	-3.01	1.19	-.14**	-3.00	1.40	-.13*
Disaster experience	-4.62	.91	-.21***	-.50	1.07	-.02
Anxiety x Condition	4.59	1.18	.19***	3.04	1.39	.12*
Depression x Condition	.88	1.20	.04	.37	1.41	.01

*$p < .05$; **$p < .01$; ***$p < .001$

R^2 is n.s. step 1; $\Delta R^2 = .51$ for step 2, $p < .001$; $\Delta R^2 = .05$ for step 3 of the Mental Health Component;
R^2 is n.s. step 1; $\Delta R^2 = .38$ for step 2, $p < .001$; $\Delta R^2 = .02$ for step 3 of the Physical Health Component.

Discussion

The goal of the present study was to demonstrate how to test the claim that mental health symptoms measured by screening instruments in the immediate wake of disasters are partly a normal response to stressful circumstances (Horwitz, 2007; Rae, 2006). To achieve this goal, we first investigated the impact

of the flood on mental health outcomes and daily functioning, and second we examined the relation between mental health outcomes and functioning.

First consistent with other studies on the impact of natural disasters conducted after the first month upon the disaster (Math *et al*, 2008; Soldatos *et al*, 2006; Johnsen *et al*, 1997), the findings clearly showed a dramatic negative impact of the recurrent floods on mental health outcomes. There were large to very large differences between the flood-affected group and the control group on anxiety, depression and total distress. The findings further showed an impact of the floods on functioning. In comparison to the control group, the flood affected group reported low psychological functioning. The impact of the disaster on indicators of psychological functioning was apparent across the board, but especially large for emotional well-being. In addition, the affected group scored lower on several domains of physical functioning. This impact was particularly large for problems during work and daily activities as a result of limiting pain and physical problems. Notably, mental health problems and disability were also extensive in the control group. The latter results may be considered in light of the disadvantaged position of the regional population in Bahraich. Bahraich is one of the three most disadvantaged districts in India in terms of literacy, education, and income (Sen & Dreze, 1999). Patel (2007) asserted that these social determinants are found to be important factors for mental health and functioning (see also WHO, 2008).

Second, the central aim of this article was to establish if the vast disaster impact on levels of mental symptomatology should be ascribed principally to the realm of 'normal' psychological distress or the domain of pathology. The results confirmed the hypothesized moderator effect of the disaster condition on the relation between mental health and functioning. In the affected group neither anxiety nor depression explained the level of functioning. Thus, despite the enormous disaster impact we found on mental health and functioning, mental health symptoms and functioning were unrelated in the disaster-affected population. As disability due to mental symptoms is a prerequisite to establish mental illness (American Psychiatric Association, 2000), these findings favor the idea that in the immediate aftermath of disasters mental health symptoms encompass the domain of 'normal' psychological distress rather than mental illness (Horwitz, 2007; Rae, 2006). In contrast, the data confirmed the interrelation between mental health symptoms and functioning in the control population. In the control group the mental health problems explained more than a third of the variance of psychological functioning and slightly less than a third of the variance of physical functioning. In the control group anxiety was associated with reduced functioning (both psychological and physical functioning) and older people scored less on physical functioning.

The study results demonstrated the utility of adding proxy measures of clinical significance to screening measures of mental health, and provided support for the claim that mental health symptoms in the immediate wake of disasters principally constitute a 'normal' reaction to stressful circumstances. Hitherto practitioners have been left with research reporting high levels of mental health symptomatology mainly collected by means of screening instruments, without a clear distinction between what part of these results comprise psychological distress or pathology. Hence, mental health figures of the disaster literature were difficult to synthesize and to translate into mental health interventions. Our study findings support a modest stance towards traditional psychiatric interventions in the immediate aftermath of the flood, as psychological distress seems to be on the foreground rather than expressions of mental illness. Hence, in our survey population psychosocial interventions - such as psychological first aid, techniques of normalization or psychoeducation – would have been more appropriate than psychiatric interventions at the time of study (Hobfoll *et al*, 2007; Sandler *et* al, 2003; de Jong, 2002). Further, the association of both mental health and disability with the context may implicate that interventions to address the erosion of the context (e.g., livelihood projects, material reconstruction of society, and self-help groups) will consequently reduce mental health symptoms and disability (cf. Hobfoll *et al*, 2007; de Jong, 2002; de Jong & Komproe, 2003). Consistently, Shalev (2004) argued: "early interventions in communities suffering mass trauma should consist of general support and bolstering of the recovery environment rather than psychological treatment" (see also, Summerfield, 1999). Nonetheless, Hubbart and Pearson (2004) noted, simply altering the social conditions may not be sufficient to alleviate suffering among severely traumatized individuals. In fact, our findings suggest that as the disaster context returns to the pre-disaster situation trauma-focused interventions that address the

impact of the disaster may be most useful after the implementation of interventions that target the more immediate psychosocial stressors affecting people's lives.

The findings of this study should be interpreted in light of various limitations. First, we relied on self-report measures, the validity of which can be affected by a variety of response biases (Bradburn, 1983). Second, this was a cohort-study, which precludes any firm conclusions about the causal nature of the relationships among variables, and bars us from dissecting the impact of the recent flood from the impact of the experience of previous floods. The especially high impact on mental health is likely to be the result of both the short-term impact of the recent flood and the devastating effect of the flood three month prior to the time of study. Third, the results pertain to those who continued living in the flood area and we do not have data on those who moved out of the area after the flood. Therefore, our disaster-affected sample may not have been representative for the entire disaster affected population. Fourth and most importantly, although we identified the importance of the context as a generic umbrella term, we did not indicate specific contextual factors that influence either mental health or functioning of disaster-affected individuals such as in conflict the study of Miller and colleagues in conflict ridden Afghanistan (Miller *et al*, 2008, 2009). The challenge for future disaster research is to pinpoint exactly what contextual factors influence mental health symptoms and disability and the relation between the two. In this regard, scholars have pointed towards the breakdown of traditional social support structures (e.g. Mc Kenzie, 2002; Wu *et al*, 2003; de Jong & Komproe, 2003), and the material destruction that disasters leave behind (Picou *et al,* 2004). As these factors find themselves on the community level rather than the individual level, it is important to use multilevel statistical analyses to study the relation between these contextual factors and individual mental health symptoms (Miller *et al*, 2006; see for an excellent methodological elaboration Kawachi & Subramanian, 2006).

Notwithstanding these limitations, the study results provided empirical input for the debate on the distinction between normal 'understandable' distress and mental disorders in the wake of disasters (Rodin & Van Ommeren, 2009; Horwitz, 2007). A debate that is not easily resolved as disaster research is characterized by a dominant use of screening instruments. We showed that this dilemma can be addressed by combining measures of mental health symptoms with proxies of clinical significance such as functioning (cf. de Jong, 2002; Miller *et al*, 2008, 2009). Interestingly, despite the vast impact of the disaster we found on mental health functioning, the study results supported the claim that a vast proportion of mental health symptoms in the short-term aftermath of disasters encompasses 'understandable' psychological distress rather than mental illness.

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Conflict of interest
The authors declare that they have no conflict of interest.

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Table 4. Hierarchical regression analyses on two measures of functioning for the affected and the control group.

	Affected group						Control group					
	Mental health component			Physical health component			Mental health component			Physical health component		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Step 1												
Gender	.32	2.16	.01	-.31	2.83	-.01	3.10	2.90	.07	.98	2.80	.02
Age	-.04	.05	-.05	-.08	.06	-.07	-.24	.08	-.20*	-.31	.08	-.26***
Years of education	.13	.44	.03	-.46	.58	-.06	-.21	.55	-.04	-.36	.53	-.07
Literacy	.68	2.89	.02	-.66	3.79	-.01	-4.86	4.60	-.11	-3.00	4.46	-.07
Socio economic class	-.33	1.29	-.02	-2.39	1.70	-.08	-1.04	1.69	-.04	-.68	1.63	-.03
Step 2												
Gender	-.45	2.17	-.01	-1.71	2.83	-.04	1.41	2.43	.03	-.59	2.47	-.01
Age	-.03	.05	-.04*	-.06	.06	-.06	-.12	.07	-.10*	-.20	.07	-.17**
Years of education	.19	.44	.03	-.37	.57	-.05	-.37	.45	-.07	-.51	.46	-.10
Literacy	.42	2.88	.01	-1.03	3.75	-.02	-5.26	3.81	-.12	-3.29	3.89	-.08
Socio economic class	-.28	1.29	-.01	-2.34	1.68	-.08	-.36	1.40	-.01	-.24	1.42	-.01
Anxiety	-1.12	1.36	-.06	-2.89	1.77	-.11	-10.20	1.97	-.43***	-8.67	2.01	-.37***
Depression	-2.23	1.50	-.10	-2.69	1.95	-.09	-3.94	1.878	-.17*	-3.30	1.91	-.15

Note: $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

R^2 is n.s. step 1; ΔR^2 is n.s. for step 2 of the Mental Health Component in the Affected group;

$R^2 = .05$ for step 1, $p < .05$; $\Delta R^2 = .35$ for step 2 $p < .001$ of the Mental Health Component in the Control group;

R^2 is n.s. step 1; ΔR^2 is n.s. for step 2 of the Physical Health Component in the Affected group;

$R^2 = .07$ for step 1, $p < .01$; $\Delta R^2 = .30$ for step 2, $p < .001$ of the Physical Health Component in the Control group.