Linking post-disaster mental health to the erosion of social fabric

© 2013, T.R. Wind

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission from the author.

Cover: Stephan Csikós Graphic Design: Kees Dogterom, Amsterdam Printing / binding: Digiprint Den Haag

Cover photograph by Akash/Hollandse Hoogte

The research was made possible by HealthNet TPO and Arq Psychotrauma Expert Group (Stichting Arq).

Linking post-disaster mental health to the erosion of social fabric

De link tussen rampgerelateerde geestelijke

gezondheid en de erosie van sociale gemeenschappen

(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit Utrecht op gezag van de rector magnificus prof. dr. G.J. van der Zwaan, ingevolge het besluit van het college voor promoties in het openbaar te verdedigen op vrijdag 1 november 2013 om 2.30 uur

door Tim Rogier Wind

geboren op 25 september 1982 te Groningen Promotoren: Prof. dr. I.H. Komproe Prof. dr. R.J. Kleber

The research was made possible by HealthNet TPO and Arq Psychotrauma Expert Group (Stichting Arq).

Table of contents

Chapter 1	Introduction 11
Section 1	The disturbed relationship between theaffected individual and the disaster context25
Chapter 2	The impact of recurrent disasters on mental health: A study on seasonal floods in northern India
Section 2	The mechanisms that associate the socialcommunity with posttraumatic stress47
Chapter 3	Social capital and post-disaster mental health
Chapter 4	The mechanisms that associate community social capital with post-disaster mental health: a multilevel model
Chapter 5	Gender differences in the link between the social context and post-disaster mental health
Section 3	Methodological consequences of not includingsocial contextual factors in disaster studies109
Chapter 6	The effect of the post-disaster context on the assessment of individual mental health scores111
Chapter 7	Discussion

Chapter 8	Summary	161
Chapter 9	Samenvatting [Summary in Dutch]	169
Dankwoord		177
About the au	ıthor	

Introduction

Over the past thirty years the occurrences of natural disasters have increased dramatically (International Disaster Database, 2012). In the news we are confronted with vivid images of the damaging impact of natural disasters on a daily basis. Images that particularly resonate are the 2004 Asia Tsunami, Hurricane Katrina (2005) and the Tsunami in Japan (2011). Generally, natural disasters are defined as natural destructive phenomena that affect more than 100 people or that result in a call for international assistance (Kessler et al, 2008). In accordance with this definition, natural disasters increased from roughly 100 per year worldwide in the late 1960s, to over 500 per year in the past decade (Pielke Jr, 2006). The frequent 'usual suspects' – namely population growth, environmental degradation, and global warming – all play a part in accounting for these increases (Kessler & Wittchen, 2008).

With little exception (e.g. Scott et al, 2003), studies consistently found that natural disasters have a vast impact on the mental health of the affected populations. Research on earthquakes, cyclones, floods, volcano eruptions, landslides and avalanches in Europe, Asia, Oceania, and the Americas revealed a broad range of mental health consequences, among which nightmares, depressed feelings, and general anxiety prevail (Norris et al, 2002a, 2002b). These mental health problems are widespread among affected populations: Researchers have found that up to 90% of disaster struck populations suffer from one or more mental health problems (Leon, 2004), but the average disaster mental health study reports that around 40% of disaster-affected people show mental health problems (Norris et al, 2002a). Although most of these mental health complaints abate naturally over time to some extent (Sahin, Batigün & Yilmaz, 2007; Young, Ruzek & Gusman, 1999), Briere and Elliot (2000) documented that among individuals that have been exposed to natural disasters, previous disaster experience was associated with significantly higher scores on posttraumatic stress, even though the time from the last disaster to involvement in the study was on average 13 years (see also Norris, Murphy & Baker, 2004).

Traditionally it was thought that the impact of a natural disaster depends on the intensity of the disaster experience (how intense or 'traumatic' does one perceive the disaster?), the memory that is left of that experience (nightmares or intrusions), and how adequately an individual deals with this experience (Lazarus & Folkman, 1984). Yet, disaster mental health problems are determined by more than this predominantly individual process. Namely, whether people develop mental health problems is also determined by the devastating impact of disasters on the social context individuals live in (Galea et al, 2008).

Many scholars noted that disasters erode the so-called 'social fabric of society'

(e.g. Almedom, 2005; Kawachi & Subramanian, 2006). After most disasters traditional social support systems do not function as before because family members or other members of the social network may be dispersed or may have even died and social routines are encumbered due to home loss (Crighton, Elliot & van der Meer, 2003; Kleber, 1995; Weems, Watts & Marsee, 2007; Woods, 2004). Other frequently reported indicators of this erosion of social fabric are looting and increased discrimination of minorities (Weems et al, 2007). Several reviews indicate that this erosion of the social fabric amplifies and accelerates the further development of mental health problems and negatively influences the recovery from mental health problems (Almedon, 2005; Kawachi & Subramanian, 2006; Sandler, 2001).

Unfortunately, these individual processes and social mechanisms to explain disaster mental health have remained remarkable strangers within disaster research. The value of this dissertation is to combine these two separated paradigms from the disaster literature to explain disaster mental health. Current (research) perspectives define disaster mental health as a construct that is determined on a single level (either on the individual level, or the contextual level; cf. Brom & Kleber, 2009; Kawachi, 2004; Kleber, 2008). Yet, throughout this dissertation we empirically show that the 'cross-level interplay' between the disaster affected context and individual variables (such as the individual disaster experience, coping and social support) determines whether or not individuals experience disaster mental health problems. From this cross-level conceptualization of disaster mental health, it follows that there is a need to combine interventions within the social community level and on the individual level. Both intervention levels are inextricably linked to one another, and whether individual suffering (e.g. posttraumatic stress) is indeed curbed, depends on the implementation of interventions at both levels. Namely, when the community is restored, there is often improvement in the individual member's functioning (Jordans et al, 2013). Without facilitating adequate functioning of individuals in the community, individual mental health problems are not likely to abate. In turn, without individual mental health interventions for those with severe mental health problems, the functioning of these specific individuals is not likely to improve.

The idea that in the wake of disasters individual interventions should be combined with interventions that restore the social community has recently been put forward in disaster mental health guidelines (Van Ommeren et al, 2007) as well as in Delphi studies among trauma experts (Hobfoll et al, 2007; Norris et al, 2008). Yet, research has not provided quantitative empirical

evidence for the basic assumption behind these interventions, that disaster mental health is determined by the *interaction* between individual processes (i.e. the individual experience as well as the individual response) *and* social mechanisms in the community. The goal of this dissertation is to address this gap between recommended 'best practice' and empirical evidence. We will stepwise show that this so-called 'cross-level' conceptualization is pivotal for understanding, addressing and researching mental health in the wake of disasters. Simultaneously, we illustrate two analytical (multilevel) tools to dissect the cross-level nature of disaster mental health.

In the remainder of this Introduction we will expand on the idea of the social context, after which we will summarize the structure of this dissertation.

The erosion of the social fabric

Interest in the impact of the social context on mental health is increasing (Borgonovi, 2010). One of the reasons for this growing interest is the shared belief that community interventions that foster the social context have positive outcomes on mental health (Somasundaram & Sivayokan, 2013). These community interventions require few resources compared to traditional public service delivery (Borgonovi, 2010). Examples of community interventions that cultivate the social context are mobilizing disaster-prevention groups (Brune & Bossert, 2009), organizing community meetings and self-help groups (Somasundaram & Sivayokan, 2013), and implementing sociotherapeutic interventions in the community (Verduin et al, submitted). Only recently, it was shown that such community interventions exert an effect on mental health outcomes (Scholte et al, 2011; Verduin et al, submitted). Nevertheless, there is still no quantitative empirical evidence on *how* the social context is related to disaster mental health.

Attention should be given to this lack of understanding, as it may lead to serious attribution and intervention errors (Hobfoll et al, 2007). If the relationship between the erosion of the social fabric and disaster mental health is misunderstood, affected individuals may wrongly assume that they – and not the social circumstances – are the failure, and interventions may over- or underestimate people's capabilities (Hobfoll et al, 2007). Therefore, several scholars (Nakhaie & Arnold, 2010; Wang et al, 2009) assert that the time has come to provide empirical evidence for specified relationships between the social fabric and the individual level that impact mental health. Such research will show how mechanisms on which individually oriented interventions are based, may interact with community interventions that foster the context. Within the social context, we elaborate on two specific factors that counteract and ameliorate the effects of natural disasters (cf. Luthar, Cucchetti & Becker, 2000; Punamäki et al, 2005; Sandler, 2001), namely 'social capital' and 'collective efficacy' (Hobfoll et al, 2007; Szreter & Woolcock, 2004). We chose these constructs for two reasons: (i) researchers argued that these specific constructs are highly relevant for disaster mental health outcomes (Almedom, 2005; Sampson et al, 1997), and (ii) there is brief and well-designed instrumentation available to measure these constructs (Harpham, 2002; Sampson, 1997).

Social capital

Within research on the relationship between social context and (mental) health, many scholars embraced the term 'community social capital'. There are several definitions of social capital, but in general, social capital is defined as 'the resources an individual can draw on through his or her social networks and the value ascribed to these resources by the individual' (Bourdieu, 1995; Hurtado, Kawachi & Sudarsky, 2011; Kawachi & Subramanian, 2006). Within reviews on social capital, studies distinguished between individual versus collective conceptualizations or operationalizations of social capital. Although the type of definition has been much debated in the social capital literature (e.g. Da Silva et al, 2007; Eriksson, 2011; Kawachi, 2006; Kawachi & Subramanian, 2006), the view on social capital as a community asset is generally 'privileged' over the individual definition (Kawachi, 2006). Kawachi (2004) claimed that the novel contribution of social capital to the already well-established literature on social networks and support lies in its collective dimension, i.e. how group-level social capital influences individual health.

Harpham (2002) distinguishes structural and cognitive components of social capital. Structural social capital refers to the presence of community linkages, while cognitive social capital refers to the appreciation of these community linkages in terms such as trust, mutual help and reciprocity. Several reviews hint towards the idea that social capital may be related to mental health problems, but findings on the direct relationship between the social context and disaster mental health are ambiguous and inconsistent (Almedon, 2005; Kawachi & Subramanian, 2006; Sandler, 2001). Scholars found that associations between community social capital and mental health outcomes are especially inconsistent and ambiguous for structural social capital (De Silva et al, 2005). In this respect, it is suggested that the two components of social capital are related to mental health in different ways (Harpham, 2009). Woolcock (2001) claimed that trust (i.e. cognitive social capital) is a consequence of structural components of social

capital. This postulated sequential relationship may explain the ambiguous and weak associations between structural social capital and mental health (De Silva et al, 2005, 2007). More distal variables (structural social capital) show by their nature weaker relationships with mental health outcomes. Yet this idea has remained without empirical evidence.

Collective efficacy

The notion of collective efficacy emphasizes residents' sense of active engagement that is not well captured by the term social capital (Sampson et al, 1997). Collective efficacy denotes the community's capacity to deal adequately with environmental demands and to achieve goals through its social organization that cannot be achieved by individuals alone (Sampson et al, 1997). Although the concepts 'social capital' and 'collective efficacy' have much in common, social capital refers to the resource potential of social networks, whereas collective efficacy refers to the shared expectations and beliefs of mutually engaged individuals that facilitate or strengthen the impact of the shared resources at their disposal. (Portes, 1998; Sampson et al, 1997). To reinforce feelings of collective efficacy, affected individuals require access to community resources (i.e. structural social capital) to act on this belief. Collective efficacy facilitates an effective use of personal and community resources (Hobfoll, 2002).

People confronted with extreme circumstances are aware that they will often sink or swim together (Hobfoll et al, 2007). Within these circumstances, individuals must feel they have the skills to overcome threat and solve their problems (Saltzman et al, 2006). Benight and colleagues noted that the more affected individuals are empowered, the more quickly they will surpass mental health problems (Benight et al, 2000). This idea agrees with the finding that individuals seek successful partners with whom to collaborate, join, and solve the often large-scale problems that are beyond the reach of any individual (Ginzburg et al, 2003; Keinan, Friedland, & Sarig-Naor, 1990; Solomon, 2003; Solomon et al, 1991). The perception that others are available for support mitigates the perception of vulnerability and encourages individuals to engage in adaptive activities they might otherwise see as risky (Bandura, 1997; Ozer & Bandura, 1990). Thus, through collective efficacy affected individuals can increase control over their lives and environment (Eriksson, 2011). For instance, collective effective communities are often more successful in containing neighborhood disturbances such as looting and outbreaks of violence that occur on the back of major disasters (Kawachi & Subramanian, 2006). As such, collective efficacy may truly empower victims of natural disasters (Da Silva et al, 2007; Kawachi & Berkman, 2001; McKenzie, Whitley & Weich, 2002; Sapag & Kawachi, 2007).

Introduction

Two estranged paradigms

Whereas both the individual process and social community mechanisms are involved in the impact of disasters on mental health, the role of the combination of the individual processes and social community mechanisms on mental health problems is less clear (Nakhaie et al, 2010). One hypothesis is that social capital exerts its influence on mental health via individual factors (Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999). Kawachi and Berkman (2001) assert that these person-related variables – such as the mobilization of social support and the employment of coping strategies – are contingent on the social context: The density of civic associations or the extent of voluntarism in a community affords the opportunity to establish one-on-one linkages for social support (Lin, Ye & Ensel, 1999). The same applies for the definition of coping: 'the cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person' (Lazarus & Folkman, 1984). In a community with abundant social linkages one will have more resources at one's disposal, and may therefore be better able to deal with environmental demands (Hobfoll et al, 2007; Kawachi & Berkman, 2001; Norris et al, 2008). We think that some individual protective variables for mental health outcomes - such as social support and coping strategies - are also dependent on social capital and these factors elucidate possible mechanisms via which social capital exerts its influence on mental health. Whereas the relevance for mental health to develop social capital in disaster-affected communities has been underscored by national and international policies (Da Silva et al, 2007; Kawachi, 2006; Najarian et al, 2001; Norris et al, 2002a), such evidence has not been substantiated in disaster research thus far.

The structure of the dissertation

To provide empirical evidence that supports the hypothesis that disaster mental health is determined by the *interaction* between the individual experience and response *and* social processes in the community, we followed a stepwise procedure. Figure 1 below schematically depicts the structure of the dissertation. In **section one** (Chapter 2), we demonstrate that the cross-level conceptualization of disaster mental health outcomes has consequences for the interpretation of mental health screening outcomes in terms of treatment need. In **section two** (Chapter 3 to 5), we will empirically reveal the mechanisms via which living in a disaster affected social community is associated to mental health problems. In **section three** (Chapter 6), we reveal that the conceptual understanding of disaster mental health, as a cross-level phenomenon, has serious methodological consequences for the findings of single-level research on post-disaster mental health thus far.



Background and setting: England and India

Most disasters take place in developing countries. Nevertheless, most research thus far takes place in the West, in particular in the United States (Kessler et al, 2008). We conducted studies in India and England. In this respect, this research contributes to a more geographical balanced representation in disaster mental health research.

The data used in this dissertation is based on two studies that were part of the MICRODIS research project. MICRODIS is a cooperative European Community funded research project on the impact of natural disasters under the combined effort of nineteen European and Asian partners.

Our first study was conducted in Uttar Pradesh, India. The Bahraich District, in Uttar Pradesh, India, is annually hit by floods, as in July and August 2008. In the region we compared a disaster-affected group with a non-affected group in October 2008. The affected region is situated between the river and a dam. The region on the other side of the dam was unaffected and identified as a non-affected group. This study was conducted in collaboration with the University of Delhi, India.

Secondly, we conducted a cross-sectional community survey in Morpeth. Morpeth is a small town located in the county of Northumberland, in the UK, with approximately 15,000 inhabitants. Demographically, Morpeth comprises a relatively aged population, as many choose to retire in Morpeth. On the 5th and 6th of September 2008, Morpeth was struck by intensive rainfall and the ground water rose rapidly resulting in the river flowing through the center bursting its banks. Consequently, Morpeth was hit by one of its worst floods since 1963. Almost a thousand properties were flooded due to the water rise. The second study was implemented in cooperation with Northumbria University, Newcastle, UK.

References

- Almedom, A.M. (2005). Social capital and mental health: An interdisciplinary review of primary evidence. *Social Science & Medicine*, *61(5)*, 943-964.
- Benight, C.C., Freyaldenhoven, R.W., Hughes, J., Ruiz, J.M., Zoschke, T.A. & Lovallo, W. R. (2000). Coping self–efficacy and psychological distress following the Oklahoma City bombing. *Journal of Applied Social Psychology*, 30, 1331-1344.
- Borgonovi, F. (2010). A life-cycle approach to the analysis of the relationship between social capital and health in Britain. *Social Science & Medicine*, *71(11)*, 1927-1934.
- Brom, D. & Kleber, R.J. (2009). Resilience as the capacity for processing traumatic experiences. In: D. Brom, R. Path-Horenczyk & J.D. Ford (Eds.), *Treating traumatized children: Risk, resilience and recovery* (pp. 133-149). New York: Routledge.
- Brune, N.E. & Bossert, T. (2009). Building social capital in post-conflict communities: evidence from Nicaragua. *Social Science & Medicine*, *68(5)*, 885-893.
- Campbell, C. & Jovchelovitch, S. (2000). Health, community and development: towards a social psychology of participation. *Journal of Community and Applied Social Psychology*, *10*, 255-270.
- Crighton, E.J., Elliot, S.J. & Van der Meer, J., Small, I. & Upshur, R. (2003). Impacts of an environmental disaster on psychological health and well-being in Karakalpakstan. *Social Science & Medicine*, *56*(*3*), 551-567.
- De Silva, M.J., Huttly, S.R., Haprham, T., Kenward, M.G. (2007). Social capital and mental health: a comparative analysis of four low income countries. *Social Science & Medicine, 64(1),* 5-20.
- Eriksson, M. (2011). Social capital and health implications for health promotion. *Global Health Action, 4.* Available at: http://www.globalhealthaction. net/index.php/gha/article/view/5611
- Ginzburg, K., Solomon, Z., Dekel, R. & Neria, Y. (2003). Battlefield functioning and chronic PTSD: Associations with perceived self-efficacy and causal attribution. *Personality and Individual Differences*, *34*(3), 463-476.
- Harpham, T. (2009). Urban Health in developing countries: what do we know and where do we go? *Health Place*, *15*(*1*), 107-116.
- Harpham, T., Grant, E. & Thomas, E. (2002). Measuring social capital within health surveys: key issues. *Health Policy and Planning*, *17(1)*, 106-111.

- Hobfoll, S.E. (2002). Social and psychological resources and adaptation. *Review* of General Psychology, 6, 307-324.
- Hobfoll, S.E., Watson, P., Bell, C.C., Bryant, R.A., Brymer, M.J., Friedman, M.J., et al. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, *70*(4), 283-315.
- Hurtado, D., Kawachi, I. & Sudarsky, J. (2010). Social capital and self-rated health in Colombia: the good, the bad and the ugly. *Social Science & Medicine*, *72(4)*, 584-590.
- Jordans, M.J., Tol, W.A., Susanty, D., Ntamatumba, P., Luitel, N.P., Komproe, I.H. & De Jong, J.T. (2013). Implementation of a mental health care package for children in areas of armed conflict: a case study from Burundi, Indonesia, Nepal, Sri Lanka and Sudan. *PloS Medicine*, *10(1)*.
- Kawachi I. (2006). Commentary: social capital and health: making the connections one step at a time. *International Journal of Epidemiology*, *35(4)*, 989-993.
- Kawachi I. & Berkman L.F. (2001). Social ties and mental health. *Journal of Urban Health*, *78(3)*, 458-467.
- Kawachi, I. (2004). Commentary: Reconciling the three accounts of social capital. *International Journal of Epidemiology, 33(4)*, 682-690.
- Kawachi, I. & Subramanian, S.V. (2006). Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal of Traumatic Stress, 19(2)*, 195-203.
- Keinan, G., Friedland, N. & Sarig-Naor, V. (1990). Training for task–performance under stress: The effectiveness of phased training methods, part 2. *Journal of Applied Social Psychology*, 20(18), 1514-1529.
- Kessler, R.C. & Wittchen, H.U. (2008). Post-disaster mental health need assessment surveys – the challenge of improved future research. *International Journal of Methods in Psychiatric Research*, 17(2), S1-S5.
- Kleber, R.J. (1995). Epilogue: Towards a broader perspective of traumatic stress. In: R.J. Kleber, Ch.R. Figley & B.P.R. Gersons (Eds.), *Beyond trauma: Cultural and societal dimensions* (pp. 299-306). New York: Plenum.
- Kleber, R.J. (2008). Psychopathologie na rampen: algemene karakteristieken en kritische kanttekeningen. *Psychologie & Gezondheid, 36*, 117-123.
- Lazarus, R.S. & Folkman, S. (1984). *Stress, Appraisal, and Coping.* New York: Springer.
- Leon, G.R. (2004). Overview of the psychosocial impact of disasters. *Prehospital and Disaster Medicine, 19 (1),* 4-9.
- Lin, N., Ye, X. & Ensel, W.M. (1999). Social support and depressed mood: a structural analysis. *Journal of Health and Social Behavor, 40*, 344-359.

- Luthar, S.S., Cucchetti, D. & Becker, B. (2000). The construct of resilience: a critical evaluation and guidelines for future work. *Child Development*, *71(3)*, 543-562.
- Najarian, L.M., Goenjian, A.K., Pelcovitz, D., Mandel, F. & Najarian, B. (2001). The effect of relocation after a natural disaster. *Journal of Traumatic Stress, 14(3)*, 511-526.
- Nakhaie, R. & Arnold, R. (2010). A four year (1996-2000) analysis of social capital and health status of Canadians: the difference that love makes. *Social Science & Medicine*, *71*(5), 1037-1044.
- Norris, F.H., Friedman, M.J., Watson, P.J., Byrne, C.S., Diaz, E. & Kaniasty, K. (2002a). 60,000 disaster victims speak: part I: an empirical review of the empirical literature, 1981-2001, *Psychiatry*, 65(3), 207-239.
- Norris, F.H., Friedman, M.J. & Watson, P.J. (2002b). 60,000 disaster victims speak: part II: Summary and implications of the disaster mental health research. *Psychiatry*, 65(3), 240-260.
- Norris, F.H., Murphy, A.D. & Baker, C.K. (2004). Postdisaster PTSD over four waves of a panel study of Mexico's 1999 flood. *Journal of Traumatic Stress*, 17(4), 283-292.
- Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F., Pfefferbaum, R.L. (2008). Community resilience as a metaphor, theory, set of capacities and strategy for disaster readiness. *American Journal of Community Psychology*, 41(1-2), 127-150.
- Ozer, E.M. & Bandura, A. (1990). Mechanisms governing empowerment effects: A self–efficacy analysis. *Journal of Personality and Social Psychology*, *58(3)*, 472-486.
- Pielke Jr, R.A. (2006). Disasters, death and destruction: making sense of recent calamities. *Oceanography*, *19*, 138-147.
- Saltzman, W.R., Layne, C.M., Steinberg, A.M. & Pynoos, R.S. (2006). Trauma/ grief-focused group psychotherapy with adolescents. In: L.A. Schein, H.I. Spitz, G.M. Burlingame & P.R. Mushkin (Eds.), *Psychological effects* of catastrophic disasters: Group approaches to treatment (pp. 669-730). New York: Haworth.
- Sampson, R.J., Raudenbush, S.W. & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, *277(5328)*, 918-924.
- Sandler, I. (2001). Quality and Ecology of Adversity as Common Mechanisms of Risk and Resilience. American Journal of Community Psychology, Vol. 29(1), 19-61.

- Sapag, J.C. & Kawachi, I. (2007). Social capital and health promotion in Latin America. *Revista Saude Publica*, *41(1)*, 139-149.
- Scholte, W.F., Verduin, F., Kamperman, A.M., Rutayisire, T., Zwinderman, A.H. & Stronks, K. (2011). The effect on mental health of a large scale psychosocial intervention for survivors of mass violence: a quasiexperimental study in Rwanda. *PLoS One, 6, 8*, e21819.
- Scott, R.L., Knoth, R.L., Beltran-Quiones, M. & Gomez, N. (2003). Assessment of psychological functioning in adolescent earthquake victims in Colombia: using the MMPI-A. *Journal of Traumatic Stress*, 16(1), 49-57.
- Solomon, Z. (2003). *Coping with war-induced stress: The Gulf War and the Israeli response*. New York: Plenum.
- Solomon, Z., Margalit, C., Waysman, M. & Bleich, A. (1991). In the shadow of the GulfWar: Psychological distress, social support and coping among Israeli soldiers in a high-risk area. *Israel Journal of Medical Sciences*, 27(11-12), 687-695.
- Somasundaram, D. & Sivayokan, S. (2013). Rebuilding community resilience in a post-war context: developing insight and recommendations – a qualitative study in North Sri Lanka. *International Journal of Mental Health Systems*, *7*(*1*), 3.
- Van Ommeren, M. & Wessels, M. (2007). Inter-agency agreement on mental health and psychosocial support in emergency settings. *Bulletin of the World Health Organization*, *85*(11), 822.
- Verduin, F., Smid, G.E., Wind, T.R., Scholte, W.F. (submitted) . In search of links between social capital, mental health and sociotherapy: a longitudinal study in Rwanda. *Social Science & Medicine*.
- Wang, H., Schlesinger, M., Wang, H. & Hsiao, W.C. (2009). The flip-side of social capital: the distinctive influences of trust and mistrust on health in rural China. *Social Science & Medicine*, *68(1)*, 133-142.
- Weems, C.F., Watts, S.E., Marsee, M.A. (2007). The psychosocial impact of Hurricane Katrina. *Behaviour Research and Therapy*, *45*(10), 2295-2306.
- Woolcock, M. (2001). The place of social capital in understanding social and economic outcomes. ISUMA. *Canadian Journal of Policy Research*, 2(1), 11-17
- Young, B.H., Ruzek, J.I. & Gusman, F.D. (1999). Disaster mental health: current status and future directions. *New directions for mental health services, 82*, 53-62.

Section 1

The disturbed relationship between the affected individual and the disaster context

The impact of recurrent disasters on mental health: A study on seasonal floods in northern India

Wind TR Joshi PC Kleber RJ Komproe IH

Published in: Prehospital and Disaster Medicine (2013), 28(3), 279-285.

Abstract

Introduction: Very little is known on the impact of recurrent disasters on mental health.

Aim: The present study examines the immediate impact of a recurrent flood on mental health and functioning among an affected population in the rural district of Bahraich, Uttar Pradesh, India, compared to a population in the same region that is not affected by floods.

Methods: The study compared 318 affected respondents with 308 individuals that were not affected by floods. Symptoms of anxiety and depression were assessed by the Hopkins Symptom Checklist-25 (HSCL-25). Psychological and physical functioning was assessed by using the Short Form-12 (SF-12).

Results: The affected group showed large to very large differences with the comparison group on symptoms of anxiety (d=.92) and depression (d=1.22). The affected group scored significantly lower on psychological and physical functioning than the comparison group (respectively d=.33 and d=.80). However, hierarchical linear regressions showed no significant relationship between mental health and the domains of functioning in the affected group, whereas mental health and the domains of functioning were significantly related in the comparison group.

Conclusion: This study found a large negative impact of the recurrent floods on mental health outcomes and psychological and physical functioning. However, in a context with recurrent floods, disaster mental health status is not a relevant predictor of functioning. The findings suggest that the observed mental health status and impaired functioning in this context are also outcomes of another mechanism: Both outcomes are likely to be related to the erosion of the social and environmental and material context. As such, the findings refer to a need to implement psychosocial context oriented interventions to address the erosion of the context rather than specific mental health interventions.

Keywords: Anxiety, depression, functioning, recurrent floods, recurrent disaster, India.

Abbreviations

DSM-IV: Diagnostic and Statistical Manual of Mental Diseases IV HSCL-25: Hopkins Symptom Checklist-25 SF-36: Medical Outcome Study 36 Item Short-Form Health Survey The impact of recurrent disasters on mental health: A study on seasonal floods in northern India

Introduction

Recurrent disasters constitute a widespread phenomenon around the globe (United Nations Information Centres 2009; World Food Programme, 2012). Among recurring disasters, seasonal floods are most common (Aaron & Platz, 2001). After decades of disaster research, it is well-known that one-time occurring disasters can have a vast impact on mental health and functioning (Briere & Elliott, 2000; Galea et al, 2007; Norris et al, 200a, 2002b). This enormous body of literature on one-time occurring disasters stands in contrast with the lack of empirical evidence on the impact of recurrent floods (Choudhury, Quraishi & Haque, 2006). This study aims to address the gap in knowledge with regard to the impact of recurrent floods on mental health.

Several scholars claim that recurrent floods are less destructive, because repeatedly affected individuals may develop adaptive coping strategies (Few & Matthies, 2006). For example, individuals in flood prone regions may build their houses on poles above the ground, or they may cultivate crops that have a short time-span which would enable harvesting in between floods. Such adaptive individual coping strategies buffer against the development of mental health problems. Yet in contrast to this optimistic perspective, Hobfoll (1989) warns that disasters – and especially recurrent disasters – may have a devastating effect on mental health, because these events create individual 'resource loss cycles'. Namely, repeatedly affected individuals run a high risk of losing their homes and of their agricultural land becoming infertile over time due to the cyclical nature of recurrent floods (Disease Control Priorities Project, 2007; Galea et al, 2007; Wiesenfeld & Panza, 1999). This post-disaster material mayhem is excessively demanding for individual psychosocial resources (i.e., individual coping efforts and social support; Wind & Komproe, 2012). And the strain on material and psychosocial resources over time induced by recurrent disasters evokes substantial mental health problems among affected individuals by recurrent disasters (Freedy et al, 1992, 1994; Hobfoll, 1989; Sattler et al, 2002; Wind & Komproe, 2012).

Beyond this loss of resources on the individual level, disasters also affect the habitat of individuals. That is, the post-disaster situation in repeatedly affected areas is often characterized by social structures that do not provide meaningful jobs and a decent living (Horwitz, 2007). Post-disaster communities further typically reveal symptoms of social erosion. Weems and colleagues (2007), for instance, showed increased civil unrest – in terms of discrimination and looting –

in the wake of disasters. This erosion of the social context is by itself associated to a plethora of mental health problems (Wind & Komproe, 2012).

To make matters worse, it is often the poor segment of society that may be forced to find alternative types of abode, and ends up living in already impoverished places that are prone to recurrent natural disasters (Wiesenfeld & Panza, 1999). And although the relative predictable character of recurrent disasters creates a possibility for prevention, reality shows that the necessary resources for prevention might not be accessible under poor living circumstances (United Nations Information Centres, 2009; World Food Programme, 2012). Thus especially this poor and marginalized segment of society will bear the brunt of the material and social erosion, and its inherent negative psychological sequelae.

This study examines the impact of seasonal floods in northern India. Noteworthy, most disaster mental health research relied on screening instruments because of their practical applicability (Connor, Foa & Davidson, 2006). Yet, the Diagnostic and Statistical Manual of Mental Diseases IV (DSM IV) requires a link of mental health symptoms with impaired functioning in order to establish actual mental health *problems* or pathology (American Psychiatric Association, 2000). Narrow and Rae further showed that mental health symptoms alone will vastly overestimate treatment need (Narrow et al, 2002). Hence, this study examines mental health screening outcomes, functioning and the relationship between these two to obtain a more reliable estimate of the metal health status after recurring floods. Floods are a recurrent phenomenon in the Bahraich district, Uttar Pradesh. In the year 2008, the district Bahraich was struck by major floods twice, first in the month of July and again in the month of September.

Method

Participants

The present study took place as part of the MICRODIS research project. MICRODIS is a European Community funded research project on the impact of natural disasters. In scope of this project, a study was conducted in Uttar Pradesh, India, with a research focus on the impact of natural disasters on mental health. The Bahraich District, in Uttar Pradesh, India, is annually hit by floods, as in July and August 2008. In this region, a disaster-affected group was compared with a non-affected group in October 2008. The affected region is situated between the river and a dam. The region on the other side of the dam was unaffected and identified as a non-affected group. A multistage random sampling procedure was used to first select four *Gram Panchayats* (smallest political units in the region) in the affected and the non-affected region, and then a sample of households. The sampling procedure resulted in the following data structure: households, Gram Panchayats, and region (affected versus non-affected). The sample included 380 households in the affected group and 330 households in the nonaffected group. The instrument was administered to 318 (84%) and 304 heads of households (92%) in the affected group and the non-affected group respectively. The demographics of the samples are depicted in Table 1.

Instruments

Symptoms of anxiety and depression were assessed by the Hopkins Symptom Checklist-25 (HSCL-25). The HSCL-25 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) (Derogatis et al, 1974; Lipman, Covi & Shapiro, 1979). An item concerning sexual interest was preventively omitted 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 (Mollica et al, 1987; Ventevogel et al 2007; Winokur et al, 1984). In the vicinity of North India, the HSCL has been used among Tibetan refugees in India and among Nepalese internally displaced persons (Crescenzi et al, 2002; Thapa & Hauff, 2005). The HSCL-25 has been used previously in disaster research (Souza, Bernatsky & Reyes, 2007). Although the cutoff score of 1.75 has become widely accepted for screening in cross-cultural research, the HSCL-25 has never been validated as a screening instrument for depression and anxiety in India (Mollica et al, 2004; Souza, Bernatsky & Reyes, 2007; Thapa & Hauff, 2005). Therefore, mean

scores of anxiety and depression were reported, rather than prevalence rates. Two scores were calculated: The anxiety score is the average of the 10 anxiety items; and the depressive symptoms score is the average of the 14 depression items. In the affected sample the Cronbach's alphas of anxiety and depression score were respectively .81 and .69. In the control sample the Cronbach's alphas of anxiety and depression were respectively .90 and .89.

32

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), one of the most extensively used assessments of functioning worldwide (Ware et al, 1998, 2002). 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). 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 (Ware, 2002). 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. 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 that were 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). The questionnaire was translated 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 differences between the original and the translated version were found.

The ethical clearance for the study was obtained from the ethical committee of the University of Delhi. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki (World Medical Assembly, 1997).

Analysis

Eleven respondents within the comparison 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. Noteworthy, these respondents did not differ on the demographic variables from the respondents included in the analyses. Among the remaining respondents, individual scale scores were obtained by computing the average of the completed items pertaining the subscale, on the condition that no more than 2 items were missing.

Student t-tests were conducted to test differences between the affected and comparison group in means scores on the mental health outcomes specified above. Additionally, effect sizes were calculated. According to Cohen 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 (Cohen, 1988).

Hierarchical regression analyses were performed separately for the affected and the comparison group to identify predictors of the two measures of functioning: the Mental Health Component and the Physical Health Component. Relevant demographics (Gender, Age, Literacy, Education, Years of education, and Religion) were added 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

There were no significant differences on socio-demographic variables between the affected and the comparison group except for religion ($X^2(1)=43.16$; *p*<.001; Table 1).

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

- abie 10 b cincographics		
	Flood affected sample	Control sample
	(n=318)	(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	

Table 1. Demographics

Note: SD=Standard Deviation

	Flood affected sample	Control sample	d
	(<i>n</i> =318)	(<i>n</i> =297)	
Anxiety (SD)	2.52 (.63) ^a	1.92 (.67) ^a	.92
Depression (SD)	$2.48 (.40)^{a}$	$1.89(.56)^{a}$	1.22

Table 2. Mean and standard deviations of Anxiety and Depression in the affected and comparison group

Note: SD=Standard Deviation. ^a*p*<.001

Differences in functioning between the affected and comparison group

Table 4 shows the means, standard deviations and effect sizes for the summary measures and subscales of functioning for the affected and the comparison group.

The affected group scores significantly lower on the Mental Health Component as an indicator of Functioning (M=37.95; SD=23.78) than the comparison group (M=45.59; SD=22.52) (t(611)=9.91; p<.001). The subscales of the mental health summary scale revealed significant differences between the affected and the comparison group on Vitality (M=41.57; SD=26.22 for the affected group and M=47.23; SD=26.97 for the comparison 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 comparison 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 comparison 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 comparison group; t(612)=12.36; p<.001). The difference between the flood-affected and the comparison 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 comparison 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 comparison 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 comparison group on Physical functioning, and significant differences between the affected and the comparison group on Role-physical (M=26.57; SD=41.39 for the affected group and M=39.52; SD=44.63 for the comparison 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 comparison 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 comparison group; t(612)=1.98; p<.05). The difference between the flood-affected and the comparison 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 comparison 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).

36

	Flood affected sample	Control sample	d
	(<i>n</i> =318)	(<i>n</i> =297)	
Mental health component (SD)	37.95 (23.78) ^a	45.59 (22.52)ª	.33
Vitality (SD)	41.57 (26.22) ^b	47.23 (26.97) ^b	.21
Social functioning (SD)	44.34 (26.70)ª	59.54 (28.44)ª	.55
Role-emotional (SD)	17.92 (36.09) ^a	40.85 (44.24)ª	.57
Emotional well-being (SD)	29.97 (19.42)ª	50.71 (22.15)ª	1.00
Physical health component (SD)	33.45 (17.79)ª	49.57 (22.34)ª	.80
Physical functioning (SD)	54.01 (32.05)	54.65 (31.72)	.02
Role-physical (SD)	26.57 (41.39)ª	39.52 (44.63)ª	.30
Bodily Pain (SD)	48.19 (32.55) ^a	60.98 (32.25)ª	.39
General health (SD)	23.03 (27.41)°	27.20 (24.52)°	.16

Table 3. Mean and standard deviations of functioning subscales in the affected and comparison group

Note: SD=Standard Deviation. ^a*p*<.001; ^b*p*<.01; ^c*p*<.0

Hierarchical regression analyses of mental health on functioning

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

For the affected group, the hierarchical regression analyses (see Table 4) showed that there were no significant predictors of the Mental Health Component and the Physical Health Component of Functioning: neither sociodemographic 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 comparison group, the hierarchical regression analyses revealed that in the first step in which the socio-demographic variables were included, Age
was a significant predictor of the Mental Health Component of functioning. 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 comparison 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).

			Affected	d group					Comparis	on group		
	Menta	l health co	mponent	Physical	health cor	nponent	Mental	nealth com	ıponent	Physical	health con	nponent
	В	SE B	β	В	SE B	β	В	SE B	β	В	SE B	β
Step 1												
Gender	2.31	2.51	.06	1.75	3.43	.04	1.55	3.02	.03	.16	2.88	.00
Age	025	.06	03	06	.08	06	23	.09	19 ^b	29	.08	24^{b}
Literacy	76	5.62	02	-7.02	7.66	14	-12.24	7.59	27	-3.42	7.26	08
Education	2.17	3.79	.17	7.27	5.16	.41	5.53	5.12	.38	32	4.89	02
Years of education	58	1.13	11	-2.57	1.54	36	-1.38	1.39	25	11	1.32	02
Religion	-4.68	4.88	07	-4.68	6.65	05	-5.66	3.39	11	-6.60	3.24	14°
Step 2												
Gender	1.79	2.53	.05	1.79	2.53	.05	.03	2.56	.00	-1.31	2.57	03
Age	02	.06	02	02	.06	02	11	.08	09	19	.08	16°
Literacy	07	5.62	00	07	5.62	00	-9.05	6.40	20	70	6.43	02
Education	1.4	3.82	.11	1.44	3.82	.11	2.81	4.33	.19	-2.61	4.34	19
Years of education	33	1.14	06	33	1.14	06	92	1.17	17	.26	1.17	.05
Religion	-4.44	4.87	07	-4.44	4.87	07	-2.39	2.87	05	-3.86	2.88	08
Anxiety	-1.59	2.35	05	-1.59	2.35	05	-15.06	2.94	45ª	-13.33	2.96	42ª
Depression	-3.91	3.46	09	-3.91	3.46	09	-4.96	3.43	13	-3.03	3.45	08
<i>Note:</i> ^a <i>p</i> <.001; ^b <i>p</i> <.01; ^c <i>p</i> <.05												
R^2 is n.s. step 1; ΔR^2 is n.s. fo	r step 2 of	the Menta	l Health C	omponen	t in the Af	fected gro	up;					
D2 in n a stop 1. A D2 in n a fo	to C actor	the Dhurie	.~1 U~~1+h	Compone	nt in tha A	frantad						

Table 4. Hierarchical regression analyses on two measures of functioning for the affected and the comparison 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 =.06 for step 1, p<.05; ΔR^2 =.29 for step 2 p<.001 of the Mental Health Component in the Affected group;

 R^2 =.07 for step 1, p<.05; ΔR^2 =.22 for step 2 p<.001 of the Physical Health Component in the Affected group.

Discussion

There is an enormous amount of research on mental health research after a disaster, but scholars largely neglected recurrent disasters (Choudhury, Quraishi & Haque, 2006). The present study shows that recurrent disasters have a severe impact on mental health and functioning. The results are notably higher than most studies on natural disasters (Disease Control Priorities Project, 2007; Knight et al, 2000; Norris et al, 2002a, 2002b; van Griensven, 2006), and equal results from studies on 'type II traumas', defined as 'the result of long-standing or repeated ordeals' (Terr, 1991).

Whereas the relationship between mental health problems and impaired functioning is a requisite for pathology, neither observed anxiety nor depression symptomatology explained the level of functioning of individuals in the affected group (American Psychiatric Association, 2000). In contrast, mental health symptomatology in the unaffected group explained more than a quarter of the outcome of psychological functioning and slightly less than a quarter of the variance of physical functioning. How can this absent relationship between mental health and functioning be explained?

In a qualitative study conducted in Bahraich, Kattri and colleagues show that economic deprivation and increased poverty evoked by the floods are related to mental health problems (Kattri et al, 2012). Based on these findings, it is likely that the relationship between mental health and functioning is masked, because the aversive context evokes both mental health problems and functioning (Wind & Komproe, 2012). In other words, mental health and functioning in this context is not a simple bivariate relationship, but is moderated by the aversive context. Namely, repeatedly affected individuals are confronted with the consequences on several domains of their existence ranging from individual victimhood, via the high risk of losing their homes and properties, to structural changes in the social and physical environment such as the loss of fertile agricultural land (Disease Control Priorities Project, 2007; Horwitz, 2007; Kattri et al, 2012; Wiesenfeld & Panza, 1999). Under such harsh circumstances anxiety, for instance, may reflect an adequate survival mechanism that alerts individuals to realistic dangers in the environment, such as recurring floods, rather than pathology. Further, such downplaying circumstances impair the ability of individuals to function properly. The idea that the adverse context likely moderates the relationship between mental health problems and impaired functioning, avoids interpreting the mental health problems in this study as indicators of pathology.

In general, therapeutic trauma interventions are directed at the individual trajectory of re-establishing a sense of a safe base in relationship with others

and the individual environment (Terr, 1991; Van der Kolk, 1987). However, what are the opportunities to return to a sense of safety within an unstable context with recurrent catastrophes? There is a need to adopt a different and elaborated approach than allocating sheer mental health services to the affected region of Bahraich to alleviate mental health symptoms (Hobfoll et al, 2007). The study findings indicate substantial distress and encumbered functioning, for which it is more appropriate to adopt a multidimensional intervention approach that also addresses the erosion of the social and environmental context (Miller et al, 2006). An example is to implement livelihood projects tailored to the circumstances, such as empowerment projects to grow crops in between floods (Hobfoll et al, 2007). Interventionists may also reconstruct society in such way that bolsters resilience against the destructive power of recurrent floods. For instance, building houses higher above the ground not only protects against material damage against the flood, but also against animal hazards, such as snake bites. These community interventions will promote the functioning of affected individuals and decrease the mental health symptoms related to survival, such as feelings of anxiety for a new flood to occur (Horwitz, 2007; Wiesenfeld & Panza, 1999). Yet, interventions that address the context will not be a panacea for all. In fact, for a small group of severely traumatized individuals there may still be an additional need for psychiatric interventions, because for these severely traumatized individuals altering the conditions may not be sufficient to alleviate suffering (Hobfoll et al, 2007; Van Ommeren & Wessels, 2007).

Limitations

The study has some limitations that may have confounded the findings. First, the results pertain to those who continued to live in the flood area, but there were no data on those who moved out of the area after the flood. Second, the affected and the non-affected samples differ significantly on religion, as the affected group comprises less Muslims. Religion – as well as the context – may create a source of nested variance across groups. Third, within the timeslot to implement the study there was insufficient time to validate the HSCL-25 in the northern Indian context. Yet, within the given time the translation procedure was thorough and accurate, and a possible systematic bias as a result of the lack of validation would have likely influenced the outcomes of both the disaster group and the non-affected group. Fourth, all measures used were self-report

The impact of recurrent disasters on mental health: A study on seasonal floods in northern India

measures, which, although they have the advantage of tapping the respondent's perception, are not always consistent with more objective measures (Esdaile & Greenwood, 2002).

Conclusion

The strength of the study is to provide empirical evidence for the impact of recurrent disasters on mental health. The study showed a large impact of the seasonal flood on symptoms of depression and anxiety. The findings indicate a need to implement psychosocial context-oriented interventions to address the erosion of the context rather than specific mental health interventions. Yet, the present study is merely a start to provide the empirical evidence needed to expand knowledge on the impact of recurrent floods on mental health. As such, this study may inspire other scholars to conduct research on recurrent disasters.

References

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders IV-TR*. Washington, DC: American Psychiatric Association.
- Aron, J.L. & Patz., A. (2001). *Ecosystem change and public health. A global perspective*. Washington: John Hopkins University Press.
- Briere, J. & Elliott, D. (2000). Prevalence, characteristics, and long-term sequelae of natural disaster exposure in the general population. *Journal of Traumatic Stress*, 13(4), 661-679.
- Choudhury, W.A., Quraishi, F.A. & Haque, Z. (2006). Mental health and psychosocial aspects of disaster preparedness in Bangladesh. *International Review of Psychiatry*, *18(6)*, 529-535.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Connor, K.M., Foa, E.B. & Davidson, J.R. (2006). Practical assessment and evaluation of mental health problems following a mass disaster. *Journal of Clinical Psychiatry*, *67(2)*, 26-33.
- Crescenzi, A., Ketzer, E., Van Ommeren, M., Phuntsok, K., Komproe, I. & De Jong, J.T. (2002). Effect of political imprisonment and trauma history on recent Tibetan refugees in India. *Journal of Traumatic Stress*, 15(5), 369-375.
- Derogatis, L.R., Lipman, R.S., Rickels, K., Uhlenhuth, E.H. & Covi, L. (1974). The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behavioral Science, 19(1),* 1-15.
- Disease Control Priorities Project. (2007). Natural Disasters: Coping with the Health impact. http://www.dcp2.org/file/121/DCPP-NauturalDisasters.pdf. Accessed July 15, 2009.
- Esdaile, S.A. & Greenwood, K.M. (2003). A comparison of mothers' and fathers' experience of parenting stress and attributions for parent child interaction outcomes. *Occupational Therapy International*, *10(2)*, 115-116.
- Few R, Matthies F. (2006). *Flood hazards and health: responding to present and future risks*. London: Earthscan.
- Freedy, J.R., Saladin, M.E., Kilpatrick, D.G., Resnick, H.S. & Saunders, B.E. (1994). Understanding acute psychological distress following natural disaster. *Journal of Traumatic Stress*, 7(2), 257-273.

The impact of recurrent disasters on mental health: A study on seasonal floods in northern India

- Freedy, J.R., Shaw, D.L., Jarell, M.P. & Masters, C.R. (1992). Towards an understanding of the psychological impact of natural disaster: An application of the conservation of resources model. *Journal of Traumatic Stress*, 5(3), 441-454.
- Galea, S., Brewin, C.R., Gruber, M., Jones, R.T., King, D.W., King, L.A., McNally, R.J., Ursano, R.J., Petukhova, M. & Kessler, R.C. (2007). Exposure to hurricane-related stressors and mental illness after Hurricane Katrina. *Archives of General Psychiatry*, 64(12), 1427-1434.
- Hobfoll, S.E. (1989). Conservation of resources. A new attempt at conceptualizing stress. *American Psychology*, *44*(*3*), 513-524.
- Hobfoll, S.E., Watson, P., Bell, C.C., Bryant, R.A., Brymer, M.J., Friedman, M.J., Friedman, M., Gersons, B.P., De Jong, J.T., Layne, C.M., Maguen, S., Neria, Y., Norwood, A.E., Pynoos, R.S., Reissman, D., Ruzek, J.I., Shalev, A.Y., Solomon, Z., Steinberg, A.M. & Ursano, R.J. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, *70(4)*, 283-315.
- Horwitz, A.V. (2007). Transforming normality into pathology: the DSM and the outcomes of stressful social arrangements. *Journal of Health and Social Behavior*, *48*(*3*), 211-222.
- Kattri, P., Joshi, P.C., Wind, T.R., Komproe, I.H. & Guha-Sapir, D. (2012). Understanding mental health as a function of social vulnerabilities in a disaster situation: Evidence from recurrent flooding in Bahraich district, Uttar Pradesh. *Journal of the Anthropological Survey in India*, 61(1), 109-125.
- Knight, B.G., Gatz, M., Heller, K. & Bengtson, V.L. (2000). Age and emotional response to the Northridge earthquake: a longitudinal analysis. *Psychology and Aging*, 15(4), 627-634.
- Lipman, R.S., Covi, L. & Shapiro, A.K. (1979). The Hopkins Symptom Checklist (HSCL)—factors derived from the HSCL-90. *Journal of Affective Disorders, 1979*, 1(1), 9-24.
- Miller, K.E., Kulkarni, M. & Kushner, H. (2006). Beyond Trauma-Focused Psychiatric Epidemiology: Bridging Research and Practice With War-Affected Populations. *American Journal of Orthopsychiatry*, *76(4)*, 409-422.
- Mollica, R.F., Cardozo, B.L., Osofsky, H.J., Raphael, B., Ager, A. & Salama, P. (2004). Mental health in complex emergencies. *Lancet*, *364*(*9450*), 2058-2067.
- Mollica, R.F., Wyshak, G., de, M.D., Khuon, F. & Lavelle, J. (1987). Indochinese versions of the Hopkins Symptom Checklist-25: a screening instrument for the psychiatric care of refugees. *American Journal of Psychiatry*, *144(4)*, 497-500.

- Narrow, W.E., Rae, D.S., Robins, L.N. & Regier, D.A. (2002) Revised prevalence estimates of mental disorders in the United States: using a clinical significance criterion to reconcile 2 surveys' estimates. *Archives of General Psychiatry*, 59(2), 115-123.
- Norris, F.H., Friedman, M.J., Watson, P.J., Byrne, C.M., Diaz, E. & Kaniasty K. (2002a). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry*, 65(3), 207-239.
- Norris, F.H., Friedman, M.J. & Watson, P.J. (2002b). 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry*, *65(3)*, 240-260.
- Sattler, D.N., Preston, A.J., Kaiser, C.F., Olivera, V.E. & Valdez, J., (2002). Schlueter, S. Hurricane Georges: a cross-national study examining preparedness, resource loss, and psychological distress in the U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States. *Journal of Traumatic Stress*, 15(5), 339-350.
- Souza, R., Bernatsky, S., Reyes, R., de, J.K. (2007). Mental health status of vulnerable tsunami-affected communities: a survey in Aceh Province, Indonesia. *Journal of Traumatic Stress*, 20(3), 263-269.
- Terr, L.C. (1991). Childhood traumas: an outline and overview. *American Journal* of *Psychiatry*, 148(1), 10-20.
- Thapa, S.B. & Hauff, E. (2005). Psychological distress among displaced persons during an armed conflict in Nepal. Social Psychiatry and Psychiatric Epidemiology, 40(8), 672-679.
- United Nations Information Centres. Monsoon 2009 (2010). http://www.unic.org. pk/pdf/Monsoon%20fact%20sheet-final%2023%20July.pdf. Accessed September 2.
- Van der Kolk, B.H. (1987). *Psychological Trauma*. Washington, DC: American Psychiatric Press.
- Van Griensven, F., Chakkraband, M.L.S., Thienkrua, W., Pengjuntr, W., Cardozo, B.L., Tantipiwatanaskul, P., Mock, P.A., Ekassawin, S., Varangrat, A., Gotway, C., Sabin, M. & Tappero, J.W. (2006). Mental Health Problems Among Adults in Tsunami-Affected Areas in Southern Thailand. *JAMA*, 296(5), 537-548.
- Van Ommeren, M. & Wessels, M. (2007). Inter-agency agreement on mental health and psychosocial support in emergency settings. *Bulletin of the World Health Organization*, 85(11), 822.

- Ventevogel, P., De, V.G., Scholte, W.F., Shinwari, N.R., Faiz, H., Nassery, R., van den, B.W. & Olff, M. (2007). Properties of the Hopkins Symptom Checklist-25 (HSCL-25) and the Self-Reporting Questionnaire (SRQ-20) as screening instruments used in primary care in Afghanistan. *Social Psychiatry and Psychiatric Epidemiology*, 42(2), 328-335.
- Wiesenfeld, E. & Panza, R. (1999). Environmental hazards and home loss: the social construction of becoming homeless. *Community, Work & Family,* 2(1), 51-65.
- Ware, J.E. Jr. (2002). Identifying populations at risk: functional impairment and emotional distress. *Managed Care*, *11(10)*, 15-17.
- Ware, J.E. Jr., Gandek, B., Kosinski, M., Aaronson, N.K., Apolone, G., Brazier, J., Bullinger, M., Kaasa, S., Leplege, A., Prieto, L., Sullivan, M. & Thunedborg, K. (1998). The equivalence of SF-36 summary health scores estimated using standard and country-specific algorithms in 10 countries: results from the IQOLA Project. International Quality of Life Assessment. *Journal of Clinical Epidemiology*, *51(11)*, 1167-1170.
- Weems, C.F., Watts, S.E. & Marsee, M.A. (2007). The psychosocial impact of Hurricane Katrina. *Behaviour Research and Therapy*, *45(10)*, 2295-2306.
- Wind, T.R. & Komproe, I.H. (2012). The mechanisms that associate community social capital with disaster mental health: A multilevel model. *Social Science & Medicine*, *75(9)*, 1715-1720.
- Winokur, A., Winokur, D.F., Rickels, K. & Cox, D.S. (1984). Symptoms of emotional Distress in a family planning service: stability over a four-week period. *British Journal of Psychiatry*, *144(4)*, 395-399.
- World Food Programme (2012). Response to Recurrent Natural Disasters and Seasonal Food Insecurity Response to Recurrent Natural Disasters and Seasonal Food Insecurity. http://www.wfp.org/content/responserecurrent-natural-disasters-and-seasonal-food-insecurity. Accessed August 15.
- World Medical Assembly (48th) (1997). Declaration of Helsinki: Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, 277(11), 925-926.

Section 2

The mechanisms that associate the social community with posttraumatic stress

Social capital and post-disaster mental health

Wind TR Fordham M

Komproe IH

Published in: *Global Health Action* (2011). Available at: http://www.globalhealthaction.net/index.php/gha/article/ view/6351

Abstract

Background: Empiric evidence on the association between social capital and disaster mental health is limited and ambiguous.

Objective: The study explores the relationship between social capital and disaster mental health outcomes (PTSD, anxiety, and depression) in combination with individual factors (appraisal, coping behavior, and social support).

Design: This is a community-based cross-sectional study in a flood-affected town in northern England, and is part of the MICRODIS multi-country research project that examines the impact of natural disasters on social mechanisms. It included 232 flood-affected respondents.

Results: The findings showed that a considerable part of the association between cognitive and structural social capital and mental health is exerted through individual appraisal processes (i.e., property loss, primary and secondary appraisal), social support, and coping behavior. These individual factors were contingent on social capital. After the inclusion of individual characteristics, cognitive social capital was negatively related to lower mental health problems and structural social capital was positively associated to experiencing anxiety, but not to PTSD or depression. Depression and anxiety showed a different pattern of association with both components of social capital.

Conclusions: Individual oriented stress reducing interventions that use appraisal processes, social support and coping as starting points could be more effective by taking into account the subjective experience of the social context in terms of trust and feelings of mutual support and reciprocity in a community. Findings indicate that affected people may especially benefit from a combination of individual stress reducing interventions and psychosocial interventions that foster cognitive social capital.

Keywords: Social capital, PTSD, depression, anxiety, disaster, social support, coping

Introduction

Increasingly, it is recognized that a disaster influences mental health of individuals via parallel trajectories (Kawachi & Subramanian, 2006). First, the individual transactional stress model describes the consequences of a natural disaster as follows (Lazarus, 1993): A disaster evokes an individual subjective experience of the event as stressful or not (i.e., primary appraisal) and an individual estimation to what extent he or she can deal with the disaster situation (i.e., secondary appraisal). Subsequently, an individual copes with the situation. Depending on the effectiveness of individual coping behavior and received social support, an individual may develop mental health problems in the wake of disasters. Second, it is recognized that beyond the individual traumatic experience (Kawachi & Subramanian, 2006; Lazarus, 1993; Priebe et al, 2010), disaster mental health outcomes are determined by the impact of disasters on the material and social environment (Kawachi & Subramanian, 2006). The destruction of and change of the material or physical environment is associated with disaster mental health outcomes (Galea et al, 2008) and in the last decade attention has turned to the exploration of the effects of the social context on mental health (Kawachi & Subramanian, 2006). Within this line, many scholars embraced 'social capital' as a possible explanation for differences in disaster mental health across affected places or affected groups of people (Baum, 1999; Galea et al, 2008; Hamano et al, 2010; Kawachi et al, 1997). There are several definitions of social capital and in general social capital is defined as 'the resources an individual can draw on through his or her social networks and the value ascribed to these resources by the individual' (Bourdieu, 1986; Field, 2003; Kawachi & Subramanian, 2006).

In the aftermath of disasters social capital is typically fractured (Hobfoll et al, 2007; Hurtado, Kawachi & Sudarsky, 2011; Kawachi & Berkman, 2001), as a result of dispersion and relocation of important others (Najarian et al, 2002). Consequently, the natural health sustaining function of social capital (i.e., its buffer function against mental health problems in times of distress; De Jong, Komproe & Van Ommeren, 2003; Norris et al, 2008) that is generally found in the literature also subsides. As a result disaster affected people may be more vulnerable to develop mental health problems (Kawachi & Subramanian, 2006; Norris et al, 2008). The assumed relevance of social capital for disaster mental health has been underscored by national and international policies to develop social capital in disaster-affected communities (De Jong, Komproe & Van Ommeren, 2003; De Silva et al, 2007; Hobfoll et al, 2007; Norris et al, 2008). Yet,

there is a lack of empiric evidence on *how* social capital exerts its influence on disaster mental health (De Silva et al, 2007). And thus, scholars concluded that current evidence on social capital and disaster mental health is inconclusive and inadequate to inform the development of specific social capital interventions to combat mental illness (Kawachi, 2006; McKenzie, Whitley & Weich, 2003).

Whereas the both individual stress trajectory and the loss of social capital have been found to impact mental health, the role of the combination of the individual mechanisms and the loss of social capital on mental health problems is less clear. One fruitful idea has been that social capital exerts its influence on mental health via individual factors (Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999). According to the well-established transactional stress model social support and coping behavior mediate the impact of trauma on mental health (Lazarus, 1993; Lazarus & Folkman, 1984), and thus these individual factors are indispensable starting points for individual interventions to diminish mental health problems. Kawachi and Berkman (2001) assert that these personrelated factors, such as social support and coping behavior, are contingent on social capital: The density of civic associations or the extent of voluntarism in a community affords the opportunity to establish one-on-one linkages for social support (Lin, Ye & Ensel, 1999). In turn, perceived or received support may either reduce negative emotional reaction to a stressful event (Gibbs, 1989; Kawachi & Berkman, 2001; Norris et al, 2005; Norris & Kaniasty, 1996; Punamäki et al, 2005). Further, the classic definition of Lazarus and Folkman of coping is 'the cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person' (Lazarus & Folkman, 1984). In a community with high social capital one will have more resources to one's disposition, and may therefore be better able to deal with environmental demands (Hobfoll et al, 2007; Kawachi & Berkman, 2001; Norris et al, 2008). The latter may in turn decrease mental health problems (Bokszczanin, 2003; Bokszczanin & Kaniasty, 2002). The intuitively appealing tenet that individual protective factors for mental health outcomes – such as social support and coping behavior – are contingent on social capital would elucidate possible mechanisms via which social capital exerts its influence on mental health. However, such evidence has not been substantiated in disaster research thus far.

The aim of this study is to examine the relationship between social capital and disaster mental health outcomes in combination with these individual factors. We specifically explore the interplay between the individual trajectory and the individual perception of social capital that impact mental health outcomes. The mental health outcomes of study are the three most common researched and prevalent post-disaster mental health outcomes: posttraumatic stress disorder (PTSS), depression, and anxiety (Kawachi & Subramanian, 2006; Norris et al, 2002; Priebe et al, 2010). All three mental health outcomes have been assumed to be associated to the individual perception of the social context (Brown, 1978; Charuvastra & Cloitre, 2008; Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999; Norris, 2002).

Regarding our research aim several issues deserve explicit attention. First, within social capital research, most studies today distinguish between a 'social network' versus a 'social cohesion' approach to social capital (Kawachi, 2006). The 'social cohesion' approach of social capital defines social capital as the resources available to members of tightly knit communities, and tends to emphasize social capital as an attribute of the community (e.g. neighborhood). By contrast, the 'social network' approach of social capital conceptualizes the concept in terms of resources that are embedded within an individual's social network (Kawachi, 2006). Second, beyond the issue of level of definition, social capital can be assessed at the individual and collective level (Kawachi, 2006; Kawachi & Subramanian, 2006). Although the level of definition (social cohesion school versus social network school) most commonly concurs with the level of assessment (collective versus individual), this is not exclusively true. For example, even if social capital is assessed at the individual level, scholars of the 'social cohesion' approach may conceptually consider an individual score as a reflection of social capital at the community level (Kawachi, Subramanian & Kim, 2008). Similarly, the authors view social capital as a community asset in accordance to the social cohesion school. Yet, we explore the interplay between the individual stress trajectory and the individual perception of social capital that impacts disaster mental health. Therefore, we assessed social capital at the individual level.

Method

Setting

We conducted a cross-sectional community survey in Morpeth. Morpeth is a small town located in the Northumberland County, UK, with about 15.000 inhabitants. Demographically, Morpeth comprises a relatively aged population, as many choose to retire in Morpeth (Government office of the North East, 2007). On the 5th and 6th of September 2008 Morpeth was struck by intensive rainfall.

The ground water rose rapidly and the river that flows through the center burst its banks. Consequently, Morpeth was hit by one of its worst floods since 1963. Almost a thousand properties were flooded due to the water rise.

Study population

We aimed to conduct a census on the basis of the Morpeth address list of the affected households. The address list comprised 786 addresses of which 39 business premises. We approached the 757 households in the list excluding the business premises.

Data collection

The data collection was carried out during August 2009. The study is part of the MICRODIS multi-country research project that examines the impact of natural disasters on social mechanisms, economical aspects and health outcomes across Europe and Asia. A local research agency was hired to conduct the survey in Morpeth. The company hired experienced local surveyors that are familiar with the local sociocultural context to conduct face-to-face interviews under the supervision of the local principal investigator Fordham (author). They received a one-day training in the administration of the interview. Written informed consent was obtained. The ethical approval for the study was obtained from the School of Applied Sciences Ethics Committee, University of Northumbria. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki (World Medical Assembly, 1997).

Measurements

Mental health outcomes

Anxiety and depression. Symptoms of anxiety and depression were assessed by the Hopkins Symptom Checklist-25 (HSCL-25; Derogatis et al, 1974). The period of reference is the last month. Two scores were calculated: The anxiety score is the average of the 10 anxiety items, and the depressive symptoms score is the average of the 15 depression items. The respondent is asked to report how much he or she has been bothered by each item during the last month on a five point scale ranging from not at all [1] to extremely [5]. The internal consistency (Cronbach's alphas) of the scales Anxiety and Depression were respectively .81 and .69.

Posttraumatic Stress Disorder (PTSD). Symptoms of PTSD were assessed by

the PTSD Checklist Civilian Version (PCL-C) (The PTSD Checklist, 1993). The PCL-C consists of 17 items organized in three subscales. Eight items are keyed to a specific trauma, in this study to the experience of the flood. The respondent is asked to report how much he or she has been bothered by each item during the last month on a five point scale ranging from not at all [1] to extremely [5]. The subscales correspond to the three symptom clusters of PTSD according to the DSM-IV (American Psychiatric Association, 2000): re-experience (5 items), avoidance (7 items), and hyperarousal (5 items). The internal consistency (Cronbach's alpha) of the PCL-C was 0.96.

Individual characteristics

The individual characteristics included in the study were the key variables of the transactional stress model: appraisal processes (Property Loss, Primary Appraisal, Secondary Appraisal; described below), Social Support and Coping. Further, we added Displacement as it has been shown to be a crucial predictor of mental health outcomes (Najarian et al, 2002; Norris, 2002). Demographic variables included in the study were Gender, Age and Education Level.

Displacement was measured by the question: 'Did you have to move out of your home after the flood?' and could be answered by 'yes' or 'no'.

Property Loss was measured by four questions: To what extent did you experience damage or loss to: (1) the structure of your house, (2) the contents and belongings of your house, (3) personal belongings with sentimental value, (4) your car. Respondents could answer from [1] 'not at all' to [5] 'fully damaged/lost'. The total Property Loss score was the average of the four items.

Primary and Secondary Appraisal. Primary appraisal refers to the perceived threat of the situation, and was measured by the question 'How traumatic was the flood for you at the time?' Secondary appraisal denotes the estimation of the capacities or possibilities one has to deal with the disaster, was measured by the question 'To what degree did you believe that you were able to deal with the situation?' Respondents could indicate their answers on a five-point scale ranging from 'not at all' [1] to 'very much' [5].

Coping Intensity. Most coping research in disaster settings thus far has focused on types of coping behavior (e.g. problem focused coping, emotional expression) in relation to mental health outcomes (Lazarus & Folkman, 1984; Sandler, 2001). This study focused on the degree to which a variety of coping strategies were employed. We term this 'Coping Intensity'. Coping Intensity has been shown to be related to mental health outcomes in extreme situations such as political imprisonment (Punamäki et al, 2008). Six items measured individual

coping (Mattlin, Wethington & Kessler, 1990). The items referred to Avoidance, Reappraisal, Religion, Active cognitive coping, Active behavioral coping, and Social support. For example: 'How much did you rely on your religious beliefs to help you deal with the flood situation?'[Religion] and 'How much did you do things improve your situation after the flood?' [Active behavioral coping]. The items rated on a 5-point scale from [1] 'not at all' to [5] 'extremely'. The total Coping Intensity score was the average of the six items.

56

Social support. The Social Support Scale of Harper and Kelly (2003) was used to measure social support. Respondents were asked to indicate how often they received any social support (10 items). Example questions were 'Did you receive any help or support from anyone to improving your economic situation?', and 'Did you receive any advice or informational support to help you understand things?' The items are rated on a 5-point scale rating from 'never' [1] to 'on most days' [5]. The social support score was the average of ten items. The Cronbach's alpha was 0.72.

Social capital

There are various instruments that measure social capital. We selected the SA-SCAT (Harpham, Grant & Thomas, 2002; Tuan et al, 2005) for our study for (i) its brevity, (ii) its wide international use (e.g. De Silva et al, 2007), and (iii) its distinction between cognitive and structural capital (Harpham, Grant & Thomas, 2002; Tuan et al, 2005).

Previous studies have provided evidence for the importance to distinguish the structural components of social capital (structural social capital) from its cognitive components (cognitive social capital). Structural social capital refers to presence of community linkages, while cognitive social capital refers to the appreciation of these community linkages in terms of trust, mutual help and reciprocity (Harpham, Grant & Thomas, 2002). Research showed that the two components have different relationships with mental health outcomes: Cognitive social capital showed to be consistently salutary for mental health outcomes, whereas results for structural social capital are more ambiguous (De Silva et al, 2005, 2007). High structural social capital was generally found to be associated with better mental health (e.g., De Silva et al, 2005, 2007), but was sometimes found to be associated with poorer mental health, and again other studies found no associations of structural social capital with mental health (Silva et al, 2005; Hurtado, Kawachi & Sudarsky, 2011). This study distinguishes between structural and cognitive social capital. The SA-SCAT has the pretence to measure social capital at the individual level.

In practice the SA-SCAT is often somewhat modified to the local context (De Silva et al, 2007; Tuan et al, 2005). In this study some items of the SA-SCAT (version from De Silva et al, 2007) were adapted to improve the relevance for the local context (see below). The adaptations were based on lessons learned from a similar previous study on a flood in Tewkesbury, UK, by the same authors (data unpublished). The SA-SCAT in our study comprised 15 questions, that measure aspects of Structural Social Capital (8 items), as well as Cognitive Social Capital (7 items; Harpham, Grant & Thomas, 2002; Tuan et al, 2005).

Structural capital that refers to the presence of community linkages, was measured by 8 items that assess the frequency of interaction between community members. Example items are: 'During the last twelve months, have you joined together with other members of the community to address a problem or common issue?', and 'In the last 12 months, have you talked with a local authority or governmental organization about problems in this community? The questions were answered on a four point scale from 'no' [1] to 'yes, often' [4]. In the structural social capital scale, we omitted the question on the number of groups one participates, as we could not aggregate the answer to this question to the questions on structural social capital about the frequency of interaction between community members. Further, the question on 'general social support' was omitted, because the topic of this question was deemed redundant as it was more specifically covered by another scale for assessment of emotional, instrumental, and informational support. Finally the question on material and economic support was combined in one question. Respondents indicated that they could not distinguish well between received financial and material support, because most of the economic and material flood damage was directly reimbursed by the insurance to the relevant contractors. The Cronbach's alpha of Structural Social Capital was .74.

Cognitive social capital that refers to the appreciation of these community linkages in terms of trust, mutual help and reciprocity was measured by 7 statements about the community one lives in. For example: 'Do the majority of the people in this community generally get along with each other?' and 'Do you think that a majority of the people in the community would take advantage of you if they got the chance?' The questions could be answered on a four point scale from 'not at all' [1] to 'completely' [4]. The Cronbach's alpha of Cognitive Social Capital was .76.

Data analysis

We first examine the demographic characteristics with SPSS 16.0.

We estimated the association of the individual perception of social capital with mental health outcomes with a multistep procedure. The relationships between social capital and individual characteristics with mental health outcomes were estimated with regression analyses for social capital and individual characteristics separately. The estimates of social capital from these analyses refer to the 'total association' of social capital and mental health outcomes (Jöreskog & Sörbom, 1993).

Second, we defined social capital as 'the resources an individual can draw on through his or her social networks and the value ascribed to these resources by the individual'. Social networks are the province of the community and are thus by definition more distally related to individual mental health outcomes than individual characteristics (Hamano et al, 2010). To account for this so called 'unequal proximity problem' (Weikunat & Wildner, 2002), we conducted hierarchical linear regression analyses in which we included the proximal individual characteristics in step 1, and added the relatively distal components of social capital and in step 2. The estimates of social capital from these analyses refer to the 'direct association' of social capital and mental health outcomes (Jöreskog & Sörbom, 1993). Regression analyses were conducted in SPSS 16.0.

Third, we analyze the 'indirect association' of social capital via individual characteristics (Jöreskog & Sörbom, 1993). To examine the indirect associations of the two components of social capital via the individual characteristics we conducted a path analysis with LISREL 8.0 in which the two components of social capital were included as moderators on the relationship between the individual variables and mental health outcomes. The LISREL estimates (e.g., structural relationships) from the path analyses are comparable with β -values from the linear regression analyses.

The total association is the sum of the direct association and indirect association. To prevent multicollinearity, the continuous variables were standardized.

Results

Ninety respondents refused to participate in the survey. Despite migration of some residents as their houses were still not livable (41 respondents), and absence of households members at the time of study (390 respondents), we were able to administer the interview to 236 respondents (31.2 %). The demographics of the sample are depicted in Table 1. The final sample (n=231) consisted of

mainly female (60.8%), 65+ of age (57.4%), and religious (94.9%), Marital status/ education/employment were more spread, with larger groups being married (31.5%) or widowed (31.5%), <high school (40.1%) and college or postgraduate (22.0%), employed (32.3%) or retired (57.3%).

Total associations. In the regression analyses with only Cognitive and Structural Social Capital as predictors for the mental health outcomes, the adjusted R^2 was .18 (p<.001) for Posttraumatic Disorder (β =.21; p<.01 for Structural Social Capital, and β =-.39; p<.001 for Cognitive Social Capital), .10 (p<.001) for Anxiety (β =.22; p<.01 for Structural Social Capital, and β =-.26; p<.001 for Cognitive Social Capital), .10 (p<.001) for Cognitive Social Capital), and .17 (p<.001) for Depression (β =.20; p<.01 for Structural Social Capital, and β =-.38; p<.001 for Cognitive Social Capital).

In the regression analyses with individual characteristics as predictors for the mental health outcomes, the adjusted R^2 for the individual characteristics was .18 (*p*<.001) for Posttraumatic Disorder (β =.16; *p*<.05 for Property Loss, and β =.32; *p*<.001 for Coping Intensity), .22 (*p*<.001) for Anxiety (β =.16; *p*<.05 for Property Loss, β =.19; *p*<.05 for Primary Appraisal, β =.30; *p*<.001 for Coping Intensity, and β =-.20; *p*<.01 for Social Support), and .23 (*p*<.001) for Depression (β =.19; *p*<.05 for Property Loss, β =.26; *p*<.001 for Coping Intensity, β =-.17; *p*<.05 for Social Support).

Direct associations. The hierarchical linear regression analyses with the individual characteristics as predictors of mental health outcomes in step 1 and Cognitive and Structural Social Capital as predictors in step 2 revealed a substantial decrease of the explained variance of both components of social capital. The ΔR^2 of social capital in addition to individual characteristics was for .06 (*p*<.001) for Posttraumatic Disorder, .03 (*p*<.001) for Anxiety, and .06 (*p*<.001) for Depression. The results of the regression analyses are depicted in Table 2.

	Frequency (percentage)
Gender	
Male	90 (38.8)
Female	141 (60.8)
Age group	
<18	1 (0.5)
18-24	5 (2.7)
25-39	17 (9.0)
40-64	57 (42.6)
> 65	108 (57.4)
Religion	
Religious	197 (94.9)
None	34 (14.7)
Marital status	
Married	83 (35.8)
Single	40 (17.2)
Separated	6 (2.6)
Divorced	23 (9.9)
Widowed	73 (31.5)
Common law	6 (2.6)
Education	
<high school<="" td=""><td>93 (40.1)</td></high>	93 (40.1)
High School	58 (25.0)
Some college	13 (5.6)
College or post-graduate	51 (22.0)
Work	75 (32.3)
Employed	12 (5.2)
Seeking work	9 (3.9)
Carer or looking after children/house	
Student or on training scheme	2 (0.9)
Retired	133 (57.3)

Table 1. Demographic characteristics of the study sample

Cognitive Social Capital remained significantly related to all three mental health outcomes beyond the individual characteristics (β =-.28; p<.001 for Posttraumatic Stress Disorder; β =-.13; p<.001 for Anxiety; and β =-.26; p<.001 for Depression).

Structural Social Capital remained positively related to Anxiety beyond the individual characteristics (β =.13; p <.01). Among the individual characteristics, Coping Intensity was positively associated to all four mental health outcomes (β =.26; *p*<.001 for Posttraumatic Stress Disorder; β =.26; *p*<.001 for Anxiety; and β =.20; *p*<.01 for Depression). Social support was negatively associated to Anxiety (β =-.20; *p*<.01) and Depression (β =-.17; *p*<.01). Primary appraisal was positively associated to Anxiety (β =.19; *p*<.05). The results of the regression analyses are depicted in Table 2.

Indirect associations. The path analyses revealed that the indirect effect of Cognitive Social Capital on PTSD was -.10 (p<.01), on Anxiety was -.10 (p<.01), on Depression was -.09 (p<.01). The indirect effect of Structural Social Capital on PTSD was .10 (p<.01), on Anxiety was .09 (p<.01), on Depression was .09 (p<.01). The results of the path analyses are depicted in Table 3. The path analyses further revealed that Cognitive Social Capital was indirectly related to the three mental health outcomes via Property Loss, Primary Appraisal, Secondary Appraisal, Social Support, and Coping Intensity (data not shown). Structural Social Capital was indirectly related to the three mental health outcomes via Property Loss

	Posttraur	natic stres	s disorder		Anxiety		Depression		1
	Social capital model	Indi- vidual charact. model	Combin- ed model	Social capital model	Indi- vidual charact. model	Combin- ed model	Social capital model	Indi- vidual charact.	Combin- ed model
								model	
	.18	.18	.26	.10	.22	.25	.17	.23	.29
Individual characteristics	β	β	β	β	β	β	β	β	β
Condor		06	07		01	01		02	02
Age		.00	01		01	01		12*	02
Education		.05	.07		01	02		03	02
Disaster related					101			100	
Displaced		04	05		.00	01		00	01
Property loss		.16*	.09		.16*	.10		.19*	.11
Primary appraisal		.05	.07		.19*	.19°		.09	.11
Secondary appraisal		.12	.09		.03	.05		.06	.03
Coping Intensity		.32***	.26***		.30***	.26***		.26***	.20**
Social support		12	13		20**	22**		17*	17**
ΔR^2			.20			.22			.23
Social capital									
Structural social capital	.21**		.09	.22**		.13*	.20**		.11
Cognitive social capital	39***		28***	26***		13 [*]	38***		26***
ΔR^2			.06			.03			.06

Table 2. Independent predictors for mental health outcomes, expressed in adjusted R squares and Betas

NOTE: **p*<.05; ***p*<.01; ****p*<.001

	Posttraumatic Stress Disorder		Anx	tiety	Depression		
	Cognitive social capital	Structural social capital	Cognitive social capital	Structural social capital	Cognitive social capital	Structural social capital	
Total effect	38**	.20**	23**	.23**	35**	.20**	
Direct effect	28**	.09**	13**	.13**	26**	.11**	
Indirect effect	10**	.10**	10**	.09**	09**	.09**	

Table 3. Total, direct and indirect effects of Structural and Cognitive Social Capital on Mental Health Outcomes

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

Values are estimates from the statistical software LISREL 8.0

Discussion

The aim of this study was to examine the relationships of the individual perception of social capital with disaster mental health outcomes in combination with individual factors that have found to mediate the impact of trauma on mental health (Lazarus, 1993; Lazarus & Folkman, 1984; Norris & Kaniasty, 1999).

The findings revealed that a considerable part of the association between both components of social capital and mental health is exerted through individual appraisal processes (i.e., property loss, primary and secondary appraisal), social support, and coping behavior. The inclusion of individual characteristics in our analyses partly veiled the relationship between social capital and mental health outcomes. Nonetheless, cognitive social capital remained consistently related to lower mental health problems. But, structural social capital was only associated to experiencing more anxiety, and not to PTSD or depression.

The inclusion or exclusion of these individual characteristics may partly explain mixed results on the association between structural social capital and mental health outcomes across previous studies thus far (De Silva et al, 2005, 2007; Kazachi & Subramanian, 2006): As in our study the inclusion of individual characteristics may have shrouded the association between structural social capital and mental health. The findings further concur with previous studies that found the cognitive component of social capital to be consistently negatively related to mental illnesses, and the structural social capital revealed to have ambiguous associations with illnesses (De Silva et al, 2005, 2007; Yen & Syme, 1999). The positive association between structural social capital and anxiety

confirms the ideas of several scholars (Kawachi & Berkman, 2001; Portes, 1998) that tight-knit social structures may not always lead to better mental health outcomes. And indeed, structural social capital showed to have a 'dark side' for feelings of anxiety in disaster situations (cf. Portes, 1998; Ross, Reynolds & Geis, 2000).

We found that while feelings of cohesiveness (i.e. cognitive social capital) may protect especially against depressive illness, participation in social structures (i.e. structural social capital) may be associated with an excess of anxiety disorders (cf. Ross, Reynolds & Geiss, 2000). This distinct pattern of association across mental health outcomes may be another reason for inconsistent associations of social capital with mental illnesses across studies (De Silva et al, 2005). Several processes may explain the distinct pattern of relations of the two components with anxiety and depression. Whereas depressed individuals symptomatically avoid structural involvement in social networks, anxious people may seek reassurance for their anxious feelings and thoughts. As a result, those individuals who show the greatest anxiety may have a larger network (i.e. higher structural social capital) to address their needs (Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999; Portes, 1998). Paradoxically, especially in a disaster situation intimate social involvements within one's network may predispose individuals to the 'contagion of stress' when stressful life events afflict those whom they feel emotionally close (cf. Barrera, 1989). This may lead to increased feelings of anxiety.

The tenet that the relatively 'weak' ties consisting of involvement in community, voluntary, and religious organizations (i.e., social capital) afford the opportunity to establish one-on-one interactions necessary for social support and certain coping strategies (Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999) was supported in our study. Contingent on cognitive social capital, the beneficial value of social support increased for PTSD and anxiety. Social support in itself was negatively related to mental health problems, as consistently found in the literature (Gibbs, 1989; Norris et al, 2005; Punamäki et al, 2005). Further, the relationship between coping intensity and mental health problems was also moderated by both components of social capital. The employment of a variety of coping behaviors (coping intensity) per se was associated to worse mental health outcomes. Through coping strategies people either attempt to change the stressful reality or to regulate their emotional reactions (Kawachi & Berkman, 2001; Lazarus, 1993; Lin, Ye & Ensel, 1999). It follows, that individuals with higher mental health problems will employ more coping behavior to address these emotional reactions, and the association between coping intensity

and mental health problems is therefore likely to be reciproke (De Silva et al, 2005). Perceptions of higher trust and mutual help (i.e. cognitive social capital) decreased the negative relationship between coping intensity and mental health outcomes.

The study has several potential limitations. First, the cross-sectional design did not allow for the establishment of a causal relationship between social capital and disaster mental health (Dietz, 2002). Second, the non-response due to refusal and especially absence was considerable. As a result our sample may not be representative for the flood-affected population in Morpeth.

How can we translate our findings into implications for interventions? The study found evidence for the importance of individual factors and for the relevance of the individual perception of environmental factors for disaster mental health outcomes. Vis-à-vis the environmental factors, we distinguished the cognitive and structural components of social capital, and found a salutary effect of cognitive social capital for mental health. Taken together, the individual oriented stress reducing interventions that use appraisal processes, social support and coping as starting points could be more effective by taking into account the subjective experience of the social context in terms of trust and feelings of mutual support and reciprocity in a community. Psychosocial interventions are tailored to establish such trust, and feelings of mutual support and reciprocity in a community. Thus, the findings indicate that affected people may especially benefit from a combination of individual stress reducing interventions and psychosocial interventions that foster cognitive social capital. Work remains to be carried out, however, in elucidating the specific individual causal mechanisms by which components of social capital lead to the maintenance, improvement or deterioration of different mental health outcomes. Structural modeling with longitudinal data may offer solace to reveal such mechanisms.

References

- American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders IV-TR. Washington, DC: American Psychiatric Association.
- Barrera, M. (1989). Models of social support and life stress: Beyond the buffering hypothesis. In: L.H. Cohen (ed.): *Life Events and Psychological Functioning*. Newbury Park, CA: Sage Publications.
- Baum, F. (1999). Social capital: is it good for your health? Issues for a public health agenda. *Journal of Epidemiology and Community Health*, *53*, 195-196.
- Bokszczanin, A. (2003). The role of coping strategies and social support in adolescent's well-being after a flood. *Polish Psychological Bulletin*, 34(2), 67-72.
- Bokszczanin, A. & Kaniasty, K. (2002). The impact of 1977 flood on children and adolescent symptoms of PTSD, depression and loneliness. The role of coping strategies. *Studia Psychologiczne*, *40*(*2*), 21-39.
- Bourdieu, P. (1986). The Forms of Capital. In: Richardson, J. (ed.) *Handbook of Theory and Research in the Sociology of Education*. New York, Greenwald Press.
- Brown, G.W. & Harris, T.O. (1978). Social origins of depression: A study of psychiatric disorder in women. London: Tavistock.
- Charuvastra, A. & Cloitre, M. (2008). Social bonds and posttraumatic stress disorder. *Annual Review of Psychology*, *59*, 301-328.
- Dietz, R.D. (2002). The estimation of neighborhood effects in the social sciences: An interdisciplinary approach. *Social Science Research*, *31*, 539-575.
- Derogatis, L.R., Lipman, R.S., Rickels, K., Uhlenhuth, E.H. & Vovi, L. (1974). The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behavioral Science, 19 (1)*, 1-15.
- De Jong, J.T., Komproe, I.H., Van Ommeren, M. (2003). Common mental disorders in postconflict settings. *Lancet (21)*, 361(9375), 2128-2130.
- De Silva, M.J., Huttly, S.R., Harpham, T., Kenward, & M.G. (2007). Social capital and mental health: A comparative analysis of four low income countries. *Social Science & Medicine, 64*, 5-20.
- De Silva, M.J., McKenzie, K., Harpham, T. & Huttly, S.R. (2005). Social capital and mental illness: a systematic review. *Journal of Epidemiology & Community Health, 59(8)*, 619-627.
- Field, J. (2003). Social Capital. Routledge.

- Galea, S., Tracy, M., Norris, F. & Coffey, S.F. (2008). Financial and Social Circumstances and the Incidence and Course of PTSD in Mississippi During the First Two Years After Hurricane Katrina. *Journal of Traumatic Stress*, 21(4), 357-368.
- Gibbs, M.S. (1989). Factors in the victim that mediate between disaster and psychopathology: A review. *Journal of Traumatic Stress*, *2(4)*, 489-514.
- Government office of the North East. (2007). *Local authority area profile Castle Morpeth*. http://www.gos.gov.uk/nestore/docs/ourregion/laps/castle_ morpeth.pdf
- Hamano, T., Fujisawa, Y., Ishida, Y., Subramanian, S.V., Kawachi, I. & Shiwaku, K. (2010). Social capital and mental health in Japan: a multilevel analysis. *PLoS One, 6, 5(10)*, e13214.
- Harper, R. & Kelly, M. (2003). Measuring Social Capital in the United Kingdom. London: Office for National Statistics.
- Harpham, T., Grant, E. & Thomas, E. (2002). Measuring social capital within health surveys: key issues. *Health Policy and Planning*, *17(1)*, 106-111.
- Hobfoll, S.E., Watson, P., Bell, C.C., Bryant, R.A., Brymer, M.J., Friedman, M.J. et al. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, *70(4)*, 283-315.
- Hurtado, D., Kawachi, I. & Sudarsky, J. (2011). Social capital and self-rated health in Colombia: The good, the bad and the ugly. *Social Science & Medicine*, *72(4)*, 584-590.
- Jöreskog, K. & Sörbom, D. (1993). Lisrel 8: Structural Equation modelling with the SIMPLIS command language. Chicago. Scientific Software International.
- Kawachi, I. (2006). Commentary: Social capital and health: making the connections one step at a time. *International Journal of Epidemiology, 35*, 989–993.
- Kawachi, I. & Berkman, L.F. (2001). Social ties and mental health. *Journal of Urban Health*, 78 (3), 458-467.
- Kawachi, I., Kennedy, B.P., Lochner, K. & Prothrow-Stith D. (1997). Social capital, income inequality, and mortality. *American Journal of Public Health*, *87(9)*, 1491-1498.
- Kawachi, I. & Subramanian, S.V. (2006). Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal of Traumatic Stress, 19(2)*, 195-203.
- Kawachi, I., Subramanian, S.V. & Kim, D. (2008). Social capital and health: a decade of progress and beyond. In I. Kawachi, S.V. Subramanian & D. Kim, (Eds.), *Social Capital and Health*. (pp. 1-26). New York: Springer.

- Lazarus, R.S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine*, 55, 234-247.
- Lazarus, R.S. & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.
- Lin, N., Ye, X. & Ensel, W,M. (1999). Social support and depressed mood: a structural analysis. *Journal of Health and Social Behavior, 40*, 344-359.
- Mattlin, J.A., Wethington, E. & Kessler, R.E. (1990). Situational Determinants of Coping and Coping Effectiveness. *Journal of Health and Social Behavior*, *31(1)*, 103-122.
- McKenzie, K., Whitley, R. & Weich, S. (2003). Social capital and mental health. *British Journal of Psychiatry*, 181, 280-283.
- Norris, F.H. (2002). Psychosocial consequences of disasters. *PTSD research quarterly, 13, (2).*
- Norris, F.H., Baker, C.K., Murphy, A.D. & Kaniasty, K. (2005). Social support mobilization and deterioration after Mexico's 1999 flood: effects of context, gender, and time. *American Journal of Community Psychology*, 36(1-2), 15-28.
- Norris, F.H., Friedman, M.J. & Watson, P.J. (2002). 60,000 disaster victims speak: part I: an empirical review of the empirical literature, 1981–2001. *Psychiatry*, 65 (3), 240-260.
- Najarian, L.M., Goejian, A.K., Pelcovitz, D., Mandel, F. & Najarian, B. (2002). The effect of relocation after a natural disaster. *Journal of Traumatic Stress*, *14 (3)*, 511-526.
- Norris, F.H. & Kaniasty, K. (1999). Received and perceived social support in times of stress: a test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71 (3)*, 498-511.
- Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F. & Pfefferbaum, R.L. (2008). Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness. *American Journal of Community Psychology*, 41(1-2), 127-150.
- Priebe, S., Grappasonni, I., Mai, M., Dewey, M., Petrelli, F. & Costa, A. (2010). Mental disorders, psychological symptoms and quality of life 8 years after an earthquake: findings from a community sample in Italy. *Social Psychiatry and Psychiatric Epidemiology*, 32, 76-83.
- Punamäki, R.-L., Salo, J., Komproe, I., Qouta, S., El-Masri, M. & De Jong, J.T.V.M. (2008).Dispositional and situational coping and mental health among Palestinian political ex-Prisoners. *Anxiety, Stress & Coping, 21(4)*, 337-358.

- Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology, 24*, 1-24.
- Punamäki, R.-L., Komproe, I., Qouta, S., El-Masri, M. & De Jong, J.T. (2005). The deterioration and mobilization effects of trauma on social support: childhood maltreatment and adulthood military violence in a Palestinian community sample. *Child Abuse and Neglect, 29(4)*, 351-373.
- Ross, C.E., Reynolds, J. & Geis, K. (2000). The contingent meaning of neighbourhood stability for residents psychological well-being. *American Sociological Review*, 65, 581–597.
- Sandler, I. (2001). Quality and Ecology of Adversity as Common Mechanisms of Risk and Resilience. *American Journal of Community Psychology, 29(1)*, 19-61.
- The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. (1993) Paper presented at the 9th Annual Meeting of the International Society for Traumatic Stress Studies San Antonio, Texas, 24-27.
- Tuan, T., Harpham, T., Huong, N.T., De Silva, M., Huong, V.T.T., Long, T.T., Van Ha, N.T. & Dewitt, D. (2005). Measuring social capital and mental health in Vietnam: A validity study. http://www.younglives.org.uk
- Weitkunat, R. & Wildner, M. (2002). Exploratory causal modeling in epidemiology: are all factors created equal? *Journal of Clinical Epidemiology*, *55*(*5*), 436-444.
- World Medical Assembly (48th). (1997). Declaration of Helsinki: Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, 277, 925-926.
- Yen, I.H. & Syme, S.L. (1999). The social environment and health: a discussion of the epidemiologic literature. *Annual Review of Public Health, 20*, 287-308.

The mechanisms that associate community social capital with post-disaster mental health: a multilevel model

Wind TR Komproe IH

Published in: Social Science & Medicine (2012), 75(9), 1715-1720.

Abstract

Many scholars have advocated that the time has come to provide empirical evidence of the mechanisms that associate community social capital with individual disaster mental health. For this purpose we conducted a study (n=232) one year after a flood (2008) in Morpeth, a rural town in northern England. We selected posttraumatic stress as an indicator of disaster mental health. Our multilevel model shows that high community social capital is indirectly salutary for individual posttraumatic stress. In particular, in communities (defined as postcode areas) with high structural social capital, the results suggest that individuals confide in the social context (high cognitive social capital) to address disaster-related demands (high collective efficacy), and employ less individual psychosocial resources (i.e. coping strategies and social support). This 'conservation of individual psychosocial resources' in a salutary social context decreases the association between the appraisal of the disaster and posttraumatic stress. As a result of this mechanism, individuals suffer less from posttraumatic stress in communities with high social capital. These findings provide new insights how intervention policies aimed at strengthening both objective and subjective dimensions of social capital may reduce post-disaster mental health problems.

Keywords: Social capital, mental health, disaster, multilevel modeling, England
Introduction

Now that the salutary association between community social capital and mental health is becoming increasingly established (Almedom, 2005; Berry & Welsh, 2010; Engström et al, 2008; Suzuki et al, 2010), the time has come to provide empirical evidence for *how* community social capital is associated to mental health (De Silva et al, 2007; Nakhaie & Arnold, 2010; Wang et al, 2009). Yet, most scholars to date merely focused on the relationship between social capital and mental health with socio-demographic factors as covariates. The purpose of this paper is to examine three different cross-level relationships through which community social capital is related to individual mental health in a disaster setting.

First, we distinguish structural and cognitive components of social capital. Structural social capital refers to the presence of community linkages, while cognitive social capital refers to the appreciation of these community linkages in terms of trust, mutual help and reciprocity (Harpham, 2002). A review found that associations between community social capital and mental health outcomes are especially ambiguous for structural social capital (De Silva et al, 2005). It has been suggested that the two components of social capital are differently related to mental health (Harpham, 2008). Woolcock (2001) claims that trust (i.e. cognitive social capital) is a consequence of structural components of social capital. This sequential relationship may explain the ambiguous and weak associations between structural social capital and mental health (De Silva et al, 2005, 2007). More distal variables (structural social capital) show by their nature weaker relationships with mental health outcomes. This study will test the hypothesis that structural social capital is sequentially related to mental health via cognitive social capital.

Second, collective efficacy refers to the communities' capacity to deal adequately with environmental demands and to achieve goals through its social organization that cannot be achieved by individuals alone (Sampson et al, 1997). According to Sampson and colleagues (1997) 'the notion of collective efficacy emphasizes residents' sense of active engagement that is not well captured by the term social capital'. Although these two concepts have much in common, Sampson (1997) claims that social capital refers to the resource potential of social networks, whereas collective efficacy refers to the shared expectations and mutual engagement by individuals in active support. This distinction differentiates the process of activating or converting social ties to achieve

desired outcomes from the ties themselves (Portes, 1998). Both components of social capital facilitate collective efficacy, and according to Eriksson (2011) both components of social capital are likely to be sequentially related to collective efficacy: Structural social capital provides the resources that are necessary for collective action (Sampson et al, 1997), and cognitive social capital creates the right ambiance to engage in collective action (Eriksson, 2011). Through collective actions community members can increase control over their lives and environment, and this increased control over post-disaster demands may in turn mitigate individual mental health problems (Da Silva et al, 2007). This study will examine the hypothesis that the two components of social capital exert their effect on mental health outcomes via collective efficacy.

Third, several researchers (Kawachi & Berkman, 2001; Wind, Fordham, & Komproe, 2011) argue that the interaction between the social context and individual psychosocial resources – such as coping and social support – impacts disaster mental health. This study examines the interaction between the social context and the following well-established individual psychosocial model: According to Thoits (1986) the appraisal of the disaster predicts mental health rather than the occurrence of the disaster itself. This appraisal process determines individual coping behavior and the search for social support. The adequateness of individual coping efforts and received social support to address perceived disaster-related demands ultimately determines disaster mental health outcomes. High levels of coping efforts indicate an inability to cope effectively with high levels of demands, and are associated to more mental health problems (Punamäki et al, 2008). High levels of social support are found to be salutary for post-disaster mental health (Norris & Kaniasty, 1996).

We use multilevel modeling procedures to test the three hypothesized crosslevel relationships and examine how social capital is related to post-disaster mental health. The study was conducted one year after a flood in Morpeth, a small town located in northern England. In September 2008 the residents of Morpeth were confronted with its worst flood in half a century which left great material damage. In this study we selected posttraumatic stress as an indicator of disaster mental health. Galea and colleagues (2008) showed that the social disaster context is an important risk factor for the prolongation of posttraumatic stress up to two years.

Method

We obtained a list of flooded premises that comprised 757 households from the local authorities in Morpeth. In August and September 2009, we approached these households. In case respondents were absent, the addresses were revisited twice. Ninety respondents refused to participate in the survey due to a lack of time. Despite migration of some residents as their houses were still not livable (41 respondents), and absence of households members at the time of study (390 respondents), we were able to administer the interview to 232 respondents (72% of the approached respondents, and 30.6% of the total address list participated in the study). The demographics of the samples are depicted in Table 1.

A local research firm conducted the survey with experienced local surveyors under supervision of the local principal investigator. The surveyors received oneday training in the administration of the questionnaire. Written informed consent was obtained from the participants after an introduction and explanation of the study purpose. The ethical approval for the study was obtained from Northumbria University. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki (World Medical Assembly, 1997).

	Answer categories	Frequency (percentage)
Demographics		
Gender	1. Male	90 (38.8)
	2. Female	141 (60.8)
Age group	1.<18	1 (0.5)
	2.18-24	5 (2.7)
	3.25-39	17 (9.0)
	4.40-64	57 (42.6)
	5. > 65	108 (57.4)
Religion	1. Religious	197 (94.9)
	2. None	34 (14.7)
Marital status	1. Married	83 (35.8)
	2. Single	40 (17.2)
	3. Separated	6 (2.6)
	4. Divorced	23 (9.9)
	5. Widowed	73 (31.5)
	6. Common law	6 (2.6)

Table 1. Demographic characteristics of the study sample

Education	 1.<high li="" school<=""> High School Some college College or post- graduate </high>	93 (40.1) 58 (25.0) 13 (5.6) 51 (22.0)
Work	 Employed Seeking work Carer or looking after children/house Student or on training scheme Retired 	75 (32.3) 12 (5.2) 9 (3.9) 2 (0.9) 133 (57.3)
Community variables		Mean (SD)
Structural Social Capital		.38 (.26)
Cognitive Social Capital		3.08 (.48)
Collective Efficacy		
Concentre Enneacy		3.05 (.41)
House Ownership		3.05 (.41) 1.78 (.95)

Measurement of variables

Posttraumatic Stress was assessed by the PTSD Checklist Civilian Version (PCL-C; Weathers et al, 1993). To measure disaster-related mental health, the introduction of this questionnaire explicitly referred to the flood, and the wording of eight items of the PCL-C were adapted to the specific experience of the flood. The Cronbach's alpha was 0.96.

Community variables

It has been argued (Thomas, 2007) that ecological associations are best explored using data from small areas such as the 'home patch' that constitute a homogeneous community. Thomas (2007) claimed that the postcode unit is a rough proximate of the geographical area where the key social interactions take place in England. In this study, the individual scores on community variables were aggregated to the postcode units.

Social Capital. We selected the SA-SCAT (Harpham et al, 2002) to measure social capital. Some items of the SA-SCAT were adapted to improve the relevance for the local context (Wind, Fordham & Komproe, 2011). Structural capital was

measured by 8 items with a four point response format. The Cronbach's alpha was .74. Cognitive social capital was measured by 7 statements with a four point response format. The Cronbach's alpha was .76.

Collective Efficacy. Collective Efficacy comprises 5 items with a five point response format (Sampson et al, 1997). The Collective Efficacy scale measures the willingness to intervene in neighborhood-threatening situations. Residents were asked about the likelihood that neighbors could count on assistance in 5 specific community situations. The Cronbach's alpha was .92.

Several scholars (Almedom, 2005; Kawachi & Subramanian, 2006; Sampson et al, 1997) advice to include objective indicators of social capital, since social capital measured by self-report questionnaires is partly determined by the perception of individuals. Sampson and colleagues (1997) showed that *Residential Stability* in a neighborhood is associated to social interactions in a neighborhood. Residential Stability in this study was measured by the response options: rented [1], owned with mortgage [2], owned outright [3]. Almedom (2005) showed that higher *Income* in neighborhoods fosters greater access to social structures (Structural Social Capital).

Individual level variables

Disaster Property Loss was defined as an indicator for the severity of the individual disaster experience. The variable was measured by four questions with a five point response format: To what extent did you experience damage or loss to: (1) the structure of your house, (2) the contents and belongings of your house, (3) personal belongings with sentimental value, (4) your car. The total Property Loss score was used in the analyses.

Primary Appraisal. Primary appraisal, the perceived threat of the situation, was measured by the question 'How traumatic was the flood for you at the time?' Respondents could indicate their answers on a five-point response format ranging from 'not at all' [1] to 'extremely' [5].

Coping Effort. Coping Effort is defined as to what extent a variety of coping strategies were employed to deal with an experienced stressor. We used a questionnaire with six items with a five point response format that assessed individual coping (Mattlin et al, 1990). The items referred to the strategies Avoidance, Reappraisal, Religion, Active cognitive coping, Active behavioral coping, and seeking Social support. The Cronbach's alpha was 0.86.

Social Support. The Social Support Scale of Harper and Kelly (2003) was used to assess Social Support. Respondents were asked to indicate how often they received ten types of social support on a five point response format. The Cronbach's alpha was 0.72.

Statistical analyses

To examine the several pathways between social capital defined at the community level (i.e. postcode level) and Posttraumatic Stress defined at the individual level, we applied two-step multilevel structural equation modeling (ML-SEM).

Step 1: SEM analysis of the individual model

We started modeling the theoretical individual model with four individual predictors of mental health, and Age and Gender. We used three fit indices to evaluate the individual models (Bentler, 1990): (1) the X² value of the model fit; (2) the Root Mean Square Error of Approximation (RMSEA) of the model (should be<.05); and (3) the Comparative Fit Index (CFI) (CFI>0.90 refers to an acceptable model fit). We modeled the most constrained model that has the relative best fit indicated by its chi-square value compared to the chi-square values of more and less constrained models (Best Fitting (BF) model, see Anderson & Gerbing, 1988). To avoid fully data driven path models, we confined our analyses to models in which only modifications of the models supported by the literature were allowed.

Step 2: Multilevel Structural Equation Modeling

In the second step, we modeled the within and between-level variance of both the individual and community variables simultaneously through a stepwise procedure. The community-level random effect of the intercept was assumed to be normally distributed with a mean of zero.

Empty model: We examined the community-level variance in Posttraumatic Stress without including any explanatory variables.

Model 1A – 1B: Model 1A is the BF model. In model 1B we examined the direct cross-level association between the community variables and Posttraumatic Stress without including the individual variables.

Model 2: In model 2 we examined the direct pathways from the community variables to Posttraumatic Stress in addition to the explained variance of the individual BF model.

Model 3A – 3C: In model 3A to 3C we examined the direct cross-level pathways between each separate community variable and the individual variables, and the cross-level interaction terms of the community variables and the relationships in the individual BF model.

Model 4: In model 4, we test the total multilevel model that included all significant structural equation relationships at the individual and community

level in the previous models (1 to 3) and additional hypothesized pathways from Structural Social Capital to Cognitive Social Capital and Collective Efficacy, and Cognitive Social Capital to Collective Efficacy. Additionally, we tested the hypothesis that Residential Stability and Income facilitated access to social capital.

The multilevel modeling was based on (i) the likelihood of the estimates (significance<0.05), (ii) the degree of support for the estimates in the literature (i.e. theoretical value), (iii) and a set of model fit indices. We evaluate the fit of the ML-SEM models by two fit indices: (1) Likelihood ratio test (LRT) for nested-model fit, and (2) Akaike information criterion (AIC). The LRT and AIC evaluate the relative fit of ML-SEM models by comparing the difference in the fit functions given the difference in number of estimated parameters. Lower values of the LRT and AIC indicate closer fit (Mehta & Neale, 2005).

Results

Demographics

Table 1 depicts the individual demographic information of the sample. The study sample contains 236 individuals nested within 59 postcode units with an average cluster size of 3.91 individuals per postcode unit.

Step 1: SEM analysis of the individual model

The initial theoretical model in the SEM had a bad model fit ($X^2(7)=23.32$; *p* <.001; CFI=.90; RMSEA=.16). The subsequent modeling procedure based on this theoretical model yielded the BF model presented in Figure 1. This model had a good fit ($X^2(10)=13.73$, *n.s.*; CFI=.97; RMSEA=0.56).

Step 2: Multilevel Structural Equation Modeling

Empty model: The intra-cluster correlation for Posttraumatic Stress across postcodes was 0.06. The fit indices of each model can be compared in Table 2.

Model 1A: The BF model.

Model 1B: Of the community variables and Posttraumatic Stress, only Cognitive Social Capital showed a significant negative pathway with Posttraumatic Stress (β =-.36; *p*<.001). Individuals in communities with high Cognitive Social Capital showed less Posttraumatic Stress.

Model 2: None of the three cross-level pathways were significant.

Model 3A: The negative pathway between Cognitive Social Capital and Coping Effort was significant (β =-.17; p<.05), and Cognitive Social Capital moderated the association between Age and Posttraumatic Stress (β =.14; p<.001).

Model 3B: The negative pathway between Collective Efficacy and Social Support was significant (β =-.23; p<.05), and Collective Efficacy showed a cross-level interaction effect on the association between Social Support and Posttraumatic Stress (β =-.07; p<.05).

Model 3C: The negative pathway between Structural Social Capital and Coping Effort was significant (β =-.05; p<.01).

Model 4: The final model (Model 4) is depicted in Figure 2. The fit indices of the final multilevel model in step 4 indicated better fit than the models in step 1 to 3. The final model met all three criteria to value ML-SEM models.

The pathways between Structural Social Capital and Cognitive Social Capital (β =.17; p<.001), and between Structural Social Capital and Collective Efficacy (β =.28; p<.001) were significant. We found no significant pathway between Cognitive Social Capital and Collective Efficacy. The pathways between Structural Social Capital and Coping Effort, between Primary Appraisal and Posttraumatic Stress, and between Coping Effort and Social Support decreased below significance. Cognitive Social Capital moderated the association between Age and Posttraumatic Stress (β =.14; p<.001). Further, we found no relationship between the community variable Income and the variables comprising the social context. Residential Stability showed a negative relationship with Collective Efficacy (β =.17; p<.001).

The final model showed that the effect of Structural Social Capital on Posttraumatic Stress was indirect via individual psychosocial variables. The association between Structural Social Capital and individual variables was in turn mediated by Cognitive Social Capital and Collective Efficacy. In communities with a salutary social context (i.e. high Structural Social Capital, high Cognitive Social Capital, and high Collective Efficacy) the association between Primary Appraisal and Posttraumatic Stress was weak or absent. High Age was especially a protective factor for Posttraumatic Stress in communities with high Cognitive Social Capital. Individuals who rented their homes perceived higher Collective Efficacy than individuals who owned their home.

	Model 1A	Model 1B	Model 2	Model 3A	Model 3B	Model 3C	Model 4
AIC	4030.63	4250.43	3423.85	3850.00	3853.75	3862.68	2653.68
LRT	-1997.32	-2104.22	-1685.92	-1885.00	-1882.87	-1890.34	-1291.84

80





X²(10)=13.73, *n.s.*; RMSEA=.056; AIC=4030.63; LRT=-1997.32





AIC=2653.68; LRT=-1291.84

81

Discussion

The present study showed that the social context was protective against disasterrelated distress, as in a community with high social capital the post-disaster reality was less demanding for individual psychosocial resources (cf. Kawachi & Berkman, 2001). Via this mechanism the social context was *indirectly* health sustaining.

82

Our original hypothesis that collective efficacy and cognitive social capital mediate the association between structural social capital and posttraumatic stress was not fully confirmed (Woolcock, 2001). Our final model showed indirect cross-level relationships with individual psychosocial resources: high cognitive social capital was associated with less coping efforts, and high collective efficacy decreased the employment of social support by individuals. These findings suggest that in communities with high social capital disaster-affected individuals rely on the social context to address disaster-related demands, and may not (need to) employ individual resources (i.e. coping strategies and social support) to address such demands. This dependency on the collective to address disaster-related demands was greater in communities with less residential stability. Apparently, in neighborhoods where more houses are rented, individuals rely more on the collective and use less individual resources to address disaster-related demands than in a neighborhood where premises are owned. In a community with high social capital, such 'conservation of individual psychosocial resources' (cf. Hobfoll, 1989) decreased the association between the (traumatic) appraisal of the disaster and posttraumatic stress. As a result, individuals in communities with high social capital suffered less from posttraumatic stress.

There has been fierce debate whether to intervene on the community or individual level to mitigate post-disaster mental health problems, and currently the importance of community interventions that foster social capital is privileged over the sole implementation of individual psychological interventions (Van Ommeren & Wessels, 2007). Adding to this discourse, our final model indicates that both types of interventions are not only geared towards the same end of improving individual mental health (Kawachi & Subramanian, 2006), but also exert their effect on mental health via the same individual mechanisms. Namely, cognitive behavioral interventions – the individual intervention of choice to address prolonged posttraumatic stress (Van Ommeren, Morris & Saxena, 2008) – alter the relationship between the original emotional response (cf. primary appraisal) and current distress, and mold individual behavior towards a more adequate response (coping and seeking social support). Our final model showed that cultivation of social capital exerts its salutary influence on posttraumatic stress via the exact same mechanisms. Yet, the clear advantage of community interventions that foster social capital over traditional individually oriented interventions, is that they represent the possibility of promoting positive outcomes effectively with relative few resources (Van Ommeren & Wessels, 2007). Our findings indicate how the cultivation of community social capital may help to decrease the need for individual psychological interventions (Hobfoll et al, 2007).

Limitations

The study has some potential limitations. First, the cross-sectional design of our study and the absence of data on pre-flood mental health, did not allow for causal inferences of disaster related distress to the flood in specific. We tried to overcome these limitations by adapting the mental health questions to the particular experience of the flood. Furthermore, the technique of MI-SEM enabled us to elucidate pathways within the model, and provided us insight in the social mechanisms related to disaster-related distress. Second, the response rate was relative low and it is not clear to what extent the study sample is representative for the population of affected households in Morpeth. Third, the relatively high age of the study sample may hamper the extrapolation of our study results to other disaster-affected populations. We attempted to partly overcome this limitation by modeling the age variance in our study. Fourth, our results relied solely upon (aggregation of) individual responses. Relying on one source of data creates the risk of not uncovering biases related to this single data source; a bias called the 'common source bias'. Kawachi and Subramanian (2006) discuss the use of objective markers of (access to) social capital. We included such objective indicators (cf. income and residential stability) which did however rely on individual report. The conclusions would have been strengthened by including another source of data in the analyses, such as the per capita density of organizations within a community.

Conclusion

Many scholars (e.g. Nakhaie & Arnold, 2010; Wang et al, 2009) advocated that the time has come to provide empirical evidence for mechanisms through which community social capital is related to individual disaster mental health. To the best of our knowledge this is the first disaster study to empirically elucidate such cross-level mechanisms that associate community social capital with post-disaster mental health. We showed that a fertile social context (i.e. high social capital) decreases the association between the individual emotional response to the disaster and posttraumatic stress, as in communities with high social capital a disaster may be less demanding for individual psychosocial resources. Through this mechanism individuals in communities with high social capital suffer less from disaster-related distress. McKenzie and colleagues (2002) highlighted that other types of mental health problems such as depression and substance abuse may not share a common pattern of association with social capital, and thus we invite future researchers to reveal the pathways through which the social context affects other indicators of post disaster mental health problems.

The mechanisms that associate community social capital with post-disaster mental health

References

- Almedom, A. M. (2005). Social capital and mental health: an interdisciplinary review of primary evidence. *Social Science & Medicine*, *61*, 943-964.
- Anderson, J. C. & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103 (3)*, 411-423.
- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin 107*, 238-246.

85

- Berry, H.L. & Welsh, J.A. (2010). Social capital and health in Australia: An overview from the household, income and labour dynamics in Australia survey. *Social Science & Medicine, 70 (4),* 588-596.
- De Silva, M.J., Huttly, S.R., Haprham, T., Kenward, M.G. (2007). Social capital and mental health: a comparative analysis of four low income countries. *Social Science & Medicine, 64 (1), 5-20.*
- De Silva, M. J., McKenzie, K., Harpham, T. & Huttly, S. R. (2005). Social capital and mental illness: a systematic review. *Journal of Epidemiology and Community Health, 59*, 619-627.
- Eriksson, M. (2011). Social capital and health implications for health promotion. *Global Health Action*, (4). Available at: http://www.globalhealthaction. net/index.php/gha/article/view/5611
- Galea, S., Tracy, M., Norris, F. & Coffey, S.E. (2008). Financial and social circumstances and the incidence and course of PTSD in Mississippi during the first two years after Hurricane Katrina. *Journal of Traumatic Stress*, *21(4)*, 357-368.
- Harper R. & Kelly M. (2003). *Measuring Social Capital in the United Kingdom*. London: Office for National Statistics.
- Harpham, T. (2008). The measurement of community social capital through surveys. In I. Kawachi, S.V. Subramanian & D. Kim (eds.). *Social capital theory and health* (pp. 51-62). New York: Springer.
- Harpham, T., Grant, E. & Thomas, E. (2002). Measuring social capital within health surveys: key issues. *Health Policy and Planning*, *17(1)*, 106-111.
- Hobfoll, S.E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *American Psychologist*, *44(3)*, 513-524.
- Kawachi, I. & Subramanian, S.V. (2006) Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal of Traumatic Stress, 19(2)*, 195-203.

- Kawachi I. & Berkman L.F. (2001). Social ties and mental health. *Journal of Urban Health*, 78, 458-467.
- Mattlin, J.A., Wethington, E. & Kessler, R.E. (1990). Situational Determinants of Coping and Coping Effectiveness. *Journal of Health and Social Behavior*. *31(1)*, 103-122
- McKenzie, K., Whitley, R. & Weich, S. (2002). Social capital and mental health. *British Journal of Psychiatry*, 181, 280-283.
- Mehta, P.D. & Neale, M.C. (2005). People are variables too: Multilevel Structural Equations Modeling. *Psychological Methods*, *10(3)*, 259-284.
- Nakhaie, R. & Arnold, R. (2010). A four year (1996-2000) analysis of social capital and health status of Canadians: the difference that love makes. *Social Science & Medicine*, *71*(*5*), 1037-1044.
- Norris, F.H. & Kaniasty, K. (1996). Received and perceived social support in times of stress: a test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71(3)*, 498-511.
- Punamäki, R-L, Salo, J., Komproe, I.H., Qouta, S., El-Masri, M., De Jong, J.T.V.M. (2008). Dispositional and situational coping and mental health among Palestinian political ex-prisoners. *Anxiety, Stress & Coping, 21(4),* 337-358.
- Sampson, R.J., Raudenbush, S.W. & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, *277 (5328)*, 918-924.
- Suzuki, E., Takao, S., Subramanian, S.V., Komatsu, H., Doi, H. & Kawachi, I. Does low workplace social capital have detrimental effect on workers' health? *Social Science & Medicine*, 70(9), 1367-1372.
- Thoits, P.A. (1986). Social support as coping assistance. *Journal of Consulting and Clinical Psychology*, *54*, 416-423.
- Thomas, H., Weaver, N., Patterson, J., Jones, P., Bell, T., Playle, R., Dunstan, F. Palmer, S., Lewis, G. & Araya, R. (2007). Mental health and quality of residential environment. *British Journal of Psychiatry*, 191, 500-505.
- Van Ommeren, M. & Wessels, M. (2007). Inter-agency agreement on mental health and psychosocial support in emergency settings. *Bulletin of the World Health Organization*, 85(11), 822.
- Wang, H., Schlesinger, M., Wang, H. & Hsiao, W.C. (2009). The flip-side of social capital: the distinctive influences of trust and mistrust on health in rural China. *Social Science & Medicine*, *68(1)*, 133-142.
- Weathers F.W., Litz B.T., Herman D.S., Huska J.A. & Keane T.M. (1993). *The PTSD Checklist (PCL): reliability, validity, and diagnostic utility.* Paper

The mechanisms that associate community social capital with post-disaster mental health

presented at the 9th Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, Texas; 1993, 24-27.

- Wind, T.R., Fordham, M. & Komproe, I.H. (2011). Social capital and post-disaster mental health. *Global Health Action*, 4, Available at: http://www. globalhealthaction.net/index.php/gha/article/view/6351
- Woolcock M. (2001). The place of social capital in understanding social and economic outcomes. *ISUMA: Canadian Journal of Policy in Health Research*, 2, 11-17.
- World Medical Assembly (48th) (1997). Declaration of Helsinki: Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, 277, 925-926.

Gender differences in the link between the social context and post-disaster mental health

Wind TR Kleber RJ Komproe IH

Manuscript has been provisionally accepted in Plos One for publication.

Abstract

Differences in disaster mental health between men and women are well described and explained in the literature. However, empirical evidence for the role of mechanisms in the social context (i.e. social capital) is hardly available. Such evidence completes the understanding of disaster mental health and facilitates the development of interventions to the specific post-disaster needs of men and women. To reveal possible gender specific mechanisms, we undertook a community study (n=232) one year after a flood (2008) in Morpeth - a rural town in northern England. Our findings showed universal and genderspecific associations between the social context and disaster mental health. The universal protective nature of a neighborhood with high social capital is that it facilitates and improves the employment of individual psychosocial resources (coping and social support). Consequently, high community social capital is associated with less posttraumatic stress among men and women. Yet, men and women showed a tendency to benefit from different mechanisms of the social context. Trust and mutual reciprocity in a community (i.e. cognitive social capital) stimulate women to apply coping efforts to deal with disaster mental health problems in a more parsimonious and efficient fashion. Findings among men suggest that residing in collective effective communities (cf. high collective efficacy) was associated with less employment of social support (i.e. family and friends) to deal with the consequences of the flood. Thus, social support among men became less relevant for dealing with disaster mental health problems. These findings may help to increase the effect of both individual and community oriented (psychosocial) interventions on disaster mental health by incorporating or stimulating these communal mechanisms.

Keywords: Social capital, mental health, disaster, gender, multilevel modelling, England

Introduction

Scholars consistently found that women are especially vulnerable to develop mental health complaints after massive aversive events, like disasters (Olff et al, 2007; Punamäki et al, 2005). This difference between disaster mental health outcomes of men and women can be explained from several perspectives.

Traditionally, gender differences in disaster mental health have been explained at the individual level. For one, women show stronger perceptions of threat and loss of control (Olff et al, 2007). Compared to male trauma survivors, female trauma survivors endorse more self-blame for the event, a greater belief that they were incompetent or damaged, and a greater belief that the world is dangerous (Tolin & Breslau, 2007). Second, whereas women tend to maintain more emotionally intimate relationships (Araya et al, 2007) and mobilize more social support during periods of stress than men (Kawachi & Berkman, 2001), this propensity for intimate social involvement may predispose women to the 'contagion of stress' when stressful life events afflict those to whom they feel emotionally close (Belle, 1983). Further, women are particularly susceptible to gender inequalities in domestic relationships, because men's mobilization of support is heavily focused on their spouses, whereas women mostly rely on friends (Kawachi & Berkman, 2001). This gendered inequality in social support may again yield women particularly vulnerable to stress. Third, women are more emotion-focused in their coping than men, whereas men demonstrate more problem-solving coping to adverse events (Clohessy & Ehlers, 1999; Lazarus & Folkman, 1984; Punamaki et al, 2008; Skinner et al, 2003). Emotion-focused coping refers to introspective efforts to reframe or cognitively reappraise a problem so that it fits better with external demands (Berg, Meegan & Deviney, 1998). Research favors the coping style by men to employ high levels of active and constructive and low level of emotion-focused coping under adverse circumstances. This strategy was associated with low levels of psychiatric symptoms and psychological distress (e.g. Punamaki et al, 2008).

Recently, we showed that the appraisal of the disaster situation, social support and coping largely depend on access to available social resources in a community (Wind, Fordham, & Komproe, 2011; Wind & Komproe, 2012). Within research on the effects of social community structures on mental health, many scholars embraced the concept 'damaged social fabric' and the role of 'social capital' (De Silva et al, 2007; Kawachi & Subramanian, 2006). There are several definitions of social capital, but in general social capital is defined as 'the

91

resources an individual can draw on through his or her social networks and the value ascribed to these resources by the individual' (Bourdieu, 1996; Hurtado, Kawachi & Sudarsky, 2011; Kawachi & Subramanian, 2006). Increased social capital is associated to more adequate and efficient employment of coping strategies – including the mobilization of social support (Wind, Fordham & Komproe, 2011; Wind & Komproe, 2012). This parsimonious employment of individual psychosocial resources decreases the association between the traumatic appraisal of the disaster and posttraumatic stress (Wind & Komproe, 2012). Hence, findings suggested that in communities with high social capital affected individuals are more resilient to symptoms of posttraumatic stress.

Although gender differences in the employment of individual psychosocial resources are clear, it is not well-understood how gender interacts with social community resources. This begs the question if community social capital 'conserves' individual psychosocial resources in the same way for men and women. Scholars have claimed that this lack of understanding may lead to serious attribution and intervention errors (Hobfoll et al, 2007; Sumasundaram & Van de Put, 2006). Namely, if the gender aspects of protective social community mechanisms are misunderstood, affected men and women in communities with poor social capital may wrongly assume that they – and not the circumstances – are the failure, and interventions may under- or overestimate people's capabilities (Hobfoll et al, 2007).

The purpose of this paper is to reveal the gender-specific nature of social community mechanisms that determine disaster mental health. The study was conducted one year after a flood in Morpeth, a small town located in northern England. In September 2008 the residents of Morpeth were confronted with its worst flood in half a century which left great material damage.

Method

We obtained a list of flooded premises that comprised 757 households from the local authorities in Morpeth. In August and September 2009, these households were approached by a commercial research firm. In case respondents were absent, their households were revisited twice. Ninety respondents (12%) refused to participate in the survey due to a lack of time. Despite migration of some residents as their houses were still not livable and absence of households members at the time of study (n=390, 52%), 232 respondents participated in the study (72% of the approached respondents, and 31% of the total address list participated in the study). The demographics of the samples are depicted in Table 1.

The local research firm administered the interviews with experienced local surveyors under supervision of the local principal investigator. The surveyors received one-day training in the administration of the verbal interview and registration of the respondents answers on the interview forms. Written informed consent was obtained from the participants after an introduction and explanation of the study purpose. The ethical approval for the study was obtained from Northumbria University. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki (World Medical Assembly, 1997).

	Answer categories	Frequency (percentage)		
Demographics				
Gender	1. Male	91 (38.8)		
	2. Female	141 (60.8)		
Age group	1.<18	1 (0.5)		
	2. 18-24	5 (2.7)		
	3. 25-39	17 (9.0)		
	4. 40-64	57 (42.6)		
	5. > 65	108 (57.4)		
Religion	1. Religious	197 (94.9)		
	2. None	34 (14.7)		
Marital status	1. Married	83 (35.8)		
	2. Single	40 (17.2)		
	3. Separated	6 (2.6)		
	4. Divorced	23 (9.9)		
	5. Widowed	73 (31.5)		
	6. Common law	6 (2.6)		
Education	1. <high school<="" td=""><td>93 (40.1)</td></high>	93 (40.1)		
	2. High School	58 (25.0)		
	3. Some college	13 (5.6)		
	4. College or post- graduate	51 (22.0)		
Work	1. Employed	75 (32.3)		
	2. Seeking work	12 (5.2)		
	3. Carer or looking after children/	9 (3.9)		
	4 Student or on training scheme	2 (0.9)		
	5 Betired	133 (57 3)		

Table 1. Demographic characteristics of the study sample

Community variables	Mean (SD)
Structural Social Capital	.38 (.26)
Cognitive Social Capital	3.08 (.48)
Collective Efficacy	3.05 (.41)

94 Measurement of variables

The social context

We operationalized the social context into three constructs that have been shown to be related to mental health (Almedom, 2005; Sampson, 1997; Wind & Komproe, 2012): structural and cognitive components of social capital, and collective efficacy. Structural social capital refers to the presence of community linkages, while cognitive social capital refers to the appreciation of these community linkages in terms of trust, mutual help and reciprocity (Harpham, 2002). Collective efficacy refers to the neighborhoods' capacity to deal adequately with environmental demands and to achieve goals through its social organization that cannot be achieved by individuals alone (Sampson et al, 1997). *Social Capital*. We selected the SA-SCAT (Harpham et al, 2002) to measure social capital. Some items of the SA-SCAT were adapted to improve the relevance for the local context (Wind, Fordham, & Komproe, 2011). Structural capital was measured by 8 items with a four point response format. The Cronbach's alpha was .74. Cognitive social capital was measured by 7 statements with a four point response format. The Cronbach's alpha was .76.

Collective Efficacy. Collective Efficacy comprises 5 items with a five point response format (Sampson et al, 1997). The Collective Efficacy scale measures the perceived willingness to intervene in neighborhood-threatening situations. Residents were asked about the likelihood that neighbors could count on assistance in 5 specific community situations. The Cronbach's alpha was .92.

It has been argued (Thomas, 2007) that contextual associations are best explored using aggregated data from individuals in small homogeneous community areas such as postcode units as a rough proximate of the geographical area where the key social interactions take place. Therefore in this study, the individual scores on social community variables were aggregated to postcode units (Wind & Komproe, 2012).

Individual level variables

Symptoms of Posttraumatic Stress was assessed by the PTSD Checklist Civilian Version (PCL-C; Weathers et al, 1993). Symptoms of posttraumatic stress were used as an indicator of individual disaster mental health. In addition, Galea and colleagues (2008) showed that the social disaster context is an important risk factor for the prolongation of posttraumatic stress up to two years. To assess disaster-related mental health, the introduction of this questionnaire explicitly referred to the flood, and the wording of eight items of the PCL-C were adapted to the specific experience of the flood. The Cronbach's alpha was 0.96.

Disaster Property Loss was defined as an indicator for the severity of the individual disaster experience. The variable was measured by four questions with a five point response format: To what extent did you experience damage or loss to: (1) the structure of your house, (2) the contents and belongings of your house, (3) personal belongings with sentimental value, (4) your car. The total Property Loss score was used in the analyses.

Primary Appraisal. Primary appraisal, the perceived threat of the situation, was measured by the question 'How traumatic was the flood for you at the time?' Respondents could indicate their answers on a five-point response format ranging from 'not at all' [1] to 'extremely' [5].

Coping Effort. Coping Effort is defined as to what extent a variety of coping strategies were employed to deal with an experienced stressor. We used a questionnaire with six items with a five point response format ranging from 'not at all' [1] to 'extremely' [5]; that assessed individual coping (Mattlin et al, 1990). The items referred to the strategies Avoidance, Reappraisal, Religion, Active cognitive coping, Active behavioral coping, and seeking Social support. The total score was used in the analyses. The Cronbach's alpha was 0.86.

Social Support. The Social Support Scale of Harper and Kelly (2003) was used to assess Social Support. Respondents were asked to indicate how often they received ten types of social support on a five point response format ranging from 'never' [1] to 'on most days' [5]. The total score was used in the analyses. The Cronbach's alpha was 0.72.

Statistical analyses

To examine the pathways between the social neighborhood variables (i.e. Structural Social Capital, Cognitive Social Capital, ad Collective Efficacy at the postcode level) and Posttraumatic Stress defined at the individual level, we applied two-step multilevel structural equation modeling (ML-SEM) for men and women separately. In the first step, we tested an earlier found individual

recursive model (Wind & Komproe, 2012) in the subsamples of men and women separately. In the second step we elaborated the gender specific individual models with earlier found relevant second-level (i.e. neighborhood level) variables, and model simultaneously the within and between-level variance of both the individual and neighborhood variables (Mehta & Neale, 2005). The analyses in this study were done with LISREL (Jöreskog & Sörbom, 1993) and MPlus (Muthén, 1994).

96

Step 1: SEM analysis of the individual model

First, we retested the earlier found individual model (see Wind & Komproe, 2012) for men and women separately: The original model indicated that a disaster (measured by Disaster Property Loss) evokes an individual subjective experience of the event as stressful (Primary Appraisal). Subsequently, an individual copes with the situation. Depending on the effectiveness of individual coping behavior (Coping Effort) and received Social Support, individuals develop Posttraumatic Stress. In the analyses we used *z*-scores of these variables as a strategy to prevent potential problems due to different ranges of scores.

We specified sequential hierarchically nested models (not shown) based on provided modification indices and evaluated the models by means of several goodness of fit measures. To avoid fully data driven path models, we only defined new paths in sequential nested models that could be (indirectly) derived from the literature. Further, we only specified relationships that resulted in an improvement of the X^2 value of successive models, with at least 5 units (i.e., modification index > 5). Beyond the X² value of the model fit, we used two fit indices to evaluate the different individual models (Bentler, 1990): (1) the Root Mean Square Error of Approximation (RMSEA) of the model (should be<.05); and (2) the Comparative Fit Index (CFI) (CFI > 0.90 refers to an acceptable model fit). The Best Fitting model (BF-model) was obtained from a sequential X² difference tests procedure: the X^2 of the structural model of interest had a significant better fit than a less saturated model but was not significantly worse than a more saturated model (Anderson & Gerbing, 1988). The final BF model for men and women only contains estimated paths with *t*>2.00, thus with significance of p < .05. The BF model comprised the individual base model for the multilevel analyses.

Step 2: Multilevel Structural Equation Modeling

The second step was to define a multilevel structural equation model, that specifies both individual and neighborhood variables as fixed effects and

random effects (heterogeneity between subsamples based on specifications of variables defined on a higher (i.e. aggregated) level). We specified the following basic equation:

$$y_{ij=} \mathcal{B}_{0} + \mathcal{B}_{1} x_{1ij} + \mathcal{B}_{2} x_{2ij} + \mathcal{B}_{3} x_{3ij} + \mathcal{B}_{4} x_{4ij} + \alpha_{1} u_{1j} + \alpha_{2} u_{2j} + \alpha_{3} u_{3j} + (u_{0j} + \varepsilon_{0ij}),$$

in which Posttraumatic Stress (y_{ij}) is defined for individual *i* in postcode *j* by the individual variables Disaster Property Damage (x_{1ij}) , Primary Appraisal (x_{2ij}) , and Social Support (x_{3ij}) , Coping Effort (x_{4ij}) , and the postcode level variables Structural Social capital (u_{1j}) , Cognitive Social Capital (u_{2j}) , and Collective Efficacy (u_{3j}) . In addition, u_{0j} is the postcode-specific random effect, and ε_{0ij} is the random component of the error term. Community-level random effect of the intercept (u_{0j}) was normally distributed with a mean of zero and variance, σ^2_{u0} . We modeled the relationships between the variables of the BF individual model and the neighborhood variables with a stepwise procedure.

Nested variance: On the postcode level, we calculated the intraclass correlation coefficient (ICC) of Posttraumatic Stress on the basis of the outcome of ANOVAs in SPSS 16.0 via the formula: $\rho = (MS_b - MS_w)/(MS_b + (k-1)MS_w)$, in which $\rho = \text{ICC}$; $MS_b =$ mean between group variance, $MS_w =$ mean within group variance, and k = mean observations per group (Shrout & Fleiss, 1979).

Model 1A – 1B: Model 1A is the individual Best Fitting model. In model 1B we examined the direct cross-level associations between the neighborhood variables and individual Posttraumatic Stress.

Model 2: In model 2 we examined the direct pathways from the neighborhood variables to individual Posttraumatic Stress beyond the individual model.

Model 3A – 3C: In model 3A to 3C we examined the direct cross-level pathways between each separate neighborhood variable and the individual variables, and the cross-level interaction terms of the neighborhood variables and the relationships in the individual BF model.

Model 4: In model 4, we test the total multilevel model that included all significant structural equation relationships at the individual and neighborhood level in the previous models (1 to 3). We tested two additional relationships between neighborhood variables: Woolcock (2001) claimed that trust (i.e. cognitive social capital) is a consequence of structural components of social capital, and Sampson and his team (1997) argued that structural social capital provides the resources that are necessary for collective action (Sampson et al, 1997). We test these additional claims (see also Wind & Komproe, 2012).

The final multilevel models in step 4 for men and women met the following

three criteria: (i) the likelihood of the estimates (significance<0.05), (ii) the degree of support for the estimates in the literature (i.e. theoretical value), (iii) and a set of model fit indices. We evaluate the fit of the ML-SEM models by two fit indices: (1) Likelihood ratio test (LRT) for nested-model fit, and (2) Akaike information criterion (AIC). The LRT and AIC evaluate the relative fit of ML-SEM models by comparing the difference in the fit functions given the difference in number of estimated parameters. Lower values of the LRT and AIC indicate closer fit (Mehta & Neale, 2005).

Results

Table 1 depicts the demographic information of the sample. The study sample contains 236 individuals nested within 59 postcode units with an average cluster size of 3.91 individuals per postcode unit.

The individual responses to the items showed no substantial skewness, kurtosis, or outliers.

Step 1: SEM analysis of the individual model

The initial model in the SEM had a bad model fit for women (X²(8)=30.88; p <.001; CFI=.86; RMSEA=.13) and was acceptable for men (X²(8)=12.45 p=0.15.; CFI=.90; RMSEA=.0). The subsequent modeling procedure based on this theoretical model yielded the BF model presented in Figure 1A for women and in Figure 1B for men. These models had a good fit for women (X²(7)=3.89, p=0.88; CFI=1.00; RMSEA=.001), and for men (X²(7)=3.90, p=0.88; CFI=.90; RMSEA=.05).

Figure 1A. The Best Fitting Individual Model for Women





Figure 1B. The Best Fitting Individual Model for Men

99

Step 2: Multilevel Structural Equation Modeling for Women Nested variance: The intra-cluster correlation for Posttraumatic Stress across postcodes was 0.13. The fit indices of each model are shown in Table 2. Model 1A: The BF model for women.

Model 1B: The only variable defined on the neighborhood level that showed a significant pathway with Posttraumatic Stress was Structural Social Capital (β =-.03; *p*<.05).

Model 2: None of the three cross-level pathways were significant.

Model 3A: Only the pathway between Cognitive Social Capital and individual variables was merely marginally significant for Coping Effort (β =-.17; *p*<.07).

Model 3B: Collective Efficacy did not show significant pathways with individual variables.

Model 3C: The negative pathway between Structural Social Capital and Coping Effort was significant (β =-.06; p<.05).

Model 4: When the neighborhood variables were simultaneously entered in the model, the relationship between Structural Social Capital and Coping Effort, and the relationship between Structural Social Capital and Posttraumatic Stress decreased below significance. The pathways between Structural Social Capital and Cognitive Social Capital (β =.15; p<.001), and between Structural Social Capital and Collective Efficacy (β =.30; p<.001) were significant. The cross-level association between Structural Social Capital and Coping Effort was indirect via Cognitive Social Capital (β =-.21; p<.05); an estimate that was stronger than all individual associations. The association between primary appraisal and social support decreased (β =.08; p<.05). The final model (Model 4) is depicted in Figure 2A. The final model met all three criteria to value ML-SEM models. Step 2: Multilevel Structural Equation Modeling for Men

Nested variance: The intra-cluster correlation for Posttraumatic Stress across postcodes was 0.054. The fit indices of each model are shown in Table 3.

Model 1A: The BF model for men.

Model 1B: Of the neighborhood defined variables, Structural Social Capital (β =-.04; *p*<.001), Cognitive Social Capital (β =-.16; *p*<.05) and Collective Efficacy (β =-13; *p*<.05) showed a significant pathway with Posttraumatic Stress.

Model 2: None of the three cross-level pathways were significant.

Model 3A: Cognitive Social Capital did not show significant pathways with individual variables.

Model 3B: The pathway between Collective Efficacy and Social Support was significant (β =-.31; p<.01).

Model 3C: The pathway between Structural Social Capital and Social Support was significant (β =-.04; *p*<.05).

	Model 1A	Model 1B	Model 2	Model 3A	Model 3B	Model 3C	Model 4
AIC	1237.41	1114.19	836.53	1112.13	1099.99	1109.01	1098.77
LRT	-591.71	-540.10	-394.27	-525.07	-519.00	-523.50	-520.39

Table 2. Fit indices models Women

Model 4: When the neighborhood variables were simultaneously entered in the model, the relationship between Structural Social Capital and Social Support and the associations between the social neighborhood variables and Posttraumatic Stress decreased below significance. The pathways between Structural Social Capital and Cognitive Social Capital (β =.17; p<.001), and between Structural Social Capital and Collective Efficacy (β =.31; p<.001) were significant. The strongest association in the BF model was the cross-level association between Structural Social Capital and Social Support via Collective Efficacy (β =-.33; p<.01). The final model (Model 4) is depicted in Figure 2B. The final model met all three criteria to value ML-SEM models.



Figure 2A. The Multilevel Model for Women

Figure 2B. The Multilevel Model for Men



AIC=2653.68; LRT=-1291.84

	Model 1A	Model 1B	Model 2	Model 3A	Model 3B	Model 3C	Model 4
AIC	1817.71	1815.45	1307.07	1644.10	1667.87	1689.89	1686.00
LRT	-891.86	-887.72	-636.53	-795.05	-806.93	-817.94	-818.00

Table 3. Fit indices models Men

Discussion

102

This study aimed to provide empirical evidence for the mechanisms via which community social capital is related with disaster mental health for men and women. In general, both genders assessed the impact of the disaster (i.e. primary appraisal), and subsequently coped with internal and external disaster-related demands. These coping efforts include the mobilization of social support. Our study showed that increased individual coping efforts (i.e. applying several coping strategies simultaneously) are related to more disaster-related distress, and reflect less efficient coping with the disaster and its consequences (see also Punamaki et al, 2008; Wind & Komproe, 2012). This relationship is likely to be reciprocal, as high coping activity may in turn comprise a symptom of distress. Residing in a community with high stocks of social capital is salutary, because in these communities both men and women employ more efficient and parsimonious coping efforts (see also Wind & Komproe, 2012), yet via different trajectories.

In communities that provide the opportunity to share the disaster experience with – and experience empathy from – community members (cf. 'social sharing', Pennebaker, 2001), women coped more efficiently with disaster-related demands (cf. Hobfoll, 1989; Wind & Komproe, 2012). Further, although women mobilized social support to manage emotion-focused reactions related to the disaster (e.g. Schwarzer & Leppin, 1991), this social support was not directly associated to posttraumatic stress (cf. Pretorius, 1996). In a community with high cognitive social capital women mobilized less emotional social support. This efficient and parsimonious use of individual coping efforts among women – including the mobilization of emotional social support – was ultimately associated to less posttraumatic stress.

Our male model indicates that social support from the direct social environment (friends and family) is less relevant for mental health of men when they can rely on the collective effective nature of their community. That is, affected men were aware that they 'sink or swim together with their neighbors'. Hence, they sought successful partners with whom to collaborate, join, and solve the often large–scale problems that are beyond the reach of any individual (Solomon, 2003). Collective efficacy increases control over affected lives and environment of through collective actions (Eriksson, 2011), and may truly empower disaster victims (Kawachi & Berkman, 2001; Sapag & Kawachi, 2007). Our study showed that the more affected men are empowered through collaboration with their neighbors, the more quickly men will surpass mental health problems and move to survivor status (cf. Benight, 2004).

Implications for interventions

Noteworthy, the cross-level associations of the social context are higher than the individual associations in our models. This finding is promising as community interventions that are aimed at fostering the social context represent the possibility of promoting positive outcomes effectively with relative few resources compared to traditional individual interventions (e.g. cognitive behavioral interventions; Borgonovi, 2010). Examples of community interventions that foster the social context are organizing community meetings and installing self-help groups or action groups (Hobfoll et al, 2007). Within such community interventions, our findings showed that interventionists should be mindful of, and stimulate, natural gender tendencies. It may be particularly salutary to actively involve men in community groups that collectively address disasterrelated demands and fight future threats to floods on behalf of the community (cf. Brune & Bossert, 2009). To promote disaster mental health of women in turn, it may be especially fruitful to involve women in building higher levels of trust within the community. In this respect, Pennebaker (2001) recommends the facilitation of 'social sharing' (e.g. organizing community meetings), in which women find the time to talk about the disaster and process the experience (cf. Brune and Bossert, 2009).

Limitations

The study has some potential limitations. First, the cross-sectional design of our study and the absence of data on pre-flood mental health, did not allow for claims of causal inferences of disaster related distress to the flood in specific. We tried to overcome these limitations by adapting the mental health questions to the particular experience of the flood. Furthermore, the technique of MI-SEM enabled us to elucidate (unidirectional) pathways within the model, and provided us insight in the social mechanisms related to disaster-related distress.

Second, the response rate was relative low and it is not clear to what extent the study sample is representative for the population of affected households in Morpeth. Third, although this study is focused on mechanisms that describe the relationship between collective variables and individual mental health, the relatively high age of the study sample may hamper the extrapolation of our study results to other disaster-affected populations.

Conclusion

104

This is the first disaster study to empirically elucidate the gender aspects of the mechanisms that associate community social capital with post-disaster mental health. The present study showed that if social capital remains intact in the wake of disasters, or is improved by community interventions, men and women will be more resilient against the development of posttraumatic stress via different trajectories. We hasten to add that social capital may not be uniformly salutary over time. Weil and colleagues (2012) recently showed that over the course of stressful events, social involvement first exposes people to more stress, but as time passes, provides them a significant buffer against negative psychosocial experience. Since, we relied on a cross-sectional study one year after a disaster, we invite scholars to replicate our study findings in a longitudinal fashion.

Gender differences in the link between the social context and post-disaster mental health

References

- Almedom, A.M. (2005). Social capital and mental health: an interdisciplinary review of primary evidence. *Social Science & Medicine, 61*, 943-964.
- Anderson, J.C. & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103(3)*, 411-423.
- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin 107*, 238-246.

- Berry, H.L. & Welsh, J.A. (2010). Social capital and health in Australia: An overview from the household, income and labour dynamics in Australia survey. *Social Science & Medicine*, *70(4)*, 588-596.
- De Silva, M.J., Huttly, S.R., Haprham, T., Kenward, M.G. (2007). Social capital and mental health: a comparative analysis of four low income countries. *Social Science & Medicine*, *64(1)*, 5-20.
- De Silva, M. J., McKenzie, K., Harpham, T. & Huttly, S. R. (2005). Social capital and mental illness: a systematic review. *Journal of Epidemiology and Community Health, 59*, 619-627.
- Eriksson, M. (2011). Social capital and health implications for health promotion. *Global Health Action, (4).* Available at: http://www.globalhealthaction. net/index.php/gha/article/view/5611
- Galea, S., Tracy, M., Norris, F. & Coffey, S.E. (2008). Financial and social circumstances and the incidence and course of PTSD in Mississippi during the first two years after Hurricane Katrina. *Journal of Traumatic Stress*, *21(4)*, 357-368.
- Harper R. & Kelly M. (2003). *Measuring Social Capital in the United Kingdom*. London: Office for National Statistics.
- Harpham, T. (2008). The measurement of community social capital through surveys. In: I. Kawachi, S.V. Subramanian & D. Kim (Eds.). *Social capital theory and health* (pp. 51-62), New York: Springer.
- Harpham, T., Grant, E. & Thomas, E. (2002). Measuring social capital within health surveys: key issues. *Health Policy and Planning*, *17(1)*, 106-111.
- Hobfoll, S.E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *American Psychologist*, *44(3)*, 513-524.
- Kawachi, I. & Subramanian, S.V. (2006). Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal of Traumatic Stress, 19(2),* 195-203.

- Kawachi I. & Berkman L.F. (2001). Social ties and mental health. *Journal of Urban Health*, 78, 458-467.
- Mattlin, J.A., Wethington, E. & Kessler, R.E. (1990). Situational Determinants of Coping and Coping Effectiveness. *Journal of Health and Social Behavior*, *31(1)*, 103-122.
- McKenzie, K., Whitley, R. & Weich, S. (2002). Social capital and mental health. *British Journal of Psychiatry*, 181, 280-283.
- Mehta, P.D. & Neale, M.C. (2005). People are variables too: Multilevel Structural Equations.
- Modeling. Psychological Methods, 10(3), 259-284.
- Nakhaie, R. & Arnold, R. (2010). A four year (1996-2000) analysis of social capital and health status of Canadians: the difference that love makes. *Social Science & Medicine*, *71*(5), 1037-1044.
- Norris, F.H. & Kaniasty, K. (1996). Received and perceived social support in times of stress: a test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71(3)*, 498-511.
- Punamäki, R.-L., Salo, J. , Komproe, I.H., Qouta, S., El-Masri, M. & De Jong, J.T.V.M. (2008). Dispositional and situational coping and mental health among Palestinian political ex-prisoners. *Anxiety, Stress & Coping, 21(4),* 337-358.
- Sampson, R.J., Raudenbush, S.W. & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, *277 (5328)*, 918-924.
- Suzuki, E., Takao, S., Subramanian, S.V., Komatsu, H., Doi, H. & Kawachi, I. Does low workplace social capital have detrimental effect on workers' health? *Social Science & Medicine*, 70(9), 1367-1372.
- Thoits, P.A. (1986). Social support as coping assistance. *Journal of Consulting and Clinical Psychology*, *54*, 416-423.
- Thomas, H., Weaver, N., Patterson, J., Jones, P., Bell, T., Playle, R., Dunstan, F. Palmer, S., Lewis, G. & Araya, R. (2007). Mental health and quality of residential environment. *British Journal of Psychiatry*, 191, 500-505.
- Van Ommeren, M. & Wessels, M. (2007). Inter-agency agreement on mental health and psychosocial support in emergency settings. *Bulletin of the World Health Organization*, 85(11), 822.
- Wang, H., Schlesinger, M., Wang, H. & Hsiao, W.C. (2009). The flip-side of social capital: the distinctive influences of trust and mistrust on health in rural China. *Social Science & Medicine*, *68*(*1*), 133-142.

Gender differences in the link between the social context and post-disaster mental health

- Weathers F.W., Litz B.T., Herman D.S., Huska J.A. & Keane T.M. (1993). *The PTSD Checklist (PCL): reliability, validity, and diagnostic utility.* Paper presented at the 9th Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, Texas, 24-27.
- Wind, T.R., Fordham, M. & Komproe, I.H. (2011). Social capital and post-disaster mental health. *Global Health Action*, 4, Available at: http://www. globalhealthaction.net/index.php/gha/article/view/6351
- Woolcock M. (2001). The place of social capital in understanding social and economic outcomes. *ISUMA: Canadian Journal of Policy in Health Research*, 2, 11-17.
- World Medical Assembly (48th) (1997). Declaration of Helsinki: Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, 277, 925-926.

107
Section 3

Methodological consequences of not including social contextual factors in disaster studies

The effect of the post-disaster context on the assessment of individual mental health scores

Wind TR Joshi PC Kleber RJ Komproe IH

Manuscript has been accepted for publication in the American Journal of Orthopsychiatry.

Abstract

Many scholars questioned the immense variation in rates of mental health outcomes across disaster studies. This study explains this variation by putting forward two methodological problems inherent to the impact of a disaster context on mental health screening scores. The HSCL-25 was administered in a flood affected group (n=318) and a non-affected group (n=304) in Uttar Pradesh, India. The affected group showed much higher mean scores on subscales anxiety and depression. However, factor analyses, i.e. CFA and multilevel CFA (Muthén, 1994), revealed two methodological phenomena that account for differences in scores. First, the outcomes revealed that a large proportion of covariance between observed mental health variables did not refer to latent concepts of interest (depression and anxiety), but to the context of both groups (disaster affected versus non-affected). The shared impact of the disaster on the context explained a large proportion of the covariances between the items, and biased outcomes. Second, after dissecting this group variance, construct validity of the assessments of anxiety and depression revealed to be poor and unstable across both groups. The subscales anxiety and depression referred to different concepts in both groups. These two methodological problems also explain variation in mental health outcomes across disaster studies.

Keywords: mental health, disaster, multilevel confirmatory factor analysis

Introduction

There is enormous variation in rates of mental health outcomes across disaster studies ranging from no mental health problems at all (Scott et al, 2003) up to ninety percent of the affected population suffering from mental health problems (Leon, 2004). Rodin and Van Ommeren (2009) distinguish two lines of explanations for this variation across studies. First and most obvious, the severity of disasters differs, and thus the degree to which affected individuals perceive different disasters as traumatic also varies. Yet, variation in individual disaster experiences only accounts for a small proportion of the variance in mental health problems (Yehuda & McFarlane, 1995). Second, scholars advocated that beyond the severity of disasters per se, the vast methodological differences in disaster studies – such as differences in research designs and sample sizes – also explain variation in mental health outcomes across studies (Galea, Maxwell, & Norris, 2008; Kessler & Wittchen, 2008; Rodin & van Ommeren, 2009).

Two methodological problems that have not been discussed in the disaster literature thus far, are related to the impact of the disaster environment on screening scores. Disasters typically create material destruction and loss of social capital (Kawachi & Subramanian, 2006; Wind, Fordham & Komproe, 2011). Mental health outcomes in the wake of disasters are largely defined by this destructive effect of disasters on the context (Kawachi & Subramanian, 2006; Wind, Fordham, & Komproe, 2011; Wind & Komproe, 2012). When scholars use screening instruments and ignore factors that operate at both the individual and at the post-disaster contextual level, this may have unwanted consequences for the interpretation of individual mental health outcomes.

First, the basic idea of screening instruments is that covariance between observed variables of screening instruments is determined by the latent mental health construct they refer to. However, this assumption is questionable when a shared context influences individual observed scores (see e.g. neighborhood studies; Kenny, 2007; Wind & Komproe, 2012). The consequence is that the covariance between observed mental health variables will refer to the latent mental health concept of interest *and* to living in the same eroded context (Dyer, Hanges, & Hall, 2005). When the latter source of covariance is ignored, covariance is mistakenly attributed to the underlying mental health concept (Muthén, 1994). The result is that assessment of mental health outcomes can be biased (Kreft & De Leeuw, 1998), and may contribute to unwanted variation of outcomes across disaster studies. The second problem is that without dissecting

variance that is related to factors operating at different contextual levels, one cannot be certain that a screening instrument has adequate construct validity. Without fulfillment of the requirement of measurement equivalence of the assessment tools, interpretations of differences between scores across groups or settings may lead to erroneous conclusions (Poortinga, 1975). That is, mental health scores differ across groups, whereas in fact the underlying concepts may differ.

The goal of the current case study is to illustrate these two methodological problems by assessing symptoms of anxiety and depression with the HSCL-25 screener (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974; Lipman, Covi, & Shapiro, 1979) among a disaster and a non-affected group in northern India.

Method

Sample

The present study took place as part of the MICRODIS research project. MICRODIS is a European Community funded research project on the impact of natural disasters (e.g. Wind, Fordham & Komproe, 2011). In scope of this project, a study was conducted in Uttar Pradesh, India, with a research focus on the impact of natural disasters on mental health.

The Bahraich District, in Uttar Pradesh, India, is annually hit by floods, as in July and August 2008. In the region we compared a disaster-affected group with a non-affected group in October 2008. The affected region is situated between the river and a dam. The region on the other side of the dam was unaffected and identified as a non-affected group. A multistage random sampling procedure was used to first select four *Gram Panchayats* (smallest political units in the region) in the affected and the non-affected region, and then a sample of households. The sampling procedure resulted in a multilevel data structure: households (level 1), Gram Panchayats (level 2), and region (affected versus non-affected; level 3). In the affected group 318 (out of 380) respondents, and in the non-affected group 304 (out of 330) respondents participated in this study. The response rates are 84% and 92% respectively. The demographics of the samples are depicted in Table 1.

Instrument

Indicators of mental health, anxiety and depression were measured by the Hopkins Symptom Checklist-25 (HSCL-25; Derogatis et al, 1974; Lipman, Covi, & Shapiro, 1979). The HSCL-25 is composed of a 10-item subscale for Anxiety and a 15-item subscale for Depression (4).

The HSCL-25 was not available in the language spoken in Northern India (Hindi). The questionnaire was translated by an independent translator from English into Hindi. The Hindi version was then taken to the field and adapted for use according to the local dialect and use of words. Thereafter, the Hindi version was translated back by another independent translator to English. Finally, the original English version was compared by the researchers with the translated English version. No differences between the original and the translated version were found.

In the affected sample the Cronbach's alphas of Anxiety and Depression were respectively .81 and .69. In the control sample the Cronbach's alphas of Anxiety and Depression were respectively .90 and .89. These psychometric properties concur with results of studies in both western (e.g., Winokur et al, 1984) and non-western settings (e.g., Crescenzi et al, 2002).

	Flood affected sample	Control sample	
	(n=318)	(n=304)	
Gender (%)	39% Female	44% Female	
	61% Male	56% Male	
Mean age (SD)	46.03 (15.74)	47.23 (13.92)	
Literacy (%)	64% Illiterate	53% Illiterate	
	36% Literate	47% Literate	
Education (%)	73% No education	66% No education	
	11% Primary education	16% Primary education	
	11% Secondary education	10% Secondary education	
	4% Higher secondary educ.	7% Higher secondary educ.	
	1 % Graduate	1% Graduate	
Year of education (SD)	2.17 (3.70)	2.45 (3.65)	
Religion (%)	92% Hindu	72% Hindu	
	8% Muslim	28% Muslim	
Anxiety (SD)	2.52 (.63)	1.92 (.67)	
Depression (SD)	2.48 (.40)	1.89 (.56)	

Table 1. Demographics and mean scores and standard deviations of anxiety and depression

Procedures

Students of the Delhi University familiar with the local sociocultural context and dialect administered the survey under the close supervision of the local principal investigator (Joshi). The students received a two day training in the administration of the HSCL-25 as part of the MICRODIS interview. If possible written informed consent was obtained. In case of illiteracy verbal informed consent and thumb impression was attained and recorded by a witness.

The ethical approval for the study was obtained from the ethical committee of the Delhi University. The study has been performed in accordance to the ethical guidelines of the Declaration of Helsinki (World Medical Assembly, 1997).

Statistical analyses

Prior to the analyses, the individual responses to the items were screened to determine the normality of the dataset. We used the Shapiro-Wilk test for this purpose: a p<0.05 refers to a significant deviation from a normal distribution. We computed descriptive statistics for demographic variables and indicators of mental health and used Student t-tests to examine the differences in mean item scores on the HSCL 25 subscales for Anxiety and Depression between the affected and the control group. All statistics tests were calculated with SPSS 16.0.

Construct validity

First, we established the construct validity of the factor structure of the HSCL-25 in the total dataset, therefore we tested a series of factor models for relative fit: (1) an one-factor model on which all items loaded; (2) an orthogonal two factor model for the items of the subscales anxiety and depression; and (3) an oblique two factor model for the items of the subscales anxiety and depression. Based on the results of step 1, we used the best fitting factor structure out of the three specified factor models in the subsequent steps. Goodness of fit measures in the CFA (and MCFA) in this study were: (1) the Chi square (X^2) test, (2) the Root Mean Square Error of Approximation (RMSEA), and (3) the Comparative Fit Index (CFI). The X² test is a global test that compares a reconstructed variance/ covariance matrix (based on the tested model) with the original variance/ covariance matrix of the study sample (Jöreskog & Sörbom, 1993). The RMSEA refers to the misfit of the model and should be less than .06 (Hu & Bentler, 1999; Browne & Cudeck, 1993; Brown, 2006). A CFI, with a value >.95 indicates good fit of the model with the data matrix and values in the range of .90-.95 may be indicative of acceptable model fit (Bentler, 1990; Brown, 2006).

Further, we performed multisample confirmatory factor analyses to evaluate equality of factor structures by testing a series of hypotheses about the robustness of the factor structure across groups (Jöreskog & Sörbom, 1993). Similarity of patterns of factor loadings can be defined on different levels; thus there are different hypotheses to test the similarity of factorial composition (Bollen, 1991; Jöreskog & Sörbom, 1993). We tested the different hypotheses of factorial invariance by comparing the absolute fit of different factor models (Byrne, Shavelson, & Muthén, 1989). In this study we distinguished the following hierarchical models: (1) a model in which the pattern of factor structure is equal across samples (model A); (2) model A with the additional constraint that the factor loadings are equal across samples (model B); (3) model B with the additional constraint that the error variances are equal across samples (model C); (4) model C: the covariance of the factors items is equal across samples (model D). The difference in X² values between (1) model A and model B, (2) model B and model C, (3) model C and model D was computed.

The degree of dissimilarity between factor structures across samples determines the difference in the X² between both test models (Devins et al., 1988). When the difference in the X² value of models, ΔX^2 , is not significant, the hypothesis of invariant factor loadings is tenable (Jöreskog & Sörbom, 1993).

Finally, we applied a four-step procedure of multilevel confirmatory factor analysis (henceforth MCFA) to identify the proportion of the covariance between observed items that refers to a shared context level (Dyer, Hanges, & Hall, 2005). In the procedure within-group variance, i.e. variance relevant for the mental health constructs at the individual level, is distinguished from between-group variance, i.e. nested variance across groups (Muthén, 1990, 1994).

Step 1: Nested variance

In the first step, we estimated the proportion of nested variance for the items of the subscales Anxiety and Depression. Hereto we calculated the intraclass correlation coefficient (ICC) on the basis of the outcome of ANOVAs in SPSS 16.0 via the formula: $\rho = (MS_b - MS_w)/(MS_b + (k - 1) MS_w)$, in which $\rho = \text{ICC}$; $MS_b = \text{mean}$ between group variance, $MS_w = \text{mean}$ within group variance, and k = mean observations per group (Shrout & Fleiss, 1979). Multilevel modeling is warranted if ICCs are above 0.05 (Dyer et al, 2005).

Step 2: Within-group factor structure

Usually CFAs are based on the total covariance matrix (S_T). In the second step we dissect the between-group variance from the within-group variance. The data

used for analysis of the factor structure in step two are in the form of the sample within-group covariance matrix, S_{PW} . The values in the S_{PW} matrix are adjusted for between-group differences by subtracting relevant group means form individual scores. If there is considerable nested variance, then the model estimated using S_{PW} may show an improved fit compared to the model estimated using S_{T} . The factor loadings resulting from step 2 are usually lower than from conventional CFAs when there is substantial nested variance (Kreft et al, 1998; Muthén, 1994), which may indicate a weaker construct validity.

118

Step 3: Between-group factor structure

In the third step, we investigate if the factor structure is stable across the affected and the control group (Dyer et al, 2005; Muthén, 1994). This analysis is based on the between-group covariance matrix, S_B (the covariance matrix of observed group means, adjusted for the grand mean). Poor fit indices would point towards the lack of a robust factor structure across groups.

Step 4: Multilevel confirmatory factor analysis

If the previous steps have shown that the construct validity is not stable across groups, a MCFA is warranted to test whether the factor structure at the withingroup level is robust at the between group level (Dyer et al, 2005; Grilli & Rampichini, 2007; Muthén, 1994). Poor fit indices would indicate a significant difference between the within group level and the between-group level. This would imply that the factor structure would not be stable at the group level, and that mental health concepts are not comparable across groups. LISREL 8 was used to perform these analyses (Jöreskog & Sörbom, 1993).

Results

Analyses of demographic characteristics of the two samples revealed only differences in religion ($X^2(1)=43.16$; *p*<.001). The individual responses to the items showed no substantial skewness, kurtosis, or outliers.

The affected group scored significantly higher than the control group on the items of the subscales Anxiety (M=2.52; SD=.63 and M=1.92; SD=.67 respectively; t(622)=11.43; p<.001), and Depression (M=2.48; SD=.40 and M=1.89; SD=.56 respectively; t(622)=13.77; p<.001; see Table 1).

Construct validity

Three defined factor models were tested, using the total sample matrix (see Table 2). The orthogonal two factor model resulted in a loss of fit compared to the one-factor model ($\Delta X^{2=}$ -235.54; p<.001) for the same amount of degrees of freedom. The oblique two factor model fits the data significantly better than the one-factor model ($\Delta X^{2}(1)$ =245.48; p<.001). These findings indicate that the oblique two-factor structure fit the data better than the one factor model and the two non-correlated factor model.

Models	X^2	df	CFI	RMSEA
				(90% Confidence interval)
One factor model	1253.04	252	0.95	0.089
				(0.085-0.093)
Orthogonal 2-factor	1488.58	252	0.94	0.083
model				(0.079-0.088)
Oblique 2-factor model	1017.66	251	0.96	0.073
				(0.069-0.078)

Table 2. Fit indices of the assessment of the HSCL-25 for pre-determined factor models on the basis of conventional CFAs

Note: X²=value tested factor structure in sample; $\Delta X^2 = X^2$ difference between two hierarchical models of invariance; Δdf =difference in degrees of freedom between two models of invariance; **p*<.001

The first column in Table 3 shows the standardized loadings of the oblique twofactor model. The results of the CFA show that all the factor loadings relevant to the oblique two-factor model are significant.

T	C 1					
Item	Standar-					
	loadings					
	Total (CFA)		Within		Between	
			(Step 2 in		(Step 3 in	
			MCFA)		MCFA)	
	Fac 1	Fac 2	Fac 1	Fac 2	Fac 1	Fac2
Item 1	.69		.21		.26	
Item 2	.67		.23		.28	
Item 3	.75		.44		.29	
Item 4	.81		.50		.23	
Item 5	.80		.39		.29	
Item 6	.76		.22		.34	
Item 7	.76		.46		.18	
Item 8	.58		.25		.19	
Item 9	.68		.23		.14	
Item 10	.59		.29		.13	
Item 11		.62		.32		.34
Item 12		.47		.13		.26
Item 13		.56		.22		.33
Item 15		.44		.20		.21
Item 16		.66		.36		.35
Item 17		.66		.44		.31
Item 18		.67		.39		.33
Item 19		.50		.26		.27
Item 20		.37		.08		.29
Item 21		.36		.01		.25
Item 22		.68		.41		.34
Item 23		.57		.30		.28
Item 24		.69		.40		.34
Item 25		.67		.32		.37

Table 3. Standardized factor loadings from the CFA, and step 2 and 3 in the MCFA

Table 4 summarizes the findings of multisample confirmatory factor analyses to test the robustness of the factor structure across the affected and non affected groups. All p values of the X² comparisons of the factor structure models between the affected sample and the non-affected were significant at the .001 level. All hypotheses of factorial invariance are rejected. These findings indicate that the factor structure across samples is not stable, so that the constitution of the theoretical concept (latent factor) is not the same in the different samples.

Model	X ² Controle	X ² Affected	ΔX^2	Δdf
Model A	948.02	906.95		
Model B	994.37	929.74	70	23*
Model C	1116.50	999.55	191.05	25^{*}
Model D	1159.22	1025.17	67.95	2*

Table 4. Test of the Equality of Factor Structures of the HSCL-25 among thedisaster affected and non affected sample

Note. Models of invariance: Model A=Model in which the number and pattern of factors are equal across samples; Model B=Model A with the additional constraint that the factor loadings are equal across samples; Model C=model B with the additional constraint that the error variances are equal across samples; Model D=model C with the additional constraint that the covariance matrices of factors are equal across samples.

 $X^2_{\text{control, affected}}$ = X^2 value of tested factor structure (model) in sample; ΔX^2 = X^2 difference between two hierarchical models of invariance; Δdf =difference in degrees of freedom between two models of invariance. *p<.001.

Step 1: Nested variance

The intra class correlation coefficients (ICC) were calculated for the subscales Anxiety and Depression in order to determine the extent of systematic grouplevel variance. Our data is clustered at two levels: [1] at the *Gram Panchayat* level due to clustered sampling, and [2] the group level (affected versus control group). At the *Gram Panchayat* level, the ICC values ranged between 0.01 and 0.04, which indicated negligible nested variance. On the group level (the affected

and the control group), the ICC was .29 for the subscale Anxiety, and .49 for the subscale Depression. These high ICC values indicate that data are nested on the group level and therefore we have to specify the between-group covariance matrix (S_p) in the multilevel analyses below.

Step 2: Within group factor structure

The within-group factor structure in step 2 showed a slightly worse fit in comparison to the original CFA for the same amount of degrees of freedom (ΔX^2 =-70.48; step 2: RMSEA=.067). The CFI in this step indicates worse fit than for the original CFA (CFI=.080). Fan, Thompson, and Wang (1999) explain that the CFI is not effective if most of the correlations between observed variables approach 0, because there is, therefore, less covariance to explain. Such low correlations are reflected in the low factor loadings below. The results from step 2 are displayed in Table 5.

The factor loadings for this within group model in step 2 were substantially lower than step 1 and ranged between .21 to .50 for anxiety, and between .01 and .44 for depression (see column 2 in Table 3). In specific, item 1 (Suddenly scared for no reason), item 2 (Feeling fearful), item 6 (Trembling), item 8 (Headaches), item 9 (Spells of terror or panic), and item 10 (Feeling restless and can't sit still) have very low loadings on the factor anxiety. Further, item 12 (Blaming yourself for things), item 13 (Crying easily), item 15 (Poor appetite), item 19 (Feeling lonely), item 20 (Thoughts of ending your life), and item 21 (Feeling of being trapped or caught) have very low loadings on the factor depression. Thus, in contrast to the results of the conventional CFA, the results of step 2 show that the factor structure, i.e. robustness of the construct, of the subscales depression and anxiety is poor.

Models	X^2	df	CFI	RMSEA (90% Confidence interval)
CFA: Total	1017.66	251	0.96	0.068 (0.064-0.073)
MCFA Step 2: Within	1088.14	251	0.80	0.067 (0.069-0.078)
MCFA Step 3: Between	7154.40	251	0.91	0.023 (0.022-0.023)
MCFA Step 4: Multilevel	2114.53	527	0.51	0.060 (0.055-0.065)

Table 5. Model fit of single- and multilevel factor structures

Note: X²=value tested factor structure in sample; $\Delta X^2=X^2$ difference between two hierarchical models of invariance; Δdf difference in degrees of freedom between two models of invariance; *p<.001

Step 3: Between group factor structure

The chi-square in Table 5 shows that the oblique two-factor model has substantially poorer fit with the within group covariance matrix. The chi-square value is much larger than seen in the conventional CFA for the same amount of degrees of freedom ($\Delta X^2(252)$ =-6066.26; CFI=.91; RMSEA=.023) and step 2 ($\Delta X^2(251)$ =-4968.27). The results point towards the lack of robustness of the factor structure across the affected and control group (see column 3 in Table 3).

Step 4: Multilevel confirmatory factor analysis

The results of the MCFA showed that the factor structure lost its robustness at the group level, when constraining both the factor loadings and the factor correlation to be invariant across the individual and group level ($X^2(527)=2114.53$, p<.001; CFI=.51; RMSEA=.060; see Table 5). Consequently, the constructs anxiety and depression are not comparable across the affected group and the control group. The multilevel (co)variance structure path diagram of the HSCL-25 is displayed in Figure 1.



Figure 1. Multilevel (co)variance structure path diagram of the HSCL-25 divided for within group covariance and between group covariance (disaster affected versus non-affected group)

Discussion

This paper aimed to illustrate methodological consequences that stem from the impact of the disaster context on screening outcomes. Similar to other disaster studies, the initial comparison of mean scores on HSCL subscales for anxiety and depression showed that the disaster affected group scored much higher on anxiety and depression than the non-affected group. We demonstrated, however, two methodological problems that hampered the comparison of mental health screening scores across these groups. The relevance of the study findings is that these problems are likely to have equally plagued other disaster studies.

First, we hypothesized that because disasters typically cause great material destruction and a loss of social capital (Kawachi & Subramanian, 2006), the disaster context evokes increased interdependence among individual mental health outcomes within an affected population (cf. Kilip, 2007). The confirmation of this hypothesis expressed itself as a nested variance problem across the group from a disaster context and the group from an unaffected environment. The problem of nested variance across the affected and non affected group was excessive in our data set. This means that the scores on the HSCL subscales anxiety and depression we found in the disaster affected group were biased because part of the covariance between observed mental health outcomes can be ascribed to the effect of the disaster context on the assessment (Kreft et al, 1998). Not accounting for this nested variance violates the assumptions of most statistical analyses including our initial comparison of means (Muthén, 1994).

Second, many authors have warned that the factor structure of constructs may vary across different measurement levels of data (Bliese & Hanges, 2004; Dyer et al, 2005; Harnqvist, 1978; Muthén, 1994). And indeed, the results of the multi-sample CFA showed that the concepts (i.e. factor structures) of anxiety and depression differed across the affected and unaffected group. The findings from the multilevel CFA further revealed that group level variance (i.e. nested variance) masked the actual low and unstable construct validity of anxiety and depression. This was shown by the fit indices of the model that relied on individual within-group variance compared to the lower fit of models where between-group variance was unaccounted for (i.e. the CFA and the multi-sample CFA). This better fitting and statistical more accurate model that is based on within-group covariance (i.e. construct relevant covariance) showed low factor loadings and weak construct validity of the subscales anxiety and depression in our study.

The two illustrated problems – respectively the presence of group level variance and the difference in conceptual domains across groups (i.e. poor and unstable factor structures) – impede the comparison of both constructs across the affected and control group. And both methodological problems contribute to the differences in mean scores across groups that we initially found. Namely, the difference in scores across both groups refers to differences in contexts and in concepts rather than to differences in mental health scores across groups.

126

These two methodological problems are not limited to our study. Most disaster mental health research relied on screening outcomes due to the practical applicability of screening instruments (Connor, Foa, & Davidson, 2006). And given the fact that the destructive impact on the context is an inherent part of catastrophic events, it is likely that in other studies part of the covariance in individual mental health scores is also related to the post-disaster context rather than to the latent mental health concept per se. Or worse, disaster studies may have compared unequal constructs just as in our study. The problem of comparing unequal constructs cannot be dismissed without the required analyses (Poortinga, 1975). The demonstrated multilevel analyses in this paper (Muthén, 1994) have however not been applied in disaster mental health research, and therefore the size of the problems is hard to estimate.

The methodological problems we illustrated in this study, ultimately refer to the topic that was put forth by Horwitz (2007): Whether specific mental health symptoms may constitute actual mental health *problems* depends on the context in which they occur. Namely, anxiety (e.g. being on high alert to danger, tension and fear) may be an adequate reaction in an environment that has recently been hit by a flood and may be struck again. Yet, these same symptoms may be an inadequate reaction in an unaffected context, and may in such a context represent the actual 'stand alone' individual mental health problems that screening instruments intend to measure. Thus, which mental health symptoms constellate mental health problems depends on the context. Accordingly, after we extracted the covariance related to the context, we found that mental health problems held different meaning across both groups.

The study is beset by some limitations. First, the affected and the nonaffected samples differ significantly on religion, as the affected group comprises less Muslims. Religion may have created an additional source of between level (co)variance of the HSCL-items in our study. Thus, apart from the difference in context (disaster or non-affected) religion may have partly influenced our analyses on the between level (MCFA). Second, within the timeslot to implement the study we did not have sufficient time to validate the HSCL-25 in the northern Indian context. Yet, we feel that within the given time the translation procedure was thorough and accurate, and we assume that a possible systematic bias as a result of the lack of validation would have influenced the outcomes of both the disaster group and the non-affected group. Despite these possible limitations, the study accomplished its goal to illustrate two methodological consequences that stem from the impact of the disaster context on mental health screening scores.

The results of this study contribute to the explanations for the wide range of outcomes when mental health outcomes in disaster studies are compared (Rodin & Van Ommeren, 2009). We illustrated a procedure how to examine construct validity of a screenings tool that is masked by nested variance as a result of the disaster (Muthén, 1994). Herewith, the study is an invitation to apply this MCFA procedure and reveal the extent of both problems in disaster mental health research. As such, scholars may determine to what extent both problems account for variation in mental health screening outcomes across disaster studies. The application of MCFA (Dyer et al, 2005; Muthén, 1994) and the identification of ecological variables that account for nested variance (Wind & Komproe, 2012) will advance our understanding of mental health in disaster contexts (Kawachi & Subramanian, 2006).

References

- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107,* 238-246.
- Bliese, P.D. & Hanges, P.J. (2004). Being too liberal and too conservative: The perils of treating grouped data as though it is independent. *Original Research Methods*, *7*, 400-417.
- Bollen, K.A. (1991). *Structural equations with latent variables*. New York: Wiley Interscience Publication.
- Brown, T. (2006). *Confirmatory Factor Analysis for Applied Research*. New York: The Guilford Press.
- Browne, M.W. & Cudeck, R. (1993). Alternative ways of assessing model fit. In: K.A. Bollen & J.S. Long (Eds.), *Testing structural equation models*. Newbury Park: Sage.
- Byrne, B.M., Shavelson, R.J. & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin, 105*, 456-466.
- Connor, K.M., Foa, E.B. & Davidson, J.R. (2006). Practical assessment and evaluation of mental health problems following a mass disaster. *Journal of Clinical Psychiatry*, *67*(*S2*), 26-33.
- Crescenzi, A., Ketzer, E., van Ommeren, M., Phuntsok, K., Komproe, I. & de Jong, J.T. (2002). Effect of political imprisonment and trauma history on recent Tibetan refugees in India. *Journal of Traumatic Stress*, 15(5), 369-375.
- Derogatis, L.R., Lipman, R.S., Rickels, K., Uhlenhuth, E.H. & Covi, L. (1974). The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behavioral Science, 19(1)*, 1-15.
- Devins, G.M., Orme, C.M., Costello, C.G., Binik, Y.M., Frizzel, B., Stam, H.J., et al. (1988). Measuring depressive symptoms in illness populations: Psychometric properties of the Center for Epidemiologic Studies Depression (CES-D) scale. *Psychology and Health, 2*, 139-156.
- Dyer, N.G., Hanges, P.J. & Hall, R.J. (2005). Applying multilevel confirmatory factor analysis techniques to the study of leadership. *The Leadership Quarterly, 16*, 149-167.
- Fan, X., Thompson, B. & Wang, L. (1999). Effects of sample size, estimation method, and model specification on structural equation modeling fit indexes. *Structural Equation Modeling*, 6, 56-83.

- Galea,S., Maxwell, A.R. & Norris, F. (2008). Sampling and design challenges in studying the mental health consequences of disasters. *International Journal of Methods in Psychiatric Research*, *17(S2)*, S21-S28.
- Grilli, L. & Rampichini, C. (2007). Multilevel factor models for ordinal variables. *Structural Equation Modeling 14(1)*, 1-25.
- Harnqvist, K. (1978). Primary mental abilities of collective and individual levels. *Journal of Educational Psychology*, *70*, 706-716.
- Hobfoll, S.E., Watson, P., Bell, C.C., Bryant, R.A., Brymer, M.J., Friedman, M.J., Friedman, M., Gersons, B.P., de Jong, J.T., Layne, C.M., Maguen, S., Neria, Y., Norwood, A.E., Pynoos, R.S., Reissman, D., Ruzek, J.I., Shalev, A.Y., Solomon, Z., Steinberg, A.M. & Ursano, R.J. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, *70(4)*, 283-315.
- Horwitz, A.V. (2007). Transforming Normality into Pathology: The DSM and the Outcomes of Stressful Social Arrangements. *Journal of Health and Social Behaviour, 48(3),* 211-222.
- Hu, L. & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55.
- Irvine, S.H. & Caroll, W.K. (1980). Testing and assessment across cultures: Issues in methodology and theory. In: H. Triandis (Ed.). *The handbook of crosscultural psychology* (pp. 127-180). Boston: Allyn & Bacon.
- Jöreskog, K. & Sörbom, D. (1993). *Lisrel 8: Structural Equation modelling with the SIMPLIS command language*. Chicago: Scientific Software International.
- Joshi, P.C., Kaushal, S., Aribam, B.S., Khattri, P., D'Aoust, Singh, M.M., Marx, M. & Guha-Sapir, D. Recurrent floods and prevalence of diarrhea among under five children: observations from Bahraich district, Uttar Pradesh, India. *Global Health Action*, *4*, Available at: http://www. globalhealthaction.net/index.php/gha/article/view/6355
- Kawachi, I. & Subramanian, S.V. (2006). Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal of Traumatic Stress, 19(2)*, 195-203.
- Kessler, R.C. & Wittchen, H.U. (2008). Post-disaster mental health need assessment surveys – the challenge of improved future research. *International Journal of Methods in Psychiatric Research*, 17(S2), S1-S5.
- Killip, S., Mahfoud, Z. & Pearce, K. (2004). What is an intracluster correlationcoefficient? Crucial concepts for primary care researchers. *Annals of Family Medicine*, *2*(*3*), 204-208.

- Kreft, I. & De Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks, CA: Sage Publications.
- Leon, G.R. (2004). Overview of the psychosocial impact of disasters. *Prehospital* and Disaster Medicin, 19(1), 4-9.
- Lipman, R.S., Covi, L. & Shapiro, A.K. (1979). The Hopkins Symptom Checklist (HSCL)-factors derived from the HSCL-90. *Journal of Affective Disorders*, 1(1), 9-24.
- McKenzie, K., Whitley, R. & Weich, S. (2002). Social capital and mental health. British *Journal of Psychiatry, 181*, 280-283

130

- Miller, K.E., Kulkarni, M. & Kushner, H. (2006). Beyond trauma-focused psychiatric epidemiology: bridging research and practice with waraffected populations. *American Journal of Orthopsychiatry*, *76(4)*, 409-422.
- Muthén, B.O. (1990). *Mean and covariance structure analysis of hierarchical data*. Paper presented at the Psychometric Society, Princeton, New Jersey.
- Muthén, B.O. (1994). Multilevel covariance structure analysis. *Sociological Methods and Research*, 22, 376-398.
- Norris, F.H., Galea, S., Friedman, M.J. & Watson, P.J. (2006). *Methods in Disaster Mental Health Research*. New York: The Guilford Press.
- Norris, F.H., Friedman, M.J. & Watson, P.J. (2002). 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry*, 65(3), 240-260.
- Nunally, J.C. & Bernstein, I.H. (1994). *Psychometric Theory*. New York: McGraw Hill.
- Poortinga, Y.H. (1975). Limitations on intercultural comparison of psychological data. *Nederlands Tijdschrift voor de Psychologie en haar Grensgebieden, 30*, 23-39.
- Rodin, D. & Van Ommeren, M. (2009). Commentary: Explaining enormous variations in rates of disorder in trauma-focused psychiatric epidemiology after major emergencies. *International Journal of Epidemiology*, 38(4), 1045-1048.
- Scott, R.L., Knoth, R.L., Beltran-Quiones, M. & Gomez, N. (2003). Assessment of psychological functioning in adolescent earthquake victims in Colombia: using the MMPI-A. *Journal of Traumatic Stress*, 16(1), 49-57.
- Shrout, P.E. & Fleiss, I.L. (1979). Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin, 86*, 420-428.
- Sinharay, S., Stern, H.S. & Russell, D. (2001). The use of multiple imputation for the analysis of missing data. *Psychological Methods*, *6*(*4*), 317-329.

The effect of the post-disaster context on the assessment of individual mental health scores

- Westen, D. & Rosenthal, R. (2003). Quantifying construct validity: Two simple measures. *Journal of Personality and Social Psychology*, *84*, 608-618.
- Wind, T.R., Fordham, M. & Komproe, I.H. (2011). Social capital and post-disaster mental health. *Global Health Action*, 4, Available at: http://www. globalhealthaction.net/index.php/gha/article/view/6351
- Wind, T.R. & Komproe, I.H. (2012). The mechanisms that associate social capital with disaster mental health: A multilevel model. *Social Science & Medicine*, *75(9)*, 1715-1720.
- Winokur, A., Winokur, D.F., Rickels, K. & Cox, D.S. (1984). Symptoms of emotional distress in a family planning service: stability over a four-week period. *British Journal of Psychiatry*, *144*, 395-399.

- WorldMedicalAssembly(48th)(1997).Declaration ofHelsinki:Recommendations guiding physicians in biomedical research involving human subjects. *JAMA*, 277, 925-926.
- Yehuda, R. & McFarlane, A.C. (1995). Conflict between current knowledge about posttraumatic stress disorder and its original conceptual basis. *American Journal of Psychiatry, 152*, 1702-1713.

Discussion

In the wake of disasters, there are large numbers of affected individuals with a complex variety of psychological and psychiatric sequelae (Leon et al, 2004; Norris et al, 2002a, 2002b). These consequences range from a number of maladaptive behavioral patterns to diagnosable psychiatric disorders as well as understandable non-pathological distress to adaptive and resilient coping responses in the face of catastrophic events (Somasundaram & Sivajokan, 2013). Conditions like posttraumatic stress disorder (PTSD), depression, anxiety, somatoform disorders, alcohol and drug abuse have shown to occur after disasters (Norris et al, 2002a, 200b). Researchers and interventionists have been impressed by the vast magnitude of these mental health outcomes, because these rates are greater than any rate in non-affected populations (Norris et al, 2002a, 200b; Rodin & Van Ommeren, 2009). In Chapters 2 and 3 we found equally high rates of mental health problems in flood-affected communities in India and England.

This dissertation dissected the complex nature of these post-disaster mental health problems by combining two separated paradigms that describe disaster mental health. As highlighted in the Introduction, current (research) perspectives on disaster mental health define a construct that is determined on a single level (*either* on the individual level, *or* the contextual level; cf. Kawachi, 2004; Kleber, 2008). Yet, throughout this dissertation we empirically showed that the 'cross-level interplay' between the disaster affected context and individual variables (such as the individual disaster experience, coping and social support) determines the manifestation of individual disaster mental health problems. We stepwise showed that this so-called 'cross-level' conceptualization is pivotal for understanding, addressing and researching mental health in the wake of disasters. Simultaneously, we illustrated two methodological tools to dissect the cross-level nature of disaster mental health.

From the conceptualization of disaster mental health as an outcome that is determined by a complex interaction between multiple levels, we shed light on four challenges that have been highlighted by other scholars in the current disaster literature. In **section one** of the Discussion, (i) we show that the cross-level conceptualization of disaster mental health outcomes has consequences on the interpretation of mental health screening outcomes in terms of treatment need. In **section two**, we reveal the cross-level mechanisms via which living in a disaster-affected social community are associated with mental health problems. Hereby, we address two problems that have existed in the disaster literature but have remained virtually unanswered by empirical research: (ii) To date it is not clear *how* disaster-affected social mechanisms may explain why (iii) researchers found ambiguous and inconsistent associations between social capital and

mental health hitherto. In **section three**, we demonstrate two methodological problems that stem from the cross-level nature of disaster mental health. These methodological problems shed light on (iv) the great variation in mental health outcomes across disaster studies that have puzzled disaster scholars and that have hampered the synthesis of findings across studies (Rodin & Van Ommeren, 2009). We end the Discussion (**section 4**) with implications of this novel conceptualization of disaster mental health for interventions.

1. The interpretation of disaster mental health symptoms in terms of treatment need

We showed that the cross-level conceptualization of disaster mental health outcomes on both the contextual and individual level has substantial consequences for the interpretation of mental health outcomes across disaster studies with regard to treatment need.

The amount of screening surveys on mental health problems in the aftermath of natural disasters has been increasing steadily in the last two decennia (Connor et al, 2006; Norris et al, 2002, 2006; Priebe et al, 2010). The primary reason to conduct these screening surveys is to inform service provisions (Gilbody et al, 2006). However, for several reasons, rates of mental health problems based upon screening surveys are not easily translated into the need for service provisions. First, the size of treatment need is hard to estimate based on screening outcomes. That is, rates of mental health problems *per se* are likely not to match treatment need (Galea et al, 2008; Van der Velden et al, 2006, 2007). Among screened mental health problems, the proportion of mild or transient symptoms without treatment need is not clear (Narrow et al, 2002) and consequently, levels of mental health problems are likely to overestimate treatment need. Narrow and colleagues (2002) showed that in the general US population, mental health figures decreased by almost 20% when taking into account indicators for treatment need. Treatment need indicators give meaning to mental health figures from screening surveys, and without the inclusion of treatment need indicators in disaster mental health surveys, the actual need for service provisions is hard to predict. Hence, treatment need indicators should be included in disaster mental health surveys (De Jong & Komproe, 2002). Nonetheless, treatment need indicators have been seldom included in disaster studies.

Second, the *nature* of treatment need is also hard to deduct from mere screening outcomes. Screening surveys primarily aim to detect individuals with

treatment need for individual oriented interventions. But, although individually oriented interventions such as cognitive behavioral therapy have a clear evidence base in the West, results are less uniform in non-Western settings in which many disasters take place (Somasundaram & Sivayokan, 2013). Equally, individual psychotherapy may not be applicable in non-Western communities. Particularly in low income and poor resource settings with lack of trained mental health workers and with massive populations that have experienced trauma, Western individual therapies are not feasible. Furthermore, individual oriented interventions do not address the problem of 'loss of the social fabric', while public mental health and community based methods address this problem and may therefore be more appropriate (Somasundaram & Sivayokan, 2013).

1.1 Treatment need indicators

To elucidate the meaning of screening outcomes in disaster research in terms of service provisions (i.e. size and nature), section one aimed to interpret the relationship between mental health outcomes and treatment need after natural disasters.

To estimate treatment need, several indicators have been described in the literature. The most established and commonly accepted indicator of treatment need in clinical practice is the impairment in social, occupational, or other important areas of functioning based upon the DSM-IV (American Psychiatric Association, 2000). Impairment of functioning has been included as a prerequisite for the establishment of many disorders in the DSM-IV and in this vein the relation between mental health symptoms and functioning is commonly accepted as an indicator of treatment need. Consistently, De Jong and Komproe (2002) recommend including measures of disability (such as functioning) in epidemiological mental health surveys. In addition to measures of functioning, other indicators of service use - such as help seeking behavior or medication use have also been used as specific treatment need indicators (Narrow et al, 2002). According to Anderson (1995) the combination of mental health problems and decreased functioning determines service use (McCracken et al, 2006). Only few studies conducted in the West (Boscarino et al, 2005; Stuber et al, 2006; ten Veen et al, 2009) have focused on help seeking behavior of disaster affected populations. Stuber and colleagues (2006) showed that merely 36% of those with probable posttraumatic stress disorder or depression sought help from a professional for a mental health problem after the September 11 attacks in New York City. Notably, help seeking behavior has been argued to underestimate treatment need, because amongst other reasons, the belief that others need available

services more than oneself and problems accessing services may impede people from seeking help (Boscarino et al, 2005). Nonetheless, once more these studies showed that when rates of mental health problems are used as indicators for treatment use, one may overestimate the actual need.

1.2 The interpretation of disaster mental health outcomes and treatment need indicators

In Chapter 2 we found that although anxiety and depression were significantly related to impaired functioning in a group that was not struck by disasters, in the disaster-affected group neither observed anxiety nor depression symptomatology accounted (statistically) for the level of impaired functioning of individuals. We explained this absence of the theoretical association between deteriorated mental health status and decreased functioning, by the hypothesis that this relationship is camouflaged by environmental stressors in the aftermath of disasters. In the stressful environment after a disaster, functioning is likely not to be solely determined by the presence of mental health problems (Freedy et al, 1992; Sattler et al, 2002), but also by the disruption of daily life and the destruction of the material context (e.g. destruction of shelters and belongings; Picou et al, 2004) and the erosion of traditional social support systems (Hobfoll et al, 2007; Kawachi and Subramanian, 2006). In a qualitative study in the same region, we found support for this hypothesis (Kattri et al, 2012). Affected individuals not only experienced the aversive event, but were also confronted with disaster consequences like losing their homes and properties and structural changes in the social and physical environment such as the loss of fertile agricultural land (cf. Disease Control Priorities Project, 2007; Horwitz et al, 2007; Kattri et al, 2012; Wiesenfeld & Panza, 1999). This qualitative data (Kattri et al, 2012) revealed that all of the observed changes in the environment were related to mental health problems and impaired functioning. Environmental stressors in the aftermath of the disaster influence (i.e. 'moderate') the relationship between mental health and functioning.

These findings by no means imply that screening results and treatment indicators in disaster surveys are meaningless vis-à-vis service provisions. Yet, the interpretation of screening results from mental health studies in relation to indicators for treatment need in disaster situations is less straightforward than in a non-disaster context. The absence of an association between mental health outcomes and functioning means that these mental health problems should not be interpreted as a sheer need for individual oriented mental health services by psychologists and psychiatrists (e.g. cognitive behavioral therapy). Rather, the

association between mental health symptoms and the shattered disaster context "normalizes" these mental health symptoms (Horwitz, 2007; Kleber, 1995). Within the harsh disaster circumstances, the mental health symptom 'feeling tense' may, for instance, reflect an adequate (and not pathological) survival mechanism that alerts individuals to realistic dangers. This 'normal' understandable distress is best approached by rebuilding the context of individuals through community level interventions that are multidisciplinary in nature. Examples of such interventions are economic development, rebuilding of shelters, and fostering security. Our quantitative and qualitative results imply that when the context is restored, there is often improvement in the individual member's functioning and wellbeing as well (see also Somasundaram & Sivayokan, 2013).

2. The indirect mechanisms that associate the social community with posttraumatic stress

Within the broad disaster context, many scholars pointed out, that disasters specifically affect the so-called "social fabric of society" (e.g. Almedom, 2005; Kawachi & Subramanian, 2006). In the aftermath of most disasters, former social support systems do not function as before when family members or other members of the social network are dispersed or have even died and social routines are encumbered due to home loss (Crighton, Elliot & van der Meer, 2003; Weems, Watts & Marsee, 2007). In the wake of disasters, the negative consequences of the damaged social fabric comprise looting and discrimination of disvalued groups (Weems et al, 2007), domestic violence (Solomon & Green, 1992) and behavioral problems among children (Swenson et al, 1996). Nonetheless, research on the relationship between the social context and disaster mental health is confronted with two problems.

The first problem is that several reviews hint towards the idea that this erosion of the social fabric may be related to mental health problems. However results on the direct relationship between the social context and disaster mental health are ambiguous and inconsistent (Almedom, 2005; Kawachi & Subramanian, 2006; Sandler, 2001). These ambiguities and inconsistencies have hampered the synthesis of findings in mental health research with a special interest in the social context. And these inconclusive results have previously even led to the belief that social capital may be inappropriate to understand contextual effects on health (cf. Nakhaie & Arnold, 2010). We took up the challenge to explain these inconclusive results and selected three constructs from the disaster literature that define the social context: structural and cognitive components of social capital, and collective efficacy. Structural social capital refers to the presence of community linkages, while cognitive social capital refers to the appreciation of these community linkages in terms of trust, mutual help and reciprocity (Harpham, 2002). Within reviews on social capital, studies distinguished between individual versus collective conceptualizations or operationalizations of social capital. Although the type of definition has been much debated in the social capital literature (e.g. Kawachi, 2006; Kawachi & Subramanian, 2006), the view on social capital as a community asset is generally "privileged" over the individual definition (Kawachi, 2006). Kawachi and colleagues (2004) claim that the novel contribution of social capital lies in its collective dimension, i.e. how group-level social capital influences individual health. Unfortunately, studies that conceptualized social capital as a community asset particularly found ambiguous associations with individual mental health outcomes (De Silva et al, 2005; Eriksson, 2011). Finally, collective efficacy refers to the neighborhoods' capacity to deal adequately with environmental demands and to achieve goals through its social organization that cannot be achieved by individuals alone (Sampson et al, 1997). We chose these three constructs for two reasons: (i) researchers argued that these specific constructs are highly relevant for disaster mental health outcomes (Almedom, 2005; Sampson et al, 1997), and (ii) there is brief and well-designed instrumentation available to measure these constructs (Harpham, 2002; Sampson, 1997).

The second problem revolves around the idea that social networks are the province of the community and are thus by definition more distally related to individual mental health outcomes than individual characteristics. Yet, it is not clear what mediates the relationship between social networks and individual mental health outcomes. It remains unclear *how* the social context is related to disaster mental health outcomes. One fruitful conceptual idea has been that social mechanisms exert their influence on mental health *via* individual factors (Kawachi & Berkman, 2001; Lin, Ye & Ensel, 1999). Disaster mental health research has been devoid of such empiric evidence, because scholars have typically compared several groups that differ in stocks of social capital. Across these groups, researchers measured mental health outcomes whilst controlling for socio-demographic factors (e.g. education, socio-economic class), but without controlling for individual psychosocial variables (Almedom, 2005).

The value of this dissertation is that we empirically reveal the cross-level mechanisms through which disaster-affected social mechanisms are related to disaster mental health (see §2.1 to §2.4). These mechanisms explain ambiguous

outcomes in the relationship between social capital and mental health thus far (see §2.5). More specifically, we revealed distinct functions of individual variables or resources and community resources in our cross-level models: First, individual factors are *directly* related to disaster mental health. This means that individual factors are directly stress-related (high coping effort) and may be directly stress-mitigating (high social support; see §2.1). Second, the social context is *indirectly* related to disaster mental health. We revealed a cross-level association of the social context with individual factors (coping effort and social support), rather than a direct relationship with disaster mental health. This cross-level association demonstrates that the social context is indirectly health sustaining (see §2.2 and §2.3).

2.1 The individual process

On the individual level, we revealed in Chapter 3 to 5 that a natural disaster evokes an individual subjective experience of the event as stressful or not (i.e., primary appraisal). Subsequently, an individual copes with his or her stress responses and the disaster-related demands. In contrast to the general idea that individuals need to address (i.e. cope with) external demands and that increased coping behavior reflects a certain degree of mastery over the situation, we showed that this is not true in the aftermath of disasters. It is more likely that stand-alone individual actions have little effect against overwhelming disasterrelated demands. Within such dire circumstances, high individual coping activity seems to comprise a symptom of distress. Furthermore, we found that increased individual coping efforts (i.e. applying several coping strategies simultaneously, such as employing an active approach and expressing emotions) are related to more posttraumatic stress. Our results showed that the employment of several coping strategies simultaneously (such as turning to religion, dealing with emotions and approaching situations actively) actually reflects less efficient and less effective ways of coping with the disaster and its consequences (Punamäki et al, 2008). In contrast to the malignant effect of increased coping efforts, we found that receiving social support was directly salutary for posttraumatic stress (Norris & Kaniasty, 1996). These individual mechanisms are summarized in Figure 1.

Discussion



Figure 1. The individual process that explains disaster mental health

From the literature we know that individual cognitive behavioral interventions are effective for post-disaster mental health problems by targeting the emotional response (cf. primary appraisal in our model) through emotional desensitization, or by changing the behavioral response (cf. coping effort and social support in our model) (Wright, Basco, & Thase, 2006). These cognitive behavioral interventions have been dubbed the principal individual intervention to address prolonged individual post-disaster anxiety problems such as PTSD (Van Ommeren, Morris & Saxena, 2008). Yet, our cross-level models point out that the vital components of the cognitive behavioral paradigm – respectively the emotional and behavioral response – should not be considered in a social vacuum, because these individual factors depend on the social context in which they occur (cf. Giddens' structuration theory, 1984; Kleber, 2008). This is especially relevant in the disaster context where the social community fabric is eroded (Hobfoll et al, 2007).

2.2 Social community mechanisms related to disaster mental health

In Chapter 3, we revealed that the three constructs within the social context (structural and cognitive social capital, and collective efficacy) have a crosslevel association with this individual process that is indirectly health sustaining, rather than a direct association of the social context with disaster mental health. In Chapter 4 and 5, we found distinct relationships of our selected social context constructs with posttraumatic stress. Namely, structural social capital was most distally related to posttraumatic stress and exerts its beneficial association with posttraumatic stress *via* cognitive social capital and collective efficacy. Social linkages in communities (i.e. structural social capital) are a requisite for, and precede, cognitive social capital (cf. Woolcock, 2001). And these community linkages facilitate collective action to address disaster-related demands (cf. collective efficacy). However, in contrast to Eriksson's claim (2011), cognitive social capital was unrelated to this collective action. The two community relationships are depicted in Figure 2.

Figure 2. The social context dissected



We also found that cognitive social capital and collective efficacy show a cross-level association with individual protective factors for disaster mental health outcomes – such as social support and coping behavior. High cognitive social capital in a community was associated with efficient and parsimonious individual coping efforts, but not with less social support. These results indicate that in communities with high trust and norms of reciprocity (i.e. cognitive social capital), affected individuals were inclined to employ individual coping efforts in a more efficient and parsimonious manner. Simultaneously, high collective efficacy in a community was associated with less mobilization of social support, but not with more parsimonious individual coping behavior. This means that in communities which are perceived as effective to collectively address disaster-related problems, affected individuals felt less need to mobilize social support to deal with these problems. These 'cross-level effects' (cf. Blakely & Woodward, 2000) are depicted by the dotted lines in Figure 3.

In Chapter 4 and 5, we termed this positive mechanism "the cross-level conservation of individual psychosocial resources" (cf. Hobfoll, 1989). This conservation of individual psychosocial resources decreased the association between the (traumatic) appraisal of the disaster and posttraumatic stress. As a result, individuals in communities with high social capital suffered less from posttraumatic stress. This salutary phenomenon – namely that the collective can conserve individual psychosocial resources – is the major contribution of this dissertation. Although the tenet that the conservation of resources is beneficial

for individuals is not new (see Conservation of Resources Theory; Hobfoll, 1989; Kawachi & Berkman, 2001; Lin et al, 1999), we are the first to empirically show the cross-level interplay between social community factors (e.g. social capital) and individual psychosocial resources. This cross-level understanding is indispensable in understanding whether individuals experience posttraumatic stress.

There is also a flipside of this social mechanism. Namely, the loss of social capital by a natural disaster can by itself be related to the individual process that determines posttraumatic stress, even without being individually confronted with the disaster (see the multilevel models in Chapter 4 and 5). In other words, even in the absence of a personal disaster experience, individuals may suffer from posttraumatic stress through the destructive effect of the disaster on their social community (Marshall et al, 2007). This finding expands the concept of trauma beyond the mere individual experience to the realm of the social community (cf. McNally, 2009). Qualitative studies by Tapsel and colleagues on a different flood in England concurred with this idea (Tapsell et al, 2002, 2009). Their qualitative findings showed that affected individuals attributed a different meaning to their social context after the flood. Disruption to community life as well as a culture of blame towards local authorities evoked significant adverse mental health effects. Consistent to our model, they too showed that a lack of collective efficacy of local responding agencies has a negative impact on flood victims' experiences (primary appraisal) and posttraumatic stress.

This eroded social fabric provides a starting point for interventionists. For instance, in an attempt to bolster social capital, the English Red Cross in Morpeth facilitated town hall meetings in which people could help each other practically (e.g. wash clothes, cooking food) and emotionally (i.e. share experiences). We postulate that this initiative increased trust and norms of reciprocity among community members (i.e. cognitive social capital). In another initiative, one of the neighborhoods mobilized itself in a so-called 'flood action group' to prevent future floods from occuring once more (cf. collective efficacy). Our model indicates that relying on these concrete community initiatives in turn decreases individual coping efforts such as mobilizing social support from friends and family. This process is ultimately related to less posttraumatic stress.

Chapter 7





2.3 Social mechanisms among men and women

In chapter 5 we showed within this cross-level mechanism, men and women generally benefited from different social community constructs. Among women especially high cognitive social capital was associated with more efficient and parsimonious coping efforts. This means that in communities that provide the opportunity to share the disaster experience with – and experience empathy from – community members (i.e. high cognitive social capital), women in particular were inclined to cope more efficiently (cf. Hobfoll, 1989). This efficient use of individual coping efforts among women was ultimately associated to less posttraumatic stress. For men, in comparison, high collective efficacy was generally associated to mobilizing less social support. This parsimonious use of individual social support among men was ultimately associated with less posttraumatic stress. The finding that collective efficacy of communities was particularly relevant for men indicates that men were especially aware that they 'sink or swim together with their neighbors' when dealing with disaster-related demands. That is, men in particular relied on successful partners with whom to
collaborate, join, and solve the often large-scale disaster-related problems that are beyond the reach of any individual (Eriksson, 2011; Kawachi & Berkman, 2001; Sapag & Kawachi, 2007; Solomon, 2003).

2.4 The dark side of social capital

Thus far, we discussed the link between the social context and posttraumatic stress. We showed that the social context revealed a cross-level buffer association with this individual process that may be indirectly health sustaining or "healthenabling", rather than a direct association of the social context with disaster mental health. The regression analyses in Chapter 3 indicated equal processes for depression and anxiety: Social capital - as an indicator of the socal context indirectly exerts its influence on these mental health outcomes via the individual process. Just as for posttraumatic stress, structural social capital was positively associated with the individual process that determines depression. Yet, Portes previously warned that high stocks of social capital are no panacea for all mental health problems (Portes, 1998). Indeed, the findings in Chapter 3 indicated that structural social capital had a negative cross-level association with the individual process (i.e. via individual coping and social support). That is, structural social capital was indirectly associated to experiencing more anxiety. Thus, structural social capital showed to have a 'dark side' for feelings of general anxiety in disaster situations. Results indicated that while feelings of cohesiveness (i.e. cognitive social capital) may protect especially against symptoms of depression, participation in social structures (i.e. structural social capital) may be associated with an excess of anxiety (cf. Ross, Reynolds & Geiss, 2000).

The indirect positive association between structural social capital and general anxiety confirms the claim of several scholars (Hobfoll et al, 2007; Ross, Reynolds & Geiss, 2000; Yen & Syme, 1999) that tight-knit social structures may not always lead to better mental health outcomes. This distinct pattern of association across mental health outcomes in Chapter 3 may be a reason for inconsistent associations of social capital with mental illnesses across studies (McKinzie, Whitley & Weich, 2002). De Silva and colleagues (2005) mention several processes that may explain the distinct pattern of relations of the two components with general anxiety and depression. Whereas depressed individuals symptomatically avoid structural involvement in social networks, anxious people may seek reassurance for their anxious feelings and thoughts. As a result, those individuals who show the greatest anxiety may have a larger network (i.e. higher structural social capital) to address their needs (McKinzie, Whitley & Weich, 2002; Norris & Kaniasty, 1999; Portes, 1998). Paradoxically, especially in a disaster situation,

intimate social involvements within one's network may predispose individuals to the 'contagion of stress' (cf. Barrera, 1989), when stressful life events afflict those to whom they feel emotionally close (Hobfoll et al, 2007). This may lead to increased feelings of anxiety. These results highlight that other types of mental health problems such as general anxiety may not share a common pattern of association with social capital. Future researchers need to reveal the pathways through which the social context affects other indicators of post disaster mental health problems (McKenzie et al, 2002).

146

2.5 Explaining ambiguous results in social capital research

The finding that disaster mental health is determined as an outcome of the interplay between social community mechanisms and individual psychosocial processes (see Chapter 3, 4 and 5) also explains inconclusive results on the *direct* association between the social context and disaster mental health thus far (e.g. De Silva et al, 2005; Islam et al, 2006). Firstly, social networks are the province of the community and are thus more distally related to individual mental health outcomes than individual characteristics. The inclusion of individual characteristics may have masked the association between structural social capital and mental health in previous mental health research. In this respect, the inclusion or exclusion of individual characteristics (primary appraisal, coping effort, social support) in Chapter 3 to 5, may partly explain mixed results on the association between structural social capital and posttraumatic stress outcomes across previous studies thus far (Kawachi, 2006; Kawachi & Subramanian, 2006; McKinzie, Whitley & Weich, 2002). Secondly, from the three community constructs that we selected, we showed that structural social capital is, in particular, distally related to posttraumatic stress. Again, more distal variables (i.e. structural social capital) show by their nature weaker relationships with mental health outcomes (see Figure 1; cf. De Silva et al, 2005, 2007). These findings explain results from previous studies that in comparison to cognitive social capital especially structural social capital revealed to have ambiguous associations with illnesses (Kawachi, 2006; McKinzie, Whitley & Weich, 2002; Yen & Syme, 1999).

Given these distal and sequential cross-level relationships, the only way to show the relationship between the social context and mental health is by using the appropriate multilevel method. By using multilevel structural equation modeling, we revealed a much closer reflection of reality than the most commonly applied bivariate approach in disaster mental health research that attempts to link social capital directly to mental health.

3. Methodological consequences of not including social contextual factors in disaster studies

In the third section, we showed that multilevel research on disaster mental health is not a simple matter of choice. Rather, single level research (either on the individual or contextual level) carries severe methodological problems that have likely plagued other comparative post-disaster mental health research that relied on screening instruments thus far. These methodological problems stem from the cross-level nature of disaster mental health.

One methodological issue that we elaborated on in Chapter 6 addresses the problem raised in the disaster mental health literature, that disaster surveys show great variation in disaster mental health outcomes (Rodin & Van Ommeren, 2009). They noted that disaster surveys are plagued by great variation in disaster mental health outcomes. This problem has puzzled many disaster scholars, because this variation is difficult to explain by the characteristics of disasters per se. Furthermore, this tremendous variation hampered the synthesis of findings in disaster mental health research. Previously, this variation in outcomes of disaster surveys has been explained by pointing at the methodological differences in research designs, in sample sizes, and in instrumentation (Galea, Maxwell, & Norris, 2008; Kessler & Wittchen, 2008; Rodin & van Ommeren, 2009). In an attempt to deal with this problem of variation in outcomes that stem from differences in study characteristics, Ginzbrug and Solomon (2008) propose to standardize instrumentation to screen for disorders and psychological problems. Raphael (2008) calls for the development of core templates for future disaster research and suggests that the international research community, along with other key stakeholders, should come together to agree on such templates in order to promote quality improvement in disaster mental health research. Yet, apart from such a labor-intensive and costly approach to standardize all disaster research in order to draw comparisons and synthesize findings, we may provide another meaning to the variation in mental health outcomes across study groups (and studies).

We demonstrated that there are two types of variation in mental health outcomes across disaster groups (and disaster studies). Most disaster mental health research relied on screening outcomes due to the practical applicability of screening instruments. The basic idea of screening instruments is that covariance between observed variables of screening instruments is determined by the latent mental health construct they refer to. However, this assumption

is questionable when a shared context influences individual observed scores (see e.g. neighborhood studies; Wind & Komproe, 2012). The consequence is that the covariance between observed mental health variables will refer (i) to the latent mental health concept of interest and (ii) to living in the same eroded context (Dyer, Hanges, & Hall, 2005). When the latter source of covariance (so called 'nested variance') is ignored, covariance is mistakenly attributed to the underlying mental health concept (Muthén, 1994). The result is that assessment of mental health outcomes can be biased (Kreft & De Leeuw, 1998), and may contribute to unwanted variation of outcomes across disaster studies. In Chapter 6 we showed excessive nested variance in a disaster-affected population. This nested variance biased outcomes; a problem that is not limited to our study. Given the fact that screening instruments are most commonly used in disaster research and that the destructive impact on the context is an inherent part of catastrophic events, it is likely that in other studies part of the covariance in individual mental health scores is also related to the post-disaster context rather than to the latent mental health concept per se. This problem of excessive 'nested variance' (i.e. variance related to the context) is likely to contribute substantially to variation across disaster studies, but notably not to the mental health variation Van Ommeren and Rodin (2009) refer to.

This nested variance in turn masked another important methodological problem. After dissecting this group variance, construct validity of the assessments of anxiety and depression revealed to be poor and unstable across both groups. The subscales anxiety and depression referred to different concepts in both groups. The methodological problem of unequal construct variance ultimately refers to the following issue: As we pointed out above, whether specific mental health symptoms may constitute actual mental health problems depends on the context in which they occur. For instance, anxiety (e.g. being on high alert to danger, tension and fear) may be an adequate reaction in an environment that has recently been hit by a flood and may be struck again. Yet, these same symptoms may be an inadequate reaction in an unaffected context and may in such a context represent the actual 'stand alone' individual mental health problems that screening instruments intend to measure. Accordingly, we found that mental health problems held different meaning across both groups. The problem of comparing unequal constructs cannot be dismissed without the required analyses (MI-CFA). It follows that researchers cannot indiscriminately employ screening instruments to compare mental health across disaster groups and non-disaster groups. Yet, the designated analyses have not been applied in disaster mental health research and therefore the size of the problems is hard to estimate.

4. Implications for interventions

The cross-level conceptualization of disaster mental health indicates a need to combine interventions on the social community level (§4.1) and on the individual level (§4.2). Both intervention levels are inextricably linked to one another and whether individual suffering (e.g. posttraumatic stress) is indeed curbed, depends on the implementation of intervention at both levels. When social capital is restored, there is often improvement in the individual member's functioning (Wind et al, 2013). Without facilitating adequate functioning of individuals in the community, individual mental health problems are not likely to abate. At the same time, for a small group of affected individuals with sustained and severe mental health problems, community based interventions may not be enough. Within these community based interventions, these individuals may be referred to mental health professionals for individual treatment.

4.1 Interventions on the social community

The strategies for reconstruction and revitalization of social capital after natural disasters that are recommended include strengthening social networks and community ties as well as building social organizations (Brune & Bossert, 2009). At the same time as repairing the destroyed social capital, it is vital to preserve, foster and promote a sense of collective efficacy to help themselves (Hobfoll et al, 2007). Examples of community based interventions that strengthen the social context range from mobilizing disaster-prevention groups (Brune & Bossert, 2009) as well as organizing community meetings (Somasundaram & Sivayokan, 2013) to more group therapeutic accounts, such as implementing school-based interventions (Jordansetal, 2013) and sociotherapeutic community interventions (Verduin et al, submitted). Previously, we mentioned several concrete initiatives from Morpeth, England, where the Red Cross facilitated town hall meetings among residents to help themselves, and community members spontaneously organized themselves in a 'flood action group' to protect themselves against the threat of future floods. The essential key of these initiatives or interventions is that the community is involved rather than the individual in addressing disasterrelated demands or in processing the disaster experience. The clear advantages of community interventions that foster social capital over traditional individualoriented interventions, is (i) that they represent the possibility of promoting positive outcomes effectively with relative few resources compared to individual oriented interventions (Borgonovi, 2010), and (ii) that they cover an affected population at large.

The findings in Chapter 5 imply that within these community interventions, practitioners should be mindful of, and stimulate, natural gender-specific tendencies. It may be particularly salutary to actively involve men in community interventions that collectively address disaster-related demands and fight future threats to floods on behalf of the community (cf. Brune & Bossert, 2009). To promote disaster mental health of women in turn, it may be especially fruitful to involve women in building higher levels of trust within the community. Pennebaker (2001) recommends the facilitation of "social sharing", for example by organizing community meetings, in which women find the time to talk about the disaster and process the experience (cf. Brune and Bossert, 2009). As such, these community interventions will put a halt to individual psychosocial resource losses for both men and women, and protect affected individuals against disaster mental health problems.

Interestingly, our findings indicate that community interventions that promote the social context and individual oriented interventions are not only geared towards the same end of improving individual mental health (Kawachi & Subramanian, 2006), but also exert their effect on mental health via the same individual mechanisms. Namely, cognitive behavioral interventions – the individual intervention of choice to address prolonged disaster-related distress (Van Ommeren, Morris & Saxena, 2008) – alter the relationship between the original emotional response (cf. primary appraisal) and current distress, and mold individual behavior towards a more adequate response (coping and seeking social support). We showed that cultivation of social capital exerts its salutary influence on disaster-related distress via the exact same mechanisms. Thus, one may conclude that the cultivation of community social capital may help to decrease the need for individual psychological interventions (Hobfoll et al, 2007; Van Ommeren & Wessels, 2007).

4.2 Modesty towards individual oriented interventions

Since interventions at the context and community level already prevent the development of impaired functioning and distress into actual mental health problems (Jordans et al, 2013), we see a modest role for individual oriented interventions. Within community based interventions, affected individuals with sustained and severe mental health problems may be referred to mental health professionals for individual treatment.

We stress that this type of intervention is a last resort and should not be indiscriminately forced upon disaster-affected individuals with mental health problems, as was sometimes the case after the Asia tsunami in 2004 (Wessels, 2009). Such an indiscriminative approach may conversely increase mental health problems for people who are not ready to process their experience (cf. Kenardy, 2000). Rather, we advise 'watchful waiting' for those with persevering severe mental health problems. For this small group of individuals, there may still be an actual need for individual psychological interventions (Hobfoll et al, 2007). Within such individual interventions, the individual models in Chapter 5 showed that women with severe mental health problems may benefit in particular from mastering practical problem-focused coping strategies in individual therapy. This concurs with findings of Tolin and Breslau (2007) who found that female disaster survivors endorse a greater belief that they were incompetent than their male counterparts. In turn, emotion-focused coping strategies constitute the blind spot of men. Therefore, affected men with severe disaster mental health problems will benefit from sharing their disaster experience on an individual therapeutic basis.

5. The added value of multilevel analyses & areas for progress

Within our body of research, we illustrated two multilevel analytical tools to reveal the cross-level character of disaster mental health problems (cf. Kawachi, 2004). First and foremost, multilevel structural equation modeling used in section 2 can be helpful in the identification of variables that either moderate or mediate the impact of disasters on mental health, in effect laying out conceptual roadmaps for empirically based interventions (Rasco & Miller, 2004 in Miller et al, 2007). Second, the procedure of multilevel confirmatory factor analysis used in section 3 (MCFA; Muthén, 1990, 1994) allows us to dissect the variance at the individual level that refers to disaster mental health constructs from contextual level variance that refers to the disaster affected and non-disaster affected group, and to examine the validity of the individual level factor structure across both groups. The application of these two types of multilevel analyses (Muthén, 1994; Dyer et al, 2005) will advance our understanding of mental health in disaster contexts (Kawachi & Subramanian, 2006). Despite its usefulness and necessity, multilevel techniques have been scarcely applied in disaster mental health research. This hesitant attitude of disaster researchers stems from statistical difficulties to conduct multilevel analyses (Miller et al, 2007). Yet, recent advances in statistical packages (such as MPlus, Muthén, 1994) render multilevel analyses more easily applicable.

Three areas for improvement

There are three areas for improvement. First, our results relied solely upon (aggregation of) individual responses. Relying on one source of data creates the

risk of not uncovering biases related to this single data source; a bias called the 'common source bias'. Kawachi and Subramanian (2006) discuss the additional use of objective markers of (access to) social capital. We included such objective indicators (cf. income and residential stability) which did however rely on individual report. The conclusions would have been strengthened by including another source of data in the analyses, such as the per capita density of organizations within a community. In this respect, Almedom (2005) claims that established indicators of social capital are amenable to quantitative and qualitative assessment, preferably in tandem. However studies that employ combined research design are rare or non-existent. Interdisciplinary multimethod investigations and analyses are called for in order to further unravel mechanisms whereby social capital and mental health might be meaningfully associated (Almedom, 2005).

Second, most disaster mental health research that includes social capital relies on a cross-sectional design (Kessler et al, 2008), and we are guilty of using that research design as well. This research design allows establishing associations, but not causal effects. Hence, there is a need for longitudinal studies on the mechanisms between social capital and disaster mental health (De Silva et al 2005; Kessler et al, 2008; Macinko & Starfield, 2001). Such research is also much needed because social capital may not be uniformly salutary over time. In the only longitudinal study on social capital known to the authors, Weil and colleagues (2012) recently showed that over the course of stressful events, social involvement first exposes people to more stress, but as time passes, provides them a significant buffer against negative psychosocial experience.

Third, although the relevance of community interventions that strengthen social capital in disaster-affected communities has been underscored by national and international policies for years (De Jong & Komproe, 2002; De Silva et al, 2007; Hobfoll et al, 2007; Norris et al, 2008), there is very limited evidence on how social capital could be mobilized in local communities (Eriksson, 2011). Only recently, Pronyk and colleagues (2008) demonstrated that it is possible to intentionally generate social capital in South Africa. To add to this meagre body of research, we conducted a longitudinal study on mental health and social capital, where a psycho-social group approach (sociotherapy) enhanced both mental health and civic participation (i.e. social capital; Verduin et al, in preparation; see also Scholte et al, 2011). Despite this and similar attempts, there remains a tremendous need for additional studies to show how social capital capital capital.

Discussion

153

In closing

Despite these areas for progress, it is our hope that this dissertation advances the theoretical mindset with regard to defining disaster mental health and, inherently, about how to intervene on these problems. We revealed that disaster mental health outcomes must be conceptualized at the crossroad of the social context and the individual (cf. Kleber, 1995). This conceptualization provided a better understanding of: (i) the interpretation of screening outcomes of postdisaster mental health problems; (ii) social mechanisms related to disaster mental health; (iii) ambiguous findings in social capital research thus far; and (iv) enormous variation across disaster mental health studies hitherto. Notwithstanding this contribution, this body of research is an empirical start to understand the social mechanisms that determine disaster mental health. There is a need for more empirical evidence on this topic in order for us to fully understand the etiology of, and mitigation strategies for, disaster mental health problems. For instance, longitudinal research on social mechanisms that explain post-disaster mental health problems needs to be high on the agenda for disaster researchers. Such research will help us understand the development of disaster mental health problems and will help us develop adequate mitigation strategies to confront the increasing numbers of disaster affected individuals with mental health problems.

23-9-2013 20:37:26

References

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders IV-TR*. Washington, DC: American Psychiatric Association.
- Almedom, A.M. (2005). Social capital and mental health: an interdisciplinary review of primary evidence. *Social Science & Medicine*, *61(5)*, 943-964.
- Barrera M. (1989). Models of social support and life stress: beyond the buffering hypothesis. In: Cohen L.H. (Ed.). *Life events and psychological functioning* (211-236). Newbury Park, CA: Sage Publications.
- Benight, C.C. (2004). Collective efficacy following a series of natural disasters. *Anxiety, Stress, and Coping, 17(4),* 401-420.
- Benight, C.C., Freyaldenhoven, R.W., Hughes, J., Ruiz, J.M., Zoschke, T.A. & Lovallo, W.R. (2000). Coping self-efficacy and psychological distress following the Oklahoma City bombing. *Journal of Applied Social Psychology, 30*, 1331-1344.
- Blakely, T.A. & Woodward, A.J. (2000). Ecological effects in multilevel studies. *Journal of Epidemiology and Community Health*, *54*, 367-374.
- Borgonovi, F. (2010). A life-cycle approach to the analysis of the relationship between social capital and health in Britain. *Social Science & Medicine*, *71 (11)*, 1927-1934.
- Boscarino, J.A., Adams, R.E., Stuber, J. & Galea, S. (2005). Disparities in mental health treatment following the World Trade Center Disaster: Implications for mental health care and health services research. *Journal of Traumatic Stress*, 18(4), 287-297.
- Brune, N.E. & Bossert, T. (2009). Building social capital in post-conflict communities: evidence from Nicaragua. *Social Science & Medicine*, *68(5)*, 885-893.
- Crighton, E.J., Elliot, S.J. & Van der Meer, J. (2003). Impacts of an environmental disaster on psychological health and well-being in Karakalpakstan. *Social Science & Medicine, 56(3)*, 551-567.
- De Jong, J.T.V.M. & Komproe, I.H. (2002). Closing the gap between psychiatric epidemiology and mental health in post-conflict situations. *Lancet*, *359*, 1793-1794.
- De Silva, M.J., Huttly, S.R., Haprham, T. & Kenward, M.G. (2007). Social capital and mental health: a comparative analysis of four low income countries. *Social Science & Medicine*, *64(1)*, 5-20.

- Dyer, N.G., Hanges, P.J. & Hall, R.J. (2005). Applying multilevel confirmatory factor analysis techniques to the study of leadership. *The Leadership Quarterly, 16*, 149-167.
- Eriksson, M. (2011). Social capital and health implications for health promotion. *Global Health Action, (4).* Available at: http://www.globalhealthaction. net/index.php/gha/article/view/5611
- Freedy, J.R., Shaw, D.L., Jarell, M.P. & Masters, C.R. (1992). Towards an understanding of the psychological impact of natural disaster: An application of the conservation of resources model. *Journal of Traumatic Stress*, *5*, 441-454.
- Giddens, A. (1984). *The Constitution of Society. Outline of the Theory of Structuration*. Cambridge: Polity.
- Gilbody S, Sheldon T. & Wessely S (2006). Should we screen for depression? *British Medical Journal*, 332, 1027-1030.
- Ginzburg, K. & Solomon, Z. (2008). Does one size fit all? The challenges of establishing a coordinating center for research of post-disaster needs assessment. *International Journal of Methods in Psychiatric Research*, 17(S2), S36-41.
- Ginzburg, K., Solomon, Z., Dekel, R. & Neria, Y. (2003). Battlefield functioning and chronicPTSD: Associations with perceived self-efficacy and causal attribution. *Personality and Individual Differences*, *34*(*3*), 463-476.
- Harpham, T., Grant, E. & Thomas, E. (2002). Measuring social capital within health surveys: key issues. *Health Policy and Planning*, *17(1)*, 106-111.
- Hobfoll, S.E. (2002). Social and psychological resources and adaptation. *Review* of General Psychology, 6, 307-324.
- Hobfoll, S.E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., et al. (2007). Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*, *70*(*4*), 283-315.
- Horwitz, A.V. (2007). Transforming normality into pathology: the DSM and the outcomes of stressful social arrangements. *Journal of Health Social Behavior*, *48*(*3*), 211-222.
- Hurtado, D., Kawachi, I. & Sudarsky, J. (2010). Social capital and self-rated health in Colombia: the good, the bad and the ugly. *Social Science & Medicine*, *72(4)*, 584-590.
- Islam, M.K., Merlo, J., Kawachi, I., Lindström, M. & Gerdtham, G. (2006). Social capital and health: Does egalitarianism matter? A literature review. *International Journal for Equity in Health*, *5*, 3-30.

- Jordans, M.J., Tol, W.A., Susanty, D., Ntamatumba, P., Luitel, N.P., Komproe, I.H. & De Jong, J.T. (2013). Implementation of a mental health care package for children in areas of armed conflict: a case study from Burundi, Indonesia, Nepal, Sri Lanka and Sudan. *PloS Medicine, 10(1)*, e1001371.
- Kattri, P., Joshi, P.C., Wind, T.R., Komproe, I.H. & Guha-Sapir, D. (2012). Understanding mental health as a function of social vulnerabilities in a disaster situation: Evidence from recurrent flooding in Bahraich district, Uttar Pradesh. *Journal of Anthropolical Survey India*, 61(1), 109-125.
- 156
- Kawachi, I. (2004). Commentary: Reconciling the three accounts of social capital. *International Journal of Epidemiology, 33 (4)*, 682-690.
- Kawachi, I. (2006). Commentary: social capital and health: making the connections one step at a time. *International Journal of Epidemiology*, *35(4)*, 989-993.
- Kawachi, I. & Berkman, L.F. (2001). Social ties and mental health. *Journal of Urban Health*, *78*(3), 458-467.
- Kawachi, I. & Subramanian, S.V. (2006) Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *Journal* of Traumatic Stress, 19(2), 195-203.
- Keinan, G., Friedland, N. & Sarig-Naor, V. (1990). Training for task-performance understress: The effectiveness of phased training methods, part 2. *Journal of Applied Social Psychology*, 20(18), 1514-1529.
- Kenardy, J. (2000). The current status of psychological debriefing. *British Medical Journal*, *321*, 1032-1033.
- Kessler, R.C. & Wittchen, H.U. (2008). Post-disaster mental health need assessment surveys – the challenge of improved future research. *International Journal of Methods in Psychiatric Research*, 17(S2), S1-S5.
- Kleber, R.J. (1995). Epilogue: Towards a broader perspective of traumatic stress. In: R.J. Kleber, Ch.R. Figley & B.P. R. Gersons (Eds.), *Beyond trauma: Cultural and societal dimensions* (pp. 299-306). New York: Plenum.
- Kleber, R.J. (2008). Psychopathologie na rampen: algemene karakteristieken en kritische kanttekeningen. *Psychologie & Gezondheid, 36*, 117-123.
- Lin, N., Ye, X. & Ensel, W.M. (1999). Social support and depressed mood: a structural analysis. *Journal of Health and Social Behavior, 40*, 344-359.
- Macinko, J. & Starfield, B. (2001). The utility of social capital in research on health determinants. *Milbank Q*, *79(3)*, 387-427.
- McCracken, C., Dalgard, O.S., Ayuso-Mateos, J.L., Casey, P., Wilkinson, G., Lethinen, V. & Dowrick, C. (2006). Health service use by adults with depression: community survey in five European countries. Evidence from the ODIN study. *British Journal of Psychiatry, 189*, 161-167.

- McKenzie, K., Whitley, R. & Weich, S. (2002). Social capital and mental health. *British Journal of Psychiatry*, 181, 280-283.
- McNally, R.J. (2009). Can we fix PTSD in DSM-V? *Depression and Anxiety, 26*, 597-600.
- Miller, K.E., Kulkarni, M. & Kushner, H. (2007). Beyond trauma-focused psychiatric epidemiology: bridging research and practice with waraffected populations. *American Journal of Orthopsychiatry*, *76(4)*, 409-422.
- Nakhaie, R. & Arnold, R. (2010). A four year (1996-2000) analysis of social capital and health status of Canadians: the difference that love makes. *Social Science & Medicine*, *71*(*5*), 1037-1044.

- Narrow, W.E., Rae, D.S., Robins, L.N. & Regier, D.A. (2002) Revised prevalence estimates of mental disorders in the United States: using a clinical significance criterion to reconcile 2 surveys' estimates. *Archives of General Psychiatry*, 59(2), 115-123.
- Norris, F.H., et al (2002). 60,000 disaster victims speak: part I: an empirical review of the empirical literature, 1981-2001, *Psychiatry*, 65(3), 207-239.
- Norris, F.H., Murphy, A.D. & Baker, C.K. (2004). Postdisaster PTSD over four waves of a panel study of Mexico's 1999 flood. *Journal of Traumatic Stress*, 17(4), 283-292.
- Norris, F.H., Friedman, M.J. & Watson, P.J. (2002). 60,000 disaster victims speak: part I: an empirical review of the empirical literature, 1981-2001, *Psychiatry*, 65(3), 240-260.
- Norris, F.H. & Kaniasty, K. (1996). Received and perceived social support in times of stress: a test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology, 71 (3),* 498-511.
- Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F.,& Pfefferbaum, R.L. (2008). Community resilience as a metaphor, theory, set of capacities and strategy for disaster readiness. *American Journal of Community Psychology*, *41* (1-2), 127-150.
- Pennebaker, J.W. (2001) Disclosing and Sharing Emotion: Psychological, Social and Health Consequences. In: M.S. Stroebe, W. Stroebe, R.O. Hansson & H. Schut (Eds.) *Handbook of bereavement research: Consequences, coping, and care* (pp. 517-539). Washington DC: American Psychological Association.
- Picou, J.S., Marshall, B.K. & Gill, D.A. (2004). Disaster. Ligitation and the corrosive community. *Social Forces*, *82*, 1493-1522.
- Pronyk, P.M., Harpham, T., Busza, J., Phetla, G., Morison, L.A., Hargreaves, J.R., Kim, J.C. & Portes A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1-24.

- Rasco, L.M. & Miller, K. E. (2004). Innovations, challenges, and critical issues in the development of ecological mental health interventions with refugees. In: K.E. Miller & L.M. Rasco (Eds.), *The mental health of refugees: Ecological approaches to healing and adaptation* (pp. 375-416). Mahwah, NJ: Erlbaum.
- Raphael, B. (2008). The challenges of purpose in the face of chaos: commentary paper by Professor Beverley Raphael. *International Journal of Methods in Psychiatric Research*, 17(S2), S42-S48.
- Rodin, D. & van Ommeren, M. (2009). Commentary: Explaining enormous variations in rates of disorder in trauma-focused psychiatric epidemiology after major emergencies. *International Journal of Epidemiology*, 38(4), 1045-1048.
 - Ross, C.E., Reynolds, J. & Geis, K. (2000). The contingent meaning of neighbourhood stability for residents psychological well-being. *American Sociological Review*, 65, 581-597.
 - Sampson, R.J., Raudenbush, S.W. & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, *277*(*5328*), 918-924.
 - Sandler, I. (2001). Quality and Ecology of Adversity as Common Mechanisms of Risk and Resilience. *American Journal of Community Psychology, 29(1)*, 19-61.
 - Sapag, J.C. & Kawachi, I. (2007). Social capital and health promotion in Latin America. *Revista Saude Publica*, *41(1)*, 139-149.
 - Sattler, D.N., De Alvarado, A.M.G., Castro, N.B., Van Male, R., Zetino, A.M. & Vega, R. (2006). El Salvador Earthquakes: relationships among acute stress disorder symptoms, depression, traumatic event exposure, and resource loss. *Journal of Traumatic Stress*, 19(6), 879-893.
 - Scholte, W.F., Verduin, F., Kamperman, A.M., Rutayisire, T., Zwinderman, A.H. & Stronks, K. (2011). The effect on mental health of a large scale psychosocial intervention for survivors of mass violence: a quasiexperimental study in Rwanda. *PLoS One, 6, 8*, e21819.
 - Solomon, Z. (2003). *Coping with war-induced stress: The Gulf War and the Israeli response*.New York: Plenum.
 - Solomon, S.D. & Green, B.L. (1992). Mental health effects of natural and human-made disasters. *PTSD research quarterly*, 3(1).
 - Somasundaram, D. & Sivayokan, S. (2013). Rebuilding community resilience in a post-war context: developing insight and recommendations – a qualitative study in North Sri Lanka. *International Journal of Mental Health Systems, 7(3).*

- Stuber, J.P. & Galea, S. (2005) Barriers in Mental Health Treatment After Disasters. *Psychiatric Services*, *56(9)*, 1157-1158.
- Swenson, C.C., Saylor, C.F. & Powell, M. P. (1996). Impact of natural disaster on preschool children: Adjustment 14 months after a hurricane. *American Journal of Orthopsychiatry*, 66(1), 122-130.
- Tapsell, S.M., Penning-Rowsell, S.N., Tunstall, S.M. & Wilson, T.L. (2002). Vulnerability to flooding and social dimensions. *Philosophical of the Royal Society B: Biological Sciences, 360*, 1511-1525.
- Tapsell, S.M. & Tunstall, S.M. (2009). 'I wish I'd never heard of Banbury': The relationship between 'place' and the health impacts from flooding. *Health & Place, 14,* 133-154.

- Ten Veen P.M.H., Morren M., Yzermans C.J. (2009). The influence of New Events on Health after Disaster: A Longitudinal study in General Practice. *Journal of Traumatic Stress 22(6)*, 505-515.
- Tolin, D.F. & Breslau, N. (2007). Sex differences in risk of PTSD. *PTSD Research Quarterly, 18(2),* 1-8.
- Velden, P.G. van der, Grievink, L., Kleber, R.J., Drogendijk, A.N., Roskam, A.J., Marcelissen, F.G.H., Olff, M., Meewisse, M. & Gersons, B.P.R. (2006). Postdisaster mental health problems and the utilization of mental health services: A four year longitudinal comparative study. *Administration and Policy in Mental Health and Mental Health Services Research*, 33, 279-288.
- Van der Velden, P.G., Kleber, R.J., IJzermans, J. & Gersons, B.P.R. (2007). Correlates of mental health services utilization 18 months and almost 4 years postdisaster among adults with mental health problems. *Journal of Traumatic Stress, 20*, 1029-1039.
- Van Ommeren, M., Morris & J., Saxena, S. (2008). Social and clinical interventions after conflict and other large disaster. *American Journal of Preventive Medicine*, 35(3), 284-286.
- Van Ommeren, M. & Wessels, M. (2007). Inter-agency agreement on mental health and psychosocial support in emergency settings. *Bulletin of the World HealthOrganization*, *85(11)*, 822.
- Verduin, F., Smid, G.E., Wind, T.R. & Scholte, W.F. (submitted) . In search of links between social capital, mental health and sociotherapy: a longitudinal study in Rwanda. *Social Science & Medicine*.
- Wright, J.H., Basco, M.R. & Thase, M.E. (2006). Learning cognitive/behavior therapy: An illustrated guide. Washington, DC: American Psychiatric Publishing, Inc.

- Weems, C.F., Watts, S.E. & Marsee, M.A. (2007). The psychosocial impact of Hurricane Katrina. *Behaviour Research and Therapy*, *45(10)*, 2295-2306.
- Wessels, M. (2009). Do No Harm: Toward Contextually Appropriate Psychosocial Support in International Emergencies. *American Psychologist*, (11), 842-854.
- Woolcock, M. (2001). The place of social capital in understanding social and economic outcomes. ISUMA. *Canadian Journal of Policy Research*, 2(1), 11-17.

Summary

Introduction

In the wake of disasters, there are enormous numbers of affected individuals with a complex variety of psychological and psychiatric sequelae. These consequences range from adaptive and resilient coping responses in the face of catastrophic events to understandable non-pathological distress as well as a number of maladaptive behavioral patterns to diagnosable psychiatric disorders. Researchers have been puzzled by the vast magnitude of these mental health problems which is immensely greater than any rate in non-affected populations. This dissertation shows that it is not so much the magnitude that is different from mental health problems in populations that are not affected by disasters, but rather the *nature* of disaster mental health problems is different. That is to say, disaster mental health problems are multilevel in nature: in contrast to mental health problems after a potentially traumatic event in non-affected populations (e.g. robbery or car accident), the mental health problems after natural disasters are not only determined by the traumatic experience itself and the way individuals cope with disaster-related demands, but also substantially by the vast destructive impact of disasters on the context and the social community in which affected people live.

In contrast to the current (research) perspectives on disaster mental health as a construct that is determined on a single level (*either* on the individual level, or the contextual level), throughout this dissertation we show that the 'cross-level interplay' between the disaster affected context and individual variables (such as the individual disaster experience, coping and social support) determines whether or not individuals experience disaster mental health problems. In section one (Chapter 2), we demonstrate that the cross-level conceptualization of disaster mental health problems has consequences for the interpretation of mental health screening outcomes in terms of treatment need. In section two (Chapter 3 to 5), we focus on a specific aspect of the disaster context, namely living in social community affected by a disaster. We empirically reveal the mechanisms via which living in a disaster affected social community is associated to mental health problems. In section three (Chapter 6), we reveal that the conceptual understanding of disaster mental health as a cross-level phenomenon has far-reaching methodological consequences for the findings of single-level research on post-disaster mental health thus far.

1. The disturbed relationship between the affected individual and the disaster context

Chapter 2 examines the immediate impact of a recurrent flood on mental health and functioning among an affected population in the rural district of Bahraich, Uttar Pradesh, India (n=318), compared to a population in the same region that is not affected by floods (n=308). This study found a large negative impact of the recurrent floods on mental health outcomes and psychological and physical functioning. However, in a context with recurrent floods, disaster mental health status is not a relevant predictor of functioning (i.e. the requisite for psychopathology). The findings of Chapter 2 suggest that the observed mental health status and impaired functioning in this context are also outcomes of another mechanism: both outcomes are likely to be related to the erosion of the social and environmental and material context. As such, the findings refer to a need to implement psychosocial context-oriented interventions to address the erosion of the context.

2. The mechanisms that associate the social community with posttraumatic stress

Within the broad disaster context, scholars have specifically focused on the effect of disasters on the social fabric of communities. Researchers embraced the concept of 'social capital'. Yet, empiric evidence on the association between social capital and disaster mental health is limited and inconsistent. Chapter **3** explores the relationship between social capital and disaster mental health problems (posttraumatic stress, anxiety, and depression) in combination with individual factors (appraisal, coping behavior, and social support). This chapter is based on a cross-sectional study in Morpeth, a flood-affected town in northern England (n=232). The findings showed that a considerable part of the association between cognitive and structural social capital and mental health is exerted through individual appraisal processes (i.e., property loss, primary and secondary appraisal), social support, and coping behavior. After the inclusion of individual characteristics, cognitive social capital was negatively related to lower mental health problems and structural social capital was positively associated to experiencing anxiety, but not to posttraumatic stress or depression. Individual oriented stress-reducing interventions that use appraisal

processes, social support and coping as starting points could be more effective by taking into account the subjective experience of the social context in terms of trust and feelings of mutual support and reciprocity in a community. Findings in this chapter indicate that affected people may benefit from a combination of individual stress-reducing interventions and psychosocial interventions that foster cognitive social capital.

The findings in the previous chapter beg the question *how* the eroded social fabric is related to disaster mental health. For this purpose, **Chapter 4** aimed to unravel this mechanism in the same cross-sectional study (2008) in Morpeth. We selected posttraumatic stress as an indicator of disaster mental health. Our multilevel model shows that high community social capital is indirectly salutary for individual posttraumatic stress. In particular, in communities (defined as postcode areas) with high structural social capital, the results suggest that individuals have faith in the social context (high cognitive social capital) to address disaster-related demands (high collective efficacy), and employ fewer individual psychosocial resources (i.e. coping strategies and social support). This "conservation of individual psychosocial resources" in a salutary social context decreases the association between the appraisal of the disaster and posttraumatic stress. As a result of this mechanism, individuals suffer less from posttraumatic stress in communities with high social capital. These findings provide new insights into *how* intervention policies aimed at strengthening both objective and subjective dimensions of social capital may reduce post-disaster mental health problems.

Although differences in disaster mental health between men and women are well described and explained in the literature, empirical evidence for the role of mechanisms in the social context (i.e. social capital) is hardly available. Such evidence completes the understanding of disaster mental health and facilitates the development of interventions to the specific post-disaster needs of men and women. In **Chapter 5** we demonstrate gender-specific mechanisms using the data from the Morpeth study. Our findings show universal *and* gender-specific associations between the social context and disaster mental health. The universal protective nature of a neighborhood with high social capital is that it facilitates and improves the deployment of individual psychosocial resources (coping and social support). Consequently, high community social capital is associated with less posttraumatic stress among men and women. Yet, men and women show a tendency to benefit from different components in the social context. Trust and mutual reciprocity in a community (i.e. cognitive social capital) stimulate women to apply coping efforts to deal with disaster mental health problems in a more

parsimonious and efficient fashion. Findings among men suggest that residing in collective effective communities (cf. high collective efficacy) is associated with less deployment of social support (i.e. family and friends) to deal with the consequences of the flood. As a result, social support among men became less relevant for dealing with disaster mental health problems. The results in Chapter 5 may help to increase the effect of both individual and communityoriented (psychosocial) interventions on disaster mental health problems by incorporating or stimulating these gender-specific communal mechanisms.

3. Methodological consequences of not including social contextual factors in disaster studies

Chapter 6 demonstrates two specific methodological problems which stem from the multilevel nature of disaster mental health problems. These two problems explain this variation in rates of mental health problems across disaster studies that have puzzled many disaster scholars. Both methodological problems are rooted in decades of disaster mental health research. To reveal both problems, we used data from the study in Uttar Pradesh, India, and applied multigroup and multilevel confirmatory factor analyses across both groups (MI-CFA).

First, the affected group showed much higher mean scores on the subscales anxiety and depression. However, the outcomes revealed that a large proportion of covariance between observed mental health variables did not refer to these latent concepts of interest (depression and anxiety), but to the shared impact of the disaster on the context. This excessive nested variance biased outcomes. This problem is not limited to our study. Most disaster mental health research relied on screening outcomes due to the practical applicability of screening instruments. And given the fact that the destructive impact on the context is an inherent part of catastrophic events, it is likely that in other studies part of the covariance in individual mental health scores is also related to the post-disaster context rather than to the latent mental health concept per se.

Second, the nested variance masked another methodological problem. After dissecting this group variance, construct validity of the assessments of anxiety and depression proved to be poor and unstable across both groups. The subscales anxiety and depression referred to different concepts in both groups. The methodological problem of unequal construct variance ultimately refers to the following issue: whether specific mental health symptoms may constitute actual mental health *problems* depends on the context in which they occur. For

instance, anxiety (e.g. being highly alert to danger, tension and fear) may be an adequate reaction in an environment that has recently been hit by a flood and may be struck again. Yet, these same symptoms may be an inadequate reaction in an unaffected context, and may in such a context represent the actual 'stand alone' individual mental health problems that screening instruments intend to measure. Accordingly, we found that mental health problems held different meaning across both groups.

Other disaster studies are likely to have compared unequal constructs just as in our study. The problem of comparing unequal constructs cannot be dismissed without the required analyses (MI-CFA). Yet, the demonstrated multilevel analyses in this chapter have however not been applied in disaster mental health research, whereas both methodological problems are likely to explain great variation in mental health outcomes across disaster studies.

Discussion

To date, individual and contextual accounts to explain disaster mental health have remained remarkable strangers to each other. In this dissertation we show that the question about the theoretically appropriate level for analyzing the determinants of disaster mental health ought not to be couched in terms of a dichotomy (*either* individual level *or* the community level)—rather, it is *both*, implemented within a multi-level analytical framework. We show that disaster mental health problems must be conceptualized at the crossroad of the (social) context and the individual. This conceptualization provides a better understanding of (i) the interpretation of screening outcomes of post-disaster mental health problems; (ii) social mechanisms related to disaster mental health; (iii) inconsistent findings in social capital research thus far; and (iv) enormous variation across disaster mental health studies hitherto.

The cross-level conceptualization of disaster mental health further indicates a need to intervene simultaneously within the social community level and on the individual level. Both intervention levels are inextricably linked to one another, and whether individual suffering (e.g. posttraumatic stress) is indeed curbed, depends on the implementation of intervention at both levels. When social capital is restored, there is often improvement in the individual member's functioning. And when individual functioning is improved, a substantial part of individual mental health problems is likely to abate. Nonetheless, for a small group of affected individuals with sustained and severe mental health problems, community based interventions may not be enough. Despite the substantial contribution of this dissertation, this body of research is merely an empirical start to understand the social mechanisms that determine disaster mental health. There is much more empirical evidence needed on this topic in order for us to fully understand the etiology of, and mitigation strategies for, disaster mental health problems. For instance, longitudinal research on social mechanisms that explain post-disaster mental health needs to be high on the agenda for disaster researchers. Such research will help us to confront the increasing numbers of disaster affected individuals with mental health problems.

Samenvatting

Introductie

Ten gevolge van natuurrampen zijn er enorme aantallen getroffen individuen met complexe psychologische en psychiatrische sequelae. Deze psychische consequenties variëren van adaptieve veerkrachtige reacties en begrijpelijke niet-pathologische stress tot dysfunctionele gedragspatronen en diagnosticeerbare psychiatrische stoornissen. Jarenlang onderzoek heeft aangetoond dat de omvang van deze problematiek in getroffen bevolkingsgroepen veel groter is dan in niet-getroffen bevolkingsgroepen. Waar echter minder aandacht voor is, is dat de constellatie van determinanten die deze rampgerelateerde psychische problemen bepalen, veel complexer is dan in in niet-getroffen bevolkingsgroepen. In tegenstelling tot psychische problemen die ontstaan na een traumatische gebeurtenis in niet door een ramp getroffen bevolkingsgroepen (bijv. diefstal of een auto-ongeluk), worden de psychische problemen na natuurrampen niet alleen bepaald door de traumatische ervaring zelf en de manier waarop individuen omgaan met de gevolgen van de ramp. Deze problemen worden ook in grote mate bepaald door de enorm destructieve gevolgen van rampen op de context en de sociale gemeenschap waarin getroffen mensen wonen. Deze complexiteit heeft grote gevolgen voor de manier waarop onderzoek en interventies na rampen ingericht moeten worden.

De huidige onderzoeksperspectieven beschouwen rampgerelateerde geestelijke gezondheidsproblemen als een concept dat wordt bepaald op één van beide niveaus (het individuele of het contextuele niveau). In dit proefschrift tonen we echter aan dat deze perspectieven onvolledig zijn, omdat juist het kruisvlak tussen individuele variabelen (zoals de individuele ramp-ervaring, coping en sociale steun) en determinanten in de rampgetroffen context bepaalt of mensen psychische problemen ervaren na een ramp. In sectie één (hoofdstuk 2) tonen we aan dat deze zogenaamde 'cross-level conceptualisering' – die een vollediger en dus juister beeld geeft van de geestelijke gezondheidstoestand na rampen – substantiële gevolgen heeft voor de interpretatie van screeningsuitkomsten, en voor de vertaling van deze resultaten naar interventies. In **deel twee** (hoofdstuk 3 tot en met 5) richten we ons op één specifiek aspect van de rampencontext, namelijk op het leven in een sociale gemeenschap die door een ramp is getroffen. In empirisch onderzoek onthullen we de mechanismen waardoor wonen in een sociale gemeenschap die door een ramp is getroffen, is geassocieerd met het al dan niet ervaren van psychische problemen. In **deel drie** (hoofdstuk 6) tonen we aan dat het conceptuele begrip van rampgerelateerde geestelijke gezondheidsproblemen als een cross-level verschijnsel serieuze methodologische consequenties heeft voor de bevindingen van het onderzoek naar rampgerelateerde geestelijke gezondheid, dat zich doorgaans slechts richt op één niveau van determinanten.

1. De verstoorde relatie tussen het getroffen individu en de rampencontext

Hoofdstuk 2 gaat in op de onmiddellijke impact van een terugkerende overstroming op de geestelijke gezondheid en het functioneren van getroffen individuen in de landelijke regio Bahraich, Uttar Pradesh, India. We vergeleken deze groep (n=318) met een populatie in dezelfde regio die niet is getroffen door overstromingen (n=308). Symptomen van angst en depressie zijn gemeten met de Hopkins Symptom Checklist-25 (HSCL-25). Psychisch en lichamelijk functioneren is beoordeeld met behulp van de Short Form-12 (SF-12). De resultaten laten een grote negatieve impact zien van terugkerende overstromingen op de geestelijke gezondheidszorg en het (psychische en fysieke) functioneren. In deze context met terugkerende overstromingen was rampgerelateerde geestelijke gezondheid echter geen relevante voorspeller van individueel functioneren (de voorwaarde om van psychopathologie te spreken). De bevindingen in hoofdstuk 2 suggereren dat de psychische gezondheidstoestand en het verminderd functioneren het resultaat zijn van een ander mechanisme: beide uitkomsten zijn waarschijnlijk gerelateerd aan de erosie van de sociale en materiële context. Deze interpretatie onderstreept de noodzaak van psychosociale interventies die de context wederopbouwen en versterken.

2. De mechanismen die de sociale gemeenschap relateren aan posttraumatische stress

Binnen de rampencontext hebben wetenschappers zich specifiek gericht op het effect van rampen op de sociale structuur van gemeenschappen. Binnen deze onderzoekslijn richtten onderzoekers hun pijlen op het concept 'sociaal kapitaal'. Helaas is empirisch bewijs voor het verband tussen sociaal kapitaal en rampgerelateerde geestelijke gezondheid tot nog toe beperkt en inconsistent.

Hoofdstuk 3 verkent de relatie tussen sociaal kapitaal en rampgerelateerde geestelijke gezondheid (posttraumatische stress, angst en depressie) in combinatie met individuele factoren (de ervaring van de ramp, coping en sociale

steun). Dit hoofdstuk is gebaseerd op een cross-sectionele studie in een door een overstroming getroffen stad in het noorden van Engeland, Morpeth (n=232). De bevindingen toonden aan dat een aanzienlijk deel van de relatie tussen cognitief en structureel sociaal kapitaal en geestelijke gezondheidszorg wordt gemedieerd door individuele factoren, te weten: de individuele beoordeling van de ramp, in welke mate iemand van zichzelf de inschatting maakt dat hij/ zij goed met de gevolgen om zal kunnen gaan, sociale steun, en coping. Na inclusie van deze individuele kenmerken, was cognitief sociaal kapitaal negatief gerelateerd aan psychische problemen (posttraumatische stress, angst en depressie). Structureel sociaal kapitaal was positief geassocieerd met het ervaren van angst, maar niet met posttraumatische stress of depressie. Bevindingen in dit hoofdstuk geven aan dat individueel gerichte stressverminderende interventies – die beoordelingsprocessen, individuele coping en sociale steun als aangrijpingspunten hebben – effectiever zouden zijn als men rekening houdt met de subjectieve ervaring van de sociale context in termen van vertrouwen, gevoelens van wederzijdse steun en wederkerigheid in een gemeenschap. Ofwel, getroffen mensen profiteren van een combinatie van individueel georiënteerde interventies én psychosociale interventies die het cognitief sociaal kapitaal verhogen.

Op basis van de resultaten in het vorige hoofdstuk rijst de vraag hoe de erosie van sociale structuren als gevolg van natuurrampen gerelateerd is aan geestelijke gezondheid. Het doel van hoofdstuk 4 was om dit mechanisme te laten zien in dezelfde cross-sectionele studie in Morpeth. We selecteerden posttraumatische stress als een indicator van rampgerelateerde geestelijke gezondheid. Ons multilevel model laat zien dat hoog sociaal kapitaal in een gemeenschap indirect heilzaam is voor individuele posttraumatische stress. Met name in gemeenschappen (gedefinieerd als postcodegebieden) met een hoog structureel sociaal kapitaal, vertrouwen individuen op de gemeenschap (hoog cognitief sociaal kapitaal) om rampgerelateerde problemen aan te pakken (hoog collective efficacy). In deze gemeenschappen doen individuen minder een beroep op hun eigen individuele psychosociale middelen (copingstrategieën en sociale steun). Dit "behoud van de individuele psychosociale middelen" in een heilzame maatschappelijke context vermindert de associatie tussen de beoordeling van de ramp en posttraumatische stress. Als gevolg van dit mechanisme, lijden mensen in gemeenschappen met een hoog sociaal kapitaal minder aan posttraumatische stress. Deze bevindingen bieden nieuwe inzichten in hoe interventiebeleid gericht op versterking van zowel de objectieve en subjectieve dimensies van sociaal kapitaal rampgerelateerde geestelijke gezondheid kan verminderen.

Hoewel de verschillen in rampgerelateerde geestelijke gezondheidsklachten tussen mannen en vrouwen goed zijn beschreven in de literatuur, is empirisch bewijs voor de rol van de sociale mechanismen in de context (by. sociaal kapitaal) nauwelijks beschikbaar. Dergelijk bewijsmateriaal zou de ontwikkeling van interventies om aan de specifieke rampgerelateerde behoeften van mannen en vrouwen te voldoen, faciliteren. In hoofdstuk 5 laten we sekse-specifieke mechanismen zien met behulp van de gegevens uit de Morpeth studie. Onze bevindingen toonden universele en sekse-specifieke associaties tussen de sociale context en de rampgerelateerde geestelijke gezondheid. Het universele beschermende mechanisme is dat een hoge mate van structureel sociaal kapitaal het gebruik van individuele psychosociale middelen (coping en sociale steun) efficiënter maakt. Als gevolg van dit mechanisme is hoog sociaal kapitaal uiteindelijk geassocieerd met minder posttraumatische stress bij mannen en vrouwen. Mannen en vrouwen toonden echter een neiging om te profiteren van verschillende componenten binnen de sociale context. Vertrouwen en wederkerigheid in een gemeenschap (cognitief sociaal kapitaal) stimuleert vrouwen om coping-inspanningen op een meer spaarzame en efficiënte manier toe te passen. Bevindingen onder de mannen suggereren dat juist de collectieve effectiviteit van gemeenschappen (cf. hoog collective efficacy) geassocieerd is met minder mobilisatie van sociale steun (van familie en vrienden) om om te gaan met de gevolgen van de overstroming. Met andere woorden, in deze gemeenschappen werd sociale steun onder mannen minder relevant voor het omgaan met psychische problemen ten gevolge van een ramp. Door deze seksespecifieke mechanismen te stimuleren kan de effectiviteit van zowel individuele als community (psychosociale) interventies voor geestelijke gezondheid verhoogd worden.

3. Methodologische gevolgen van het niet opnemen van sociaal contextuele factoren in rampstudies

Hoofdstuk 6 laat twee specifieke methodologische problemen zien, die voortkomen uit het cross-level karakter van rampgerelateerde geestelijke gezondheid. Beide methodologische problemen zijn geworteld in decennia van rampgerelateerd geestelijk gezondheidsonderzoek. Menig onderzoeker heeft zijn hoofd gebroken over de enorme variatie in prevalenties van rampgerelateerde geestelijke gezondheidsuitkomsten, en de analyses van deze twee

problemen bieden allebei een verklaring voor deze enorme variatie. Om beide problemen aan het licht te brengen gebruikten we de gegevens van de Uttar Pradesh studie, en pasten multilevel confirmatieve factoranalyse toe over beide groepen (MI-CFA).

In het begin toonde de rampgroep veel hogere scores op de subschalen angst en depressie. Echter, uit de resultaten bleek dat een groot deel van de covariantie tussen geobserveerde psychische variabelen niet naar de latente concepten verwijst (depressie en angst), maar naar de impact van de ramp op de context. Deze excessieve zogenoemde 'geneste variantie' vertekent de uitkomsten. Dit probleem is niet beperkt tot onze studie. Het leeuwendeel van het onderzoek naar rampgerelateerde geestelijke gezondheid is gebaseerd op screeningsuitkomsten vanwege de praktische toepasbaarheid van de hiervoor benodigde meetinstrumenten. En aangezien de destructieve impact op de omstandigheden een inherent onderdeel is van natuurrampen, is het waarschijnlijk dat in andere studies eveneens een deel van de covariantie van individuele psychische scores gerelateerd is aan de rampcontext, in plaats van aan de latente mentale gezondheidsconcepten.

Ten tweede maskeert de geneste variantie een ander methodologisch probleem. Na het ontleden van deze groepsvariantie, bleek de constructvaliditeit van de concepten angst en depressie instabiel te zijn over beide groepen. Met andere woorden, de subschalen angst en depressie verwezen naar verschillende concepten in beide groepen. Het methodologische probleem van ongelijke constructvariantie verwijst uiteindelijk naar het volgende probleem: Of specifieke psychische symptomen werkelijke geestelijke gezondheidsproblemen vormen hangt af van de context waarin ze voorkomen. Zo kan angst (bijv. alert zijn op gevaar, spanning en angst ervaren) een adequate reactie zijn in een omgeving die onlangs is getroffen door een overstroming en opnieuw getroffen kan worden. Dezelfde symptomen kunnen daarentegen een onaangepaste reactie zijn in een onaangetaste context, en zodoende op de werkelijke alleenstaande individuele psychische problemen wijzen die screeningsinstrumenten beogen te meten. Kortom geestelijke gezondheidsproblemen kunnen een verschillende betekenis hebben in verschillende contexten.

Andere rampenstudies hebben waarschijnlijk eveneens ongelijke constructen vergeleken net als in onze studie. Het probleem van het vergelijken van ongelijke constructen kan niet worden verworpen zonder de vereiste analyses (MI-CFA). De aangetoonde multilevel analyses in dit hoofdstuk zijn echter niet toegepast rampgerelateerd geestelijk gezondheidsonderzoek, terwijl beide methodologische problemen een deel van de grote variatie verklaren in de geestelijke gezondheidsuitkomsten over rampenstudies.

Samenvatting

Discussie

Tot nu toe zijn de individuele en contextuele verklaringen voor rampgerelateerde geesteliike gezondheidsproblemen opmerkelijk geïsoleerd van elkaar gebleven. In dit proefschrift hebben we laten zien dat de vraag over het theoretisch juiste niveau van determinanten van rampgerelateerde geestelijke gezondheidsklachten niet moet worden geformuleerd in termen van een tweedeling (hetzij het individueel niveau, hetzij het gemeenschapsniveau). Geestelijke gezondheid na rampen wordt namelijk bepaald door de interactie tussen beide niveaus, en moet dan ook als zodanig geconceptualiseerd worden. Deze conceptualisering leidt tot verbeterde inzichten in rampenonderzoek op verschillende domeinen, te weten: (i) de vertaling van rampgerelateerde psychische problemen op basis van screeningsonderzoek naar interventies, (ii) sociale mechanismen die gerelateerd zijn aan geestelijke gezondheidsproblemen ten gevolge van een ramp, (iii) inconsistente bevindingen in rampenonderzoek naar sociaal kapitaal, en tot slot (iv) de enorme variatie in rampgerelateerde geestelijke gezondheidsstudies.

De cross-level conceptualisering van rampgerelateerde geestelijke gezondheid onderstreept de noodzaak om tegelijkertijd interventies uit te voeren op het sociale gemeenschapsniveau en het individuele niveau. Beide interventieniveaus zijn onlosmakelijk met elkaar verbonden. Of individueel lijden (bijv. posttraumatische stress) inderdaad wordt beteugeld, is afhankelijk van de uitvoering van interventies op beide niveaus. Als het sociaal kapitaal in bepaalde mate hersteld is, zal er verbetering optreden in individueel functioneren. En als individueel functioneren verbetert, zullen individuele psychische problemen waarschijnlijk ook afnemen. Desalniettemin zal voor een minderheid van getroffen individuen met aanhoudende en ernstige psychische problemen, 'community' georiënteerde interventies niet volstaan, en voor deze personen zullen individueel gerichte interventies noodzakelijk zijn.

Ondanks de substantiële bijdrage van dit onderzoek betreft het slechts een begin om de sociale mechanismen die rampgerelateerde geestelijke gezondheid bepalen, in empirisch onderzoek te doorgronden. Er is veel meer empirisch bewijs nodig om de etiologie van rampgerelateerde psychische problemen volledig te begrijpen en om hiervoor preventiestrategieën te ontwikkelen. Hierbinnen heeft longitudinaal onderzoek naar sociale mechanismen die rampgerelateerde psychische problemen bepalen prioriteit. Dergelijk onderzoek zal ons helpen het hoofd te bieden aan het stijgende aantal rampgetroffen personen met psychische problemen.

Dankwoord

Allereerst gaat mijn grote dank uit naar het onderwerp van dit proefschrift: de onderzochte rampgetroffenen. Ik wil hen graag danken voor hun openheid ten dienste van de wetenschap en praktijk. Zonder hen was dit onderzoek onmogelijk.

In het bijzonder bedank ik mijn promotoren. Ivan, ik kwam bij je met grote dromen over onderzoek in verre landen, maar had geen idee of deze werkelijkheid zouden worden. Ik had veel ambities, maar weinig ervaring. Jouw intensieve begeleiding de afgelopen jaren heeft me geholpen deze dromen en ambities te verwezenlijken. Je devies was 'lineair circulair leren': Telkens als ik dacht dat ik een stap verder was, stelde je kritische vragen die mijn prille gedachtengoed weer aan het wankelen brachten. Dat was een inspirerende en uitdagende manier van werken. Je bent de vader van het gedachtengoed in deze dissertatie. Je hebt me aangemoedigd tot hoogwaardig onderzoek en gemotiveerd tot het uiterste, zelfs waar ik niet wist dat ik het in me had. Door het proefschrift heen klinkt het gezegde 'het geheel is meer dan de som der delen' en dat gevoel had ik in onze samenwerking altijd. Uiteraard even zoveel dank aan Rolf, mijn tweede promotor. Je kwam er later bij en ik ben je dankbaar voor al je inspanningen en in het specifiek voor je 'andere perspectief'. Waar Ivan en ik ons vooral richtten op abstracties, vroeg je ons steevast naar de praktische implicaties van onze theoretische beschouwingen ('Wat kan de praktijk met deze resultaten?'). Je had oog voor de menselijke kant in ons werk als ook buiten ons werk, waardoor er onmiddellijk sociale cohesie was in de samenwerking tussen jou, mij en Ivan.

Veel dank gaat uit naar de beoordelingscommissie van het proefschrift, te weten: professor Peter van der Heijden, professor Ton Robben, professor Theo Bouman, professor Maggie Stroebe-Harrold en professor Frank Kortman. Dank aan het Europese onderzoeksproject MICRODIS waarin de interdisciplinaire samenwerking met antropologen, sociaal geografen, economen en medici een intellectuele verrijking was. Ik wil speciaal stil staan bij de uitvoerende onderzoekers binnen dit project – Dr. Fordham en Professor Joshi – die het onderzoek in respectievelijk Engeland en India mogelijk maakten. Ik bedank alle collega's van HealthNet TPO en Stichting Arq – en in het bijzonder het management en de raad van bestuur van beide organisaties – voor het creëren van een vruchtbare setting waarbinnen ik mijn onderzoek kon ontplooien.

Veel dank aan mijn de paranimfen Bas en Jasper, respectievelijk tweelingbroer en goede vriend. Bas: ook al zijn we anders in veel opzichten, jouw andere

Dankwoord

levensvisie die jij het beste samenvatte in de wielren-metafoor tijdens je eigen promotie ('stoempen op grootblad tot de finish') inspireerde me mijn werk af te maken en mijn dromen na te leven. Jasper: je bent een voorbeeldig wetenschapper en in die zin een voorbeeld voor mij in academisch opzicht. Met jou deel ik mijn interesse in de wetenschap en een specifieke interesse in de rol van wiskunde. Aan beiden paranimfen even zoveel dank voor de afleiding tijdens verre reizen en in nachtelijke escapades.

178

Tot slot wil ik mijn familie en vrienden bedanken. Aan mijn vader en moeder, Bob en Nienke: bedankt voor jullie soms onuitgesproken maar altijd voelbare geloof in mij. Vrienden: bedankt voor de ontspanning die ik met jullie in de loop der jaren heb gevonden in mijn Amsterdamse leven.

About the author

The background and main interests of Tim R. Wind (1982) revolve around the combination of clinical psychological research and practice. He studied clinical psychology and cross-cultural psychology, and subsequently completed another master of excellence in humanitarian action. Whereas he graduated in Groningen, he also accomplished parts of his degrees at the University of Arlington, Texas, and at the University of Deusto, Spain, and completed internships in La Paz, Bolivia, and at the Colombian Red Cross, Bogotá, Colombia.

After his graduation, Tim worked as a project fellow and technical advisor at HealthNet TPO under close supervision of Professor Ivan Komproe. Within a multidisciplinary European research project on natural disasters – in which HealthNet TPO collaborated – he conducted the research for this dissertation. At HealthNet TPO, Tim also provided trainings in research methodology in Afghanistan (HealthNet TPO Afghanistan), and gave master classes in how to investigate the impact of natural disasters in the wake of natural disasters (Hue University, Vietnam, and Heidelberg University, Germany). Simultaneously, he started working as a psychologist for refugees in Centrum '45.

Currently, he works as a health care psychologist (GZ-psycholoog) with refugees and victims of human trafficking at Equator Foundation and Centrum '45 in Diemen. Tim provides therapy across the broad range of psychopathology, and is specialized in trauma focused therapy and in emotion regulation therapy. He further teaches statistics at the University of Leiden. In his spare time, Tim trains and teaches taekwondo in Amsterdam.