A Mental Healthcare Model for Mass Trauma Survivors

Control-Focused Behavioral Treatment of Earthquake, War, and Torture Trauma

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mesele esir düşmekte değil,
teslim olmamakta bütün mesele!

falling captive is not the problem,
the problem is not to surrender!

İşte Böyle Laz İsmail, Nazım Hikmet Ran, Yatar Bursa Kalesinde, Yapı Kredi Yayınları, 2002, p. 170.

(Translated by Metin Başoğlu)

Contents

Preface

Despite significant advances in treatment of psychological trauma in the last two decades, current knowledge in this field falls short of addressing the care needs of millions of mass trauma survivors around the world, particularly in developing countries. Such a challenging task requires brief and effective treatments that can be cost-effectively disseminated to survivors through all possible means, including health professionals, lay therapists, self-help tools, and even mass media. None of the current trauma treatments are suitable for this purpose. Drawing on 20 years of research aimed at development of brief and effective interventions and cost-effective treatment dissemination methods, this book represents a visionary approach to this problem with recourse to sound theory and evidence.

With its broad scope, this book will be of interest to a wide readership. A learning theory formulation of earthquake, war, and torture trauma in Part 1 might be useful for researchers as well as care providers in understanding mechanisms of traumatic stress common to different types of trauma events. A sound theory-based understanding of mechanisms of traumatic stress is essential in choice of interventions likely to be useful in helping trauma survivors. In view of the fact that the evidence base of learning theory originated largely from experimental work with animals, evidence pertaining to human behavior in support of this theoretical model might be of interest to students of learning theory. Such evidence in relation to torture trauma might also be of interest to human rights workers and legal professionals because of its relevance to definitional issues surrounding torture and the controversy regarding the distinction between torture and cruel, inhuman, and degrading treatment.

In view of the urgent need for evidence-based interventions for mass trauma survivors, Part 2 provides a step-by-step description of brief assessment and behavioral treatment strategies for earthquake, war, and torture survivors developed in the course of our work. Part 3 provides a mental healthcare model for earthquake survivors based on brief and largely self-help interventions together with the tools needed for implementation of the model in earthquake-prone countries. These tools include various screening and assessment instruments and two manuals designed for cost-effective dissemination of treatment knowledge to professional and lay therapists as well as to survivors. As such, the book might be of interest to individual care providers, disaster relief organizations, psychosocial aid groups, as well as governments of countries at risk of earthquakes. Also presented is a critical review of various issues in care of mass trauma survivors in the light of evidence in support of a learning theory formulation of trauma.

The mental healthcare approach described in this book aims at empowerment of mass trauma survivors. Although the importance of empowerment in recovery from trauma is widely recognized among care providers, the rather broad, elusive, and ill-defined nature of the concept has somewhat limited its usefulness in clinical or fieldwork with mass trauma survivors. A learning theory approach to trauma sheds light on the nature of psychosocial interventions that are conducive to empowerment of survivors. As such, the interventions described in the book are likely to be of interest to all care providers who believe empowerment is the way forward in effective care of survivors.

Acknowledgments

Ebru Şalcıoğlu and I dedicate this book, a product of nearly 20 years of research, to our good friend Marianne Gerschel, President of Spunk Fund, Inc. and Spunk Foundation International. She has had the insight and vision to recognize the importance of scientific research for the human rights cause and effective care of mass trauma survivors. She started supporting our research on mental health effects of torture trauma in the early 1990s at a time when torture was widely perceived in the Western world as an esoteric issue confined to remote dictatorships and when few funders were cognizant of the importance of scientific research in this area. Ms. Gerschel's support also made possible the large multi-site research project on cognitive effects of war and torture trauma in former Yugoslavia. When the 1999 earthquake in Turkey occurred, she was again there to help us launch a research program that led to the development of brief treatments for earthquake survivors. We were fortunate to have her with us at every stage of our work, taking part in shaping research ideas and providing us with moral support in dealing with the trials and tribulations of running large projects. Although she is too modest to acknowledge it, the work reviewed in this book would not have been possible without her loyal support over the years.

We are also indebted to the Bromley Trust for their regular support for our work since the early 1990s. The late Mr. Keith Bromley's faith in the value of our work for the human rights cause has always been a source of inspiration for us. Together with Spunk Fund, Inc. and Spunk Foundation International, the Bromley Trust made possible much of our work, including this book. We also appreciate Teresa Elwes' kind efforts to promote our work.

Part of our work with earthquake survivors between 2000 and 2003 was supported by CORDAID from the Netherlands. We are indebted to more than 60 colleagues internationally, who contributed to our work over the years. Special thanks are due to Maria Livanou, who made significant contributions to all aspects of our work. Her scientific and executive input as the International Projects Coordinator, together with the diligent work of our colleagues Cvetana Crnobarić, Tanja Frančišković, Enra Suljić, and Dijana Đurić as regional project coordinators and their hard-working teams made high-quality research possible in the difficult post-war circumstances of former Yugoslavia. Thanks are also due to Deniz Kalender and Gönül Acar for their part in running treatment studies with earthquake survivors in difficult post-disaster circumstances and Tamer Aker who contributed to our work with torture and earthquake survivors in Turkey. Special thanks are due to Susan Mineka for her major contribution to the 1992 book on torture regarding the parallels between the experimental models of anxiety / depression and human experience under torture. She provided us with valuable insights into learning theory, which inspired the work in this book. The first author also learned a great deal from Metin Özek and Isaac Marks during many years of work with them. Finally, we are grateful to all survivors of war, torture, and earthquake who participated in our studies and shared their experiences with us.

Introduction

Mass trauma events, such as wars, armed conflicts, acts of terror, political violence, torture, and natural disasters affect millions of people around the world. The 'New World Order' following the collapse of the Soviet Union has seen an escalation in political violence of all kinds around the globe and a 'war on terror' leading to the invasion of Iraq and Afghanistan by the United States and its allies. According to the Office of the United Nations High Commissioner for Refugees (UNHCR, 2009) figures, the number of forcibly displaced people in the world was 42 million at the end of 2008, including 15.2 million refugees, 827 000 asylum-seekers, and 26 million internally displaced people, 20% of whom were in industrialized countries. According to World Health Organization estimates (Van Ommeren et al., 2005), 20% of people exposed to mass trauma events develop post-traumatic stress disorder (PTSD). This suggests that 8.4 million war survivors worldwide (about 1.7 million in industrialized countries and 6.7 million in developing countries) are likely to need mental healthcare. These figures do not include non-displaced civilians exposed to various war events, political violence, or torture. Although reliable estimates of the prevalence of torture are not available, it is known to be systematically practiced in at least 81 countries (Amnesty International, 2009). Torture is known to be associated with long-term mental health consequences (Başoğlu et al., 2001; Campbell, 2007; Johnson & Thompson, 2008; Steel et al., 2009).

Among natural disasters earthquakes are a major contributor to the public health problem posed by mass trauma events. Over the 30 years between 1974 and 2003 a total of 660 earthquakes occurred worldwide which resulted in the death of 559 608 people and affected more than 82 million people (Guha-Sapir et al., 2004). Earthquakes make a disproportionate impact in developing countries (Guha-Sapir et al., 2004). Indeed, of all people killed by earthquakes worldwide in the last decade, more than 72% were in Asia (Guha-Sapir et al., 2004). Evidence (e.g. Armenian et al., 2000; Başoğlu et al., 2004b; Durkin, 1993; Lai et al., 2004; Önder et al., 2006; Wang et al., 2000) suggests that exposure to earthquakes is associated with increased psychiatric morbidity.

Currently there is no mental healthcare model that is capable of addressing the needs of millions of mass trauma survivors around the world, particularly the dispossessed populations of developing countries that often bear the brunt of these trauma events. Effective dealing with this problem requires interventions that are (1) *theoretically sound*, (2) *proven to be effective*, (3) *brief*, (4) *easy to train therapists in their delivery*, (5) *practicable in different cultures*, and (6) *suitable for dissemination through media other than professional therapists, such as lay people, self-help tools, and mass media*. Current treatments commonly used with trauma survivors do not meet more than two or three of these requirements. The last requirement is particularly important, as even the most effective treatment is of limited use if it cannot be widely disseminated to millions of people who may be in need of help.

Evolution of control-focused behavioral treatment

This book essentially tells the story of a nearly 20-year-long odyssey in search of a mental healthcare approach that satisfies the above requirements. Such a model requires a sound theoretical framework. In a previous book (Başoğlu, 1992) on *Torture and Its Consequences: Current Treatment Approaches*, we had examined the parallels between animal and human responses to unpredictable and uncontrollable stressors and presented a learning theory formulation of torture trauma (Başoğlu & Mineka, 1992) drawing on the work of Martin E. P. Seligman, Steve Maier, Bruce Overmier, Susan Mineka, and many other prominent learning theorists and anxiety researchers. As much of the

evidence in support of this formulation had originated from experimental work with animals, its relevance to human experience was not entirely clear. Accordingly, we set out on a long journey to explore the parallels between animal and human experience under extreme duress and gather evidence pointing to the relevance of this formulation to humans. First, we conducted a series of three studies in Turkey between 1993 and 1999 to examine the role of unpredictable and uncontrollable stressors in psychological responses to torture. After the cessation of hostilities in former Yugoslavia countries we launched a 5-year multi-site research program in Bosnia-Herzegovina, Croatia, and Serbia to examine the same issue in 1358 survivors of war trauma, including combat, internal displacement, refugee experience, aerial bombardment, and torture. These studies provided ample evidence in support of a learning theory model of traumatic stress. Such evidence implied that traumatic stress can be reversed by interventions that enhance sense of control over (or resilience against) traumatic stressors. This hypothesis ultimately led to the development of Control-Focused Behavioral Treatment (CFBT).

The important role of sense of control in treatment of anxiety disorders is well known to anxiety researchers. Indeed, Barlow (2002) provided an excellent review of the work on this issue in his book on *Anxiety and its Disorders*. There have been few attempts, however, to develop a behavioral intervention specifically designed to enhance sense of control over or resilience against anxiety cues or traumatic stressors. Such an intervention needs to aim for anxiety tolerance and control rather than anxiety reduction. Indeed, in a recent review of the processes of change in exposure treatment, Craske et al. (2008) found no conclusive evidence to suggest an association between treatment outcome and the extent of fear reduction during and between sessions. Craske and Mystkowski (2006) suggested that "*. . . it is time to shift away from an emphasis on fear reduction during exposure therapy as an index of learning at the process level toward a model of exposure therapy that emphasizes . . . weakening of avoidance and strengthening tolerance of aversive internal states and fear*" (pp. 233).

This is indeed what we have done in the 1990s in the light of findings from our studies pointing to the important role of sense of control in the development (Başoğlu et al., 1997) as well as treatment (Başoğlu et al., 1994a; Başoğlu et al., 1994b) of anxiety disorders. We shifted treatment focus from habituation to enhancement of sense of control over anxiety cues and anxiety tolerance. For reasons detailed in Chapter 6, we thought such a paradigm change might enhance the efficacy of behavioral treatment. This not only led to important procedural changes in the application of exposure treatment but also a broader treatment focus including but not limited to avoidance behaviors. Hence, CFBT came into existence.

In 1999 a 7.4 magnitude earthquake struck the Marmara region of Turkey, killing more than 17 000 people and exposing millions of people to severe trauma. Until then much of our experience with behavioral treatment was limited to patients with anxiety disorders in clinical settings. Our knowledge on the development and course of traumatic stress reactions in naturalistic settings was rather limited. This disaster turned out to be a major milestone for our work in providing not only an opportunity to test CFBT more extensively but also valuable insights into natural processes of recovery from trauma. We learned a great deal by simply observing how people recover from traumatic stress without any help from a therapist. Having experienced the earthquake and the aftershocks ourselves, we also learned a great deal from our own experience.

In 1999 we established a research-driven treatment delivery project and conducted fieldwork with more than 10 000 survivors in 6 years. When we set out to test CFBT in the early days of the disaster, inundated by demands for help from thousands of survivors, we quickly realized that CFBT delivered in 8 to 10 sessions was too long for post-disaster circumstances. Furthermore, due to demographic mobility in the disaster region and day-to-day survival problems, many survivors were not able to attend treatment for more than one session. Therefore, we had no choice but to deliver treatment in a single session and hope for the best. Given that not much can be squeezed into a 60-minute session, treatment was limited to instructions for self-exposure to fear-evoking trauma cues presented with a treatment rationale designed to enhance sense of control over fear. Although we knew from previous experience that much of the improvement in anxiety disorders with exposure treatment occurs within the first few weeks after a few exposure sessions (Marks et al., 1988; Marks et al., 1993), we were not certain whether the survivors would comply with self-exposure instructions in a post-disaster setting without regular monitoring of progress. In the meantime we conducted research to examine treatment outcome.

To our own surprise, an open trial (Başoğlu et al., 2003b) showed that 80% of the cases improved after a single treatment session, which was confirmed by later randomized controlled studies (Başoğlu et al., 2005b; Başoğlu et al., 2007b). Thus, single-session CFBT came into being, proving once again that necessity is the mother of invention!

We then embarked on a search for an explanation for this somewhat serendipitous discovery. Examining how survivors coped with debilitating fear of earthquakes, we discovered that many survivors, without any instructions or guidance from a mental health professional, used self-exposure in their natural environment to overcome their fear of earthquakes. This discovery was an eye opener for us in several ways. Most importantly, it suggested that self-help is not only a viable approach in survivor care but also one that carries great potential. This may not be surprising from an evolutionary point of view, considering that trauma is as old as human history and our survival could not have been possible without the secret key to trauma recovery coded in our genes. Second, it pointed to live exposure as the most potent therapeutic ingredient in behavioral treatment, thereby justifying the sharp focus of CFBT on anxiety cues and avoidance behaviors, excluding cognitive restructuring and other anxiety management strategies that characterize traditional cognitive-behavioral treatments. Furthermore, it made us realize that CFBT simply provides a motivational impetus for a naturally existing tendency in people to use self-exposure as a means of overcoming trauma-induced helplessness. In a sense the intervention merely imitated a key natural recovery process in humans. With such insight, we set out to search for other evidence pointing to exposure as an evolutionarily determined process in recovery from trauma. Indeed, such evidence eventually helped us conceive a self-help model of mental healthcare for survivors. This model incorporates several variants of CFBT, which were developed and routinely used with good results in more than 6000 earthquake survivors. Based on this experience we also developed tools designed to facilitate cost-effective dissemination of treatment knowledge to care providers as well as to survivors themselves.

This book brings together the knowledge and experience gained through two decades of work with torture, war, and earthquake survivors. Despite its broader scope, it could be regarded as a sequel to the 1992 book on torture (Başoğlu, 1992) in the sense that the hypotheses generated by a learning theory formulation of torture in the latter guided the entire research presented in this book. Although the book may appear to concern different trauma events, its focus is on mechanisms of traumatic stress and recovery common to all forms of trauma, whether of human design or due to natural causes. As such, it is designed to facilitate understanding of traumas of an apparently different nature around a unifying theory and how they may respond to brief behavioral interventions that closely match their underlying mechanisms of traumatic stress. As research guided by learning theory focuses on universals in animal and human behavior under duress, its findings cut across not only species but also cultures. This is an important point to bear in mind in evaluating the cross-cultural applicability of the findings reviewed in this book.

In view of the fact that CFBT is an exposure-based treatment, evidence of its efficacy reviewed in this book needs to be considered in the broader context of the robust evidence base for other exposure-based treatments (reviewed in American Psychiatric Association, 2004; National Institute of Clinical Excellence, 2005). We were initially reluctant to give it a different name to avoid cluttering the literature with yet another label for exposure-based treatments. However, considering the rather radical departure from habituation paradigm to anxiety tolerance and control and various procedural differences that distinguish it from traditional exposure treatment, Control-Focused Behavioral Treatment appeared to be an appropriate name for this intervention. We do not contend that it is an entirely novel intervention and it might well be regarded as a streamlined, simplified, and enhanced version of traditional behavioral treatment.

Evidence base

In this book we review findings from more than 20 studies that contributed to the development of CFBT and a mental healthcare model based on this intervention. As we refer to these studies throughout the book, their methodology is briefly summarized in Table 1, Table 2, and Table 3 to facilitate evaluation of their findings. These tables also provide some idea about the evidence base for CFBT. As part of the work covered in the book has already been published, some findings may be familiar to the reader. Nevertheless, as this is the first time we present our work in its entirety together with a detailed account of its theoretical

Table 1 Studies of survivors of torture, war, and earthquake with similar methodology

	Study	Trauma	Sample type	Sample size	Sampling method	Time since trauma (months)	Measures	
							Assessor-rated	Self-rated
1	Başoğlu, 2009; Başoğlu et al., 1997; Başoğlu et al., 1994c	Torture	Mixed group of political activists and non-activists	202	Consecutive referrals from human rights organizations and cases accessed using snowballing method in Istanbul, Turkey	44	SIST SCID CAPS	BDI
2	Başoğlu et al., 2007a	Torture	Veterans and civilian survivors of war	230[1]	Target sampling from two associations for war veterans and prisoners of war in Belgrade (Serbia), collective camps in Rijeka (Croatia), and community in Banja Luka (Republic of Srpska) and Sarajevo (Bosnia-Herzegovina)	95	SIST SCID CAPS RTSQ	SITSOW BDI DRS EBAW
3	Başoğlu et al., 2005a	War	Veterans, refugees, and internally displaced civilian survivors of war	1079	Cross-sectional survey through target sampling in Belgrade (Serbia), Rijeka (Croatia), Sarajevo (Bosnia-Herzegovina), and Banja Luka (Republic of Srpska)	77	SISOW SCID CAPS	SITSOW BDI DRS
4	Şalcıoğlu, 2004	Earthquake	Survivors in the community	387	Target sampling in the community (n =188) and among self-referrals for treatment (n = 199)	22	SISE SCID CAPS RTSQ	SITSES BDI FAQ EBAT

BDI = Beck Depression Inventory, DRS = Depression Rating Scale, CAPS = Clinician's Administered PTSD Scale, EBAT = Emotion and Beliefs after Trauma, EBAW = Emotions and Beliefs after War, FAQ = Fear and Avoidance Questionnaire, RTSQ = Redress for Trauma Survivors Questionnaire, SCID = Structured Clinical Interview for DSM-III-R/DSM-IV Disorders, SISE = Structured Interview for Survivors of Earthquake, SISOW = Structured Interview for Survivors of War, SIST = Structured Interview for Survivors of Torture, SITSES = Screening Instrument for Traumatic Stress in Earthquake Survivors, SITSOW = Screening Instrument for Traumatic Stress in War Survivors.

[1] In the original study the sample size was reported as 279, including 49 survivors whose psychological assessment was conducted in relation to a war stressor other than torture. The latter cases are excluded in the analyses reported in this book.

Table 2 Field surveys with earthquake survivors (N = 4332)

Study	n	Sampling method	Time since earthquake (months)	Measures
Başoğlu et al., 2002	1000	Consecutive screening in 5 survivor camps	10	SITSES
Başoğlu et al., 2004b	950	Random community sampling	14	SITSES, FAQ
Şalcıoğlu et al., 2003	586	Consecutive screening in 3 survivor camps	20	SITSES, FAQ
Şalcıoğlu et al., 2007	769	Consecutive screening among resettled homeless survivors	40	SITSES, FAQ
Livanou et al., 2002	1027	Consecutive self-referrals for treatment	14	SITSES

SITSES = Screening Instrument for Traumatic Stress in Earthquake Survivors, FAQ = Fear and Avoidance Questionnaire.

Table 3 Treatment studies

	Trauma	n	Treatment
Randomized controlled trials			
Başoğlu et al., 2005b	Earthquake	59	Single session CFBT
Başoğlu et al., 2007b	Earthquake	31	Earthquake Simulation Treatment + Single-session CFBT
Open trials			
Başoğlu et al., 2003b	Earthquake	231	Full-course CFBT
Başoğlu et al., 2003a	Earthquake	10	Earthquake Simulation Treatment
Şalcıoğlu & Başoğlu, 2008	Earthquake	23	Full-course CFBT with children
Şalcıoğlu & Başoğlu, 2008	Earthquake	8	Earthquake Simulation Treatment with children
Başoğlu & Şalcıoğlu, this volume	Earthquake	84	Self-help manual
Case studies			
Başoğlu & Aker, 1996	Torture	1	Exposure Treatment
Başoğlu et al., 2004a	Torture	1	Exposure Treatment
Başoğlu et al., 2009	Earthquake	8	Self-help manual
Başoğlu & Şalcıoğlu, this volume	War and torture	2	Full-course CFBT
Başoğlu & Şalcıoğlu, this volume	Earthquake	2	Full-course CFBT of prolonged grief

CFBT = Control-Focused Behavioral Treatment.

framework, the book might provide an opportunity to re-evaluate previously published findings around a unifying theory. We also present some previously unpublished findings based on pooled samples from previous studies. Table 1 shows the studies that examined mechanisms of traumatic stress in torture, war, and earthquake survivors using similar methodology.

The first study is a series of three consecutive studies designed to examine mechanisms of traumatic stress in torture survivors. A substantial part of the empirical evidence relating to mechanisms of traumatic stress in earthquake survivors originated from a study by Şalcıoğlu (2004). Table 2 shows the field surveys that examined PTSD prevalence and symptom profile and the risk factors for traumatic stress in earthquake survivors. Table 3 lists the treatment studies with torture and earthquake survivors. Other studies that examined psychometric properties of various

questionnaires for assessment of earthquake, war, and torture trauma are reviewed in Chapter 3 and Chapter 5.

Preview of contents

Part 1 – theory

Chapter 1 presents a learning theory model of traumatic stress and some evidence in support of the model. It reviews the role of unpredictable and uncontrollable stressors in earthquake-related traumatic stress, cognitive and behavioral responses to earthquakes, natural recovery processes in earthquake survivors, and possible evolutionary processes that determine psychological responses to earthquake trauma. In addition, some research data are presented in support of the helplessness and hopelessness effects of earthquakes.

Chapter 2 is an updated version of a previous chapter (Başoğlu & Mineka, 1992) on the role of uncontrollable and unpredictable stressors in torture-induced traumatic stress, which appeared in our 1992 book on torture (Başoğlu, 1992). It presents a learning theory account of captivity, interrogation, and torture experiences and provides empirical evidence in support of this formulation. Also reviewed are various cognitive and behavioral coping responses during and after torture, the role of resilience and context of captivity in torture-induced distress, natural recovery processes in the post-captivity phase, and the role of cognitive factors in war and torture trauma.

Part 2 – assessment and treatment

Chapter 3 provides an assessment strategy for screening of mass trauma survivors and evaluation of intervention outcomes. The assessment instruments developed for this purpose are provided in Appendix A. We have also provided guidelines in determining treatment needs of survivors and priorities in treatment planning on the basis of data obtained using these instruments.

Chapter 4 includes a detailed description of CFBT as it would be delivered to war, torture, or earthquake survivors in a clinical or fieldwork setting. The treatment is described in a step by step how-to-do-it fashion with some case vignettes to facilitate understanding of various issues in behavioral assessment and treatment. The chapter includes a description of various applications of CFBT in earthquake survivors, such as treatment of children, delivery of single-session CFBT individually and in groups, and using an earthquake simulator.

Chapter 5 details behavioral assessment of grief using two questionnaires developed for this purpose and describes application of CFBT in cases with prolonged grief problems. Case vignettes are provided, along with a discussion of various issues in treatment. Also presented are some evidence of treatment effectiveness from our studies and a comparison of CFBT with other treatments of prolonged grief.

Chapter 6 reviews the evidence from treatment studies that tested CFBT. This chapter is informative in demonstrating the developmental stages for CFBT and the various theoretical and practical considerations that went into development of its various applications, such as single-session CFBT, Earthquake Simulation Treatment, and self-administered CFBT. It also includes a discussion of mechanisms of improvement in CFBT (e.g. habituation versus increased sense of control) and available evidence pointing to the role of sense of control in recovery from traumatic stress. Also reviewed are various theoretical and procedural features of CFBT that distinguish it from other exposure treatments.

Part 3 – implications for care of mass trauma survivors

Chapter 7 reviews the implications of our work for a cost-effective mental healthcare model for earthquake survivors. The chapter is organized into three sections. The first section details a three-stage outreach treatment delivery program designed to deliver care to as many survivors as possible with minimal therapist involvement by utilizing single-session applications of CFBT and self-help tools. The second section reviews prospects for alternative methods of treatment dissemination through lay therapists, a self-help manual, and mass media. The third section outlines a mental healthcare model for earthquake survivors that incorporates all possible treatment dissemination methods and reviews procedures that need to be undertaken in pre- and post-disaster phases for large-scale implementation of the model in earthquake-prone countries.

Chapter 8 reviews the implications of our work for various issues concerning care of mass trauma survivors, including generally accepted guidelines regarding

aims, levels, focus, and timing of interventions and the role of antidepressants in treatment of trauma survivors. This chapter casts a critical look at the current status of knowledge in trauma treatment, mental healthcare policies for mass trauma survivors, and the controversy that surrounds the concept of PTSD in the light of evidence from our work.

Chapter 9 reviews various controversial issues in rehabilitation of war and torture survivors, including the effectiveness of and justification for current lengthy and costly torture rehabilitation programs. As it is widely believed that torture is more severe than natural disaster trauma and therefore more difficult to treat, some comparative data from our studies testing this hypothesis are presented. Also included are two recent case studies of CFBT, which point to prospects for brief treatment of tortured asylum-seekers and refugees. Finally, the possible reasons for lack of progress in the field of torture rehabilitation are reviewed with some recommendations for effective rehabilitation of war and torture survivors.

Appendices: assessment instruments and treatment manuals

Appendix A provides various assessment instruments that might be of use to care providers in screening survivors for treatment needs and evaluation of intervention outcomes. These include the adult and child versions of the *Screening Instrument for Traumatic Stress in Earthquake Survivors*, *Fear and Avoidance Questionnaire*, *Depression Rating Scale*, *Screening Instrument for Traumatic Stress in War Survivors*, *Grief Assessment Scale*, *Behavior Checklist for Grief*, *Work and Adjustment Scale*, *Global Improvement Scale*, and *Sense of Control Scale*. Available psychometric data on as yet unpublished instruments are provided in Chapter 3 and Chapter 5. These instruments can be freely translated and used in their present form without permission from the publishers or the authors and with due reference to the authors in any publications based on them.

Appendix B includes a CFBT Delivery Manual (*Helping People Recover from Earthquake Trauma*), which is designed to assist health professionals (mental healthcare providers, general practitioners, nurses, social workers, etc.), as well as lay people with an adequate educational background in delivering CFBT to survivors. It is highly structured to provide step by step guidance in assessment and treatment. It also includes sections on treatment of children, delivery of treatment in a single session, and assessment and treatment of prolonged grief.

Appendix C includes a self-help manual (*Recovering from Earthquake Trauma*) designed to help earthquake survivors in administering CFBT by themselves. It is also highly structured to guide users at every stage of assessment and treatment. It includes sections on assessment, explanation of treatment and its rationale, overcoming earthquake-related fear and distress, evaluation of treatment progress, treating prolonged grief, and dealing with problems in treatment. This manual can be used after an initial assessment by a therapist or as a stand-alone tool with minimal or no therapist contact.

These manuals are prepared in the understanding that post-disaster circumstances, particularly in developing country settings, require psychological care dissemination to survivors in every way possible. It is worth noting here that while we piloted the self-help manual and used it in routine treatment delivery we did not yet have a chance to test the usefulness of the CFBT Delivery Manual in guiding lay therapists in delivery of the intervention. This is because we prepared this manual towards the end of the project in Turkey after we accumulated sufficient experience and observations (reviewed in Chapter 7) that made us think that such a manual may be a useful tool in treatment dissemination. Nevertheless, we decided to make the manual available so that it can be tested and used by others. At the very least it may be useful in disseminating treatment knowledge to mental health professionals involved in care of earthquake survivors. Considering the highly structured nature of the manual, it might perhaps be helpful in delivering the intervention without extensive prior training in CFBT, though this remains to be tested.

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Part 1 Theory

Chapter 1

A learning theory formulation of earthquake trauma

Since the 1960s substantial experimental work with animals suggested that unpredictable and uncontrollable stressors play an important role in the development of anxiety and fear. Exposure to unpredictable and uncontrollable stressors is associated with certain associative, motivational, and emotional deficits in animals that closely resemble the effects of traumatic stress in humans (Mineka and Zinbarg, 2006). These deficits include learned helplessness, a phenomenon characterized by failure of animals initially exposed to uncontrollable shocks to later learn to escape or avoid shocks that were potentially controllable in a different situation (Overmier and Seligman, 1967; Seligman and Maier, 1967), and opiate-mediated analgesia (Maier et al., 1982; Maier et al., 1983). As detailed reviews of findings from experimental animal studies and their relevance to anxiety disorders are available elsewhere (Başoğlu and Mineka, 1992; Foa et al., 1992; Mineka and Zinbarg, 2006), such a review will not be attempted here. While much of the evidence concerning the role of unpredictable and uncontrollable stressors in anxiety is based on animals, evidence that emerged in the last two decades points to close parallels between animal and human responses to such stressors. In this chapter we present a learning theory model of traumatic stress and review the role of unpredictability and uncontrollability of stressors in the development of traumatic stress responses in people exposed to earthquakes. We also discuss various cognitive and behavioral responses to such stressors, which provide remarkable examples of how humans cope with unpredictable and uncontrollable stressors and recover from their effects. Finally, we present some data from our studies of earthquake survivors in support of the model.

A learning theory model of traumatic stress

Figure 1.1 illustrates how various factors or processes before, during, and after trauma lead to various post-trauma health outcomes. The model essentially reflects what we know about evolutionarily determined responses to life-threatening events in animals and humans. Animals have innate species-specific defense reactions against threatening events, such as fight, flight, or freezing (Bolles, 1970). Accordingly, during trauma exposure the model entails two types of stressor response sequences (or pathways) that broadly reflect fight and flight responses. Fight responses in humans involve various proactive cognitive, behavioral, and emotional responses aimed at removing the threat, minimizing its adverse effects, or reducing the distress associated with it. Flight responses (e.g. escape from the dangerous situation), on the other hand, are essentially avoidance processes aimed at self-protection (Bolles, 1970).

Appraisal of controllability of a threatening event determines whether a person engages in fight or flight responses. If the individual has not had previous learning of control over negative outcomes of stressor events, the event is perceived as uncontrollable, leading to flight responses. Loss of cognitive, behavioral, or emotional control over the event (e.g. inability to escape from the situation, avoid the occurrence of the event, or reduce its impact) is associated with distress, fear, or panic. Such loss of control confirms the uncontrollability of the stressor event and leads to a state of helplessness or anxiety with respect to possible future occurrences of the event. According to Alloy and colleagues (1990), individuals who are uncertain about their ability to control outcomes of future stressor events

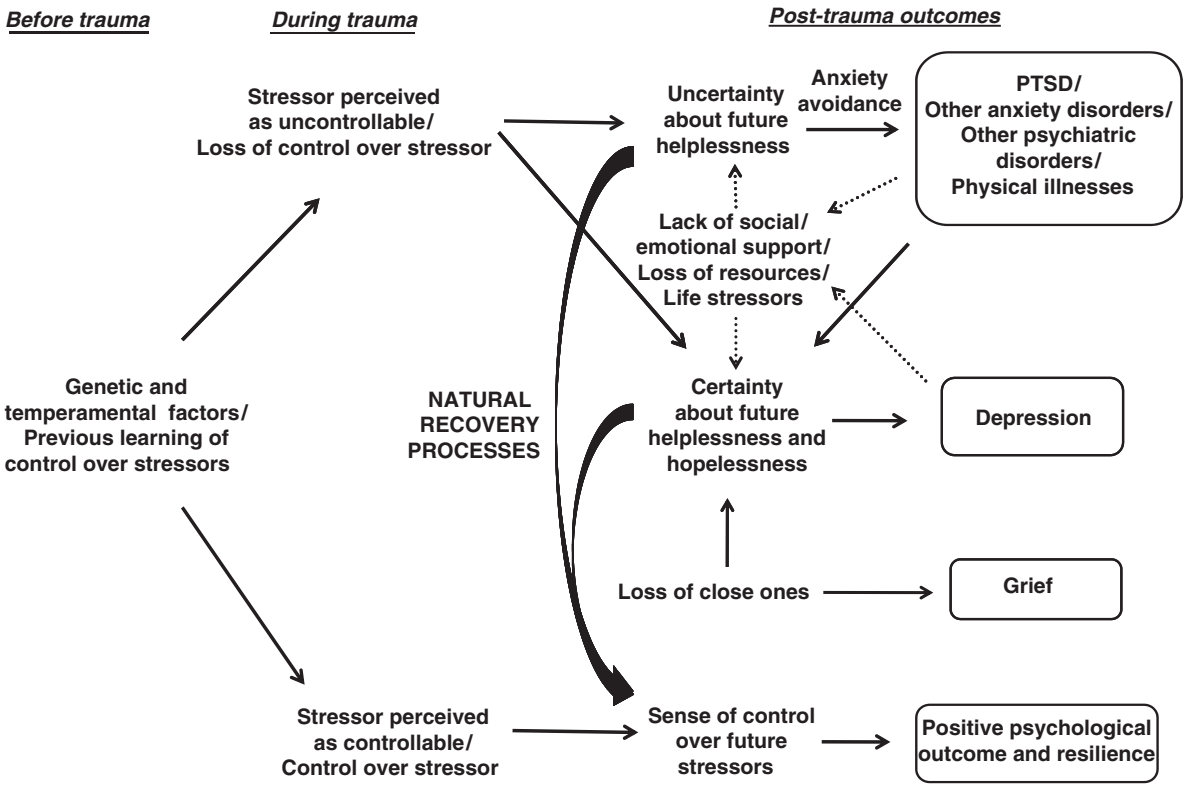

Figure 1.1 A learning theory model of traumatic stress.

are more likely to experience anxiety, whereas those who are more certain about their helplessness but still uncertain about whether a negative outcome will actually occur are likely to develop a mixed anxiety-depressive state. On the other hand, those who are certain of both their helplessness and the occurrence of negative outcomes are likely to develop hopelessness depression. In situations that involve multiple stressor events (e.g. recurring earthquakes, war violence, combat, political persecution, torture, etc.), future occurrences of the traumatic stressors may reinforce the learned helplessness effects of the initial event and may lead to more certain helplessness and even hopelessness. Several other factors may contribute to depression by increasing certainty about helplessness and hopelessness. These include uncontrollable stressor effects of various PTSD symptoms, such as intrusive thoughts, flashbacks, nightmares, etc. (Alloy et al., 1990), and additional uncontrollable life stressors caused by functional impairment secondary to PTSD symptoms (e.g. inability to find employment due to severe behavioral avoidance, memory / concentration difficulties or serious family discord due to problems of irritability / anger outbursts, etc.) or other psychiatric / medical problems. In situations that involve a single traumatic event, certainty about helplessness and hopelessness may be enhanced by failed attempts at achieving control over re-experiencing symptoms of PTSD and / or overestimated probability of the same event occurring in the future. Learned helplessness might be facilitated by a pessimistic attributional style characterized by attributions of negative outcomes to internal, stable, and global causes (Abramson et al., 1978). Thus, the extent of certainty about the occurrence of future negative outcomes and helplessness are the two critical factors in anxiety and depression. While uncertainty about helplessness with respect to future threats is associated with anxiety, loss events are more likely to lead to hopelessness and depression (see Mineka et al., 1998 for a more detailed discussion of helplessness / hopelessness perspective in anxiety / depression).

Turning to the second pathway in Figure 1.1, if the individual has had previous learning of control over stressor events or the important aspects of their environment, they can utilize effective control strategies to secure safety (e.g. by removing or warding off threat), reduce the impact of the event if it cannot be avoided, and gain control over fear evoked by the stressor. Effective control might be achieved on cognitive, behavioral, or emotional levels. Such control often reduces anxiety or fear during exposure to the stressor event, facilitates recovery from the acute impact of trauma, and reinforces expectancies of control over future stressor events. Achieving effective control over stressor events also has protective or immunizing effects against future uncontrollable stressors (Hannum et al., 1976; Seligman and Maier, 1967; Williams and Maier, 1977).

The third pathway in Figure 1.1 represents *natural recovery processes* in trauma survivors. These processes involve various cognitive and behavioral control strategies that are utilized to reduce helplessness anxiety and hopelessness depression during both the trauma phase involving exposures to multiple ongoing stressor events and post-trauma phase. Recovery is likely to the extent that these strategies are effective in reducing helplessness and hopelessness. The model thus proposes an explanation as to why some people show 'spontaneous recovery' from traumatic stress, while others develop chronic traumatic stress. This issue will be clearer as we detail the various cognitive and behavioral control strategies most commonly employed by survivors and how they relate to natural recovery later in this chapter.

Mental and physical health outcomes of trauma exposure

Figure 1.1 shows an association between helplessness anxiety and various health outcomes of trauma exposure. These may include various psychiatric conditions (e.g. PTSD, other anxiety disorders, depression and suicide, substance abuse, psychotic illnesses, etc.) and physical health problems (e.g. cardiovascular disorders, psychosomatic illnesses, immune system disorders, etc.). In surveys that employed structured clinical interview forms for assessment of psychiatric disorders, PTSD and depression were the most common psychiatric outcomes of exposure to mass trauma events, including wars (Başoğlu et al., 2005; de Jong et al., 2003; Laban et al., 2004; Priebe et al., 2010; Steel et al., 2002), torture (Başoğlu et al., 1994b; Van Ommeren et al., 2001), and natural disasters (Chou et al., 2005; Lai et al., 2004; McMillen et al., 2000; McMillen et al., 2002; Önder et al., 2006). In a study (Şalcıoğlu, 2004, see Table 1 in Introduction for methodological details) of 387 earthquake survivors that used structured interviews to assess all psychiatric disorders, while PTSD was the most common outcome (present in 41% of the cases), anxiety disorders other than PTSD were also quite common, at least one anxiety disorder occurring in 47% of treatment seekers and in 24% of non-treatment seekers. The rates of all other diagnoses (mood disorders other than depression, somatoform disorders, substance abuse / dependence disorders, adjustment disorder, and eating disorders) were 25% (less than 6% for each condition) among treatment seekers and 17% (less than 4% for each condition) among non-treatment-seekers.

The model could explain increased rates of suicidal ideas or acts among trauma survivors as a helplessness and hopelessness response to unpredictable and uncontrollable stressors. Indeed, studies (Chou et al., 2003; Yang et al., 2005) show an association between greater exposure to earthquake stressors and PTSD, depression, and increased suicide risk. In addition, analyses of pooled samples from our five surveys altogether (Başoğlu et al., 2002; Başoğlu et al., 2004; Livanou et al., 2002; Şalcıoğlu et al., 2003; Şalcıoğlu et al., 2007) involving 4299 earthquake survivors revealed a strong association between PTSD and suicidal ideas, the latter reported by 20.4% of survivors with PTSD, as opposed to 2.7% of the survivors without PTSD ($p < 0.001$). Survivors with depression had also higher rates of suicidal ideas than those without depression (27% versus 2.8%, respectively, $p < 0.001$). These findings lend support to an association between suicidal ideas and helplessness anxiety and hopelessness depression.

The effects of stress on physical health are well known. There are reports of an association between traumatic stress after earthquakes and increased blood pressure (Kario et al., 1997; Kario et al., 2001; Minami et al., 1997; Saito et al., 1997), myocardial infarction (Leor and Kloner, 1996; Suzuki et al., 1997; Tsai et al., 2004), deaths due to coronary heart disease (Kloner et al., 1997; Leor et al., 1996; Ogawa et al., 2000; Trichopoulos et al., 1983), increase in blood glucose levels in diabetic people (Inui et al., 1998), cerebrovascular stroke (Sokejima et al., 2004), increased incidence of gastric ulcer and bleeding ulcer (Aoyama et al., 1998;

Matsushima et al., 1999), and immune system dysregulation (Inoue-Sakurai et al., 2000; Segerstrom et al., 1998; Solomon et al., 1997). Furthermore, experimental studies show that perceived controllability of stressors is critical in modulating immune functioning in animals (Fleshner et al., 1998; Laudenslager et al., 1983) and in humans (Peters et al., 1999; Sieber et al., 1992).

Other factors contributing to traumatic stress reactions

The model includes lack of social / emotional support, loss of resources, and trauma-related or unrelated life stressors as mediating factors for all post-trauma health outcomes. Because of insufficient evidence regarding the role of these factors in particular post-trauma outcomes, these variables are included in the model only tentatively (hence the dotted arrows). Whether these mediating factors relate to all post-trauma outcomes or differentially to individual outcomes is not clear. Of particular interest is how these factors relate PTSD and depression as the two most common outcomes of trauma exposure. It is worth briefly reviewing the available evidence in this regard.

The association between stressful life events and depression is well documented in the life events literature (Tennant, 2002). This association may be mediated by the impact of additional stressor events on hopelessness. Impaired functioning resulting from debilitating traumatic stress may severely limit one's capacity to cope with stressful life events, which in turn may further undermine expectations of effective control over such events in general and contribute to hopelessness depression.

Loss of resources refer to loss of material possessions, employment, social status, employment / business / educational opportunities, ability to make future plans, access to health services, and lowered standard of life. Methodological issues in studies of the role of resource loss in post-trauma outcome preclude definitive conclusions. Such studies are generally characterized by an overly broad measurement of resource loss. In some studies (e.g. Freedy et al., 1994; Sattler et al., 2006) this construct included personal characteristics (e.g. sense of control, self-efficacy, optimism), external resources (e.g. material possessions, social support networks), and energy resources (e.g. money, time, skills). Findings of an association between this construct and psychological distress (Freedy et al., 1994) and PTSD (Asarnow et al., 1999) in earthquake survivors are difficult to interpret because it is not clear which aspect of resource loss accounted for this association. Nevertheless, the critical mediating factor might be loss of control over traumatic stressors, as suggested by two other studies (Sattler et al., 2006), which found that loss of personal characteristic resources (largely characterized by sense of control over life) was the strongest predictor of Acute Stress Disorder and depression. In addition, such studies are not informative with regard to possible differential associations between resource loss and PTSD and depression, because of their failure to control for the effects of severity of trauma exposure in examining the impact of resource loss on post-trauma mental health status. In earthquake survivors, for example, resource loss may also mean greater exposure to trauma (e.g. collapse of house, being trapped under rubble, etc.). It is thus difficult to interpret the findings of some studies (Armenian et al., 2000) that reported an association between financial loss and PTSD and depression. Our studies (Başoğlu et al., 2002; Başoğlu et al., 2004; Şalcıoğlu et al., 2003; Şalcıoğlu et al., 2007) show no association between material loss and PTSD, when trauma severity is statistically controlled for.

Although social support is said to be a protective factor against traumatic stress (Hobfoll et al., 2007; Norris et al., 2002; Van Ommeren et al., 2005), studies have yielded conflicting findings in this regard. Furthermore, social support is a complex process and the mechanisms by which it might affect post-trauma outcome have not been extensively investigated in an empirical fashion. In addition, at least three major methodological problems preclude definitive conclusions on this issue. First, most studies have not made a distinction between *social* and *emotional* support, which may be different constructs with differential effects on helplessness and hopelessness responses. Second, in examining the effects of social support on traumatic stress reactions, most studies did not use multiple regression analysis to control for confounding variables. Findings based on bivariate analyses may be grossly misleading. Third, most studies did not examine how social support relates to PTSD and depression separately, and, when they did, they did not use uncorrelated measures of PTSD and depression. The latter issue is important, given the high rates of comorbidity between PTSD and depression.

It is important to note that the model in Figure 1.1 makes a distinction between *social* and *emotional* support. Social support includes, among others,

emergency relief efforts in the immediate post-trauma phase, material aid, compensation for material loss, assistance in legal matters, and provision of various other forms of redress (e.g. restoration of justice). Emotional support, on the other hand, involves help and guidance in overcoming the disabling effects of fear and related traumatic stress symptoms, help with daily problems, and encouragement for problem-solving behaviors, and instilling courage and hope. In our studies we found no association between lack of social support and PTSD in survivors of earthquakes (Şalcıoğlu, 2004), war (Başoğlu et al., 2005), and torture (Başoğlu et al., 1994a), consistent with other studies (Bodvarsdottir and Elklit, 2004; Carr et al., 1995; Carr et al., 1997; Lai et al., 2004; Sattler et al., 2006) that used multiple regression analysis in examining risk factors for PTSD. Although a prospective study (Seplaki et al., 2006) of 1160 survivors of Chi Chi earthquake provided some support for an association between lack of social support and depression, this association was rather weak. These findings are consistent with a meta-analytic study (Ozer et al., 2003) of predictors of PTSD, which found that most studies reporting strong predictions with support variables emphasized emotional rather than other forms of support. Emotional support might perhaps reduce PTSD and depression through enhancing sense of control over traumatic stressors and / or anxiety and distress associated with them. Such support might play a role in natural recovery processes discussed later in this chapter and also has parallels with certain aspects of CFBT described in Chapter 4. It might be said that any form of support might mitigate the effects of traumatic stress to the extent that it directly or indirectly provides opportunities for learning of effective control in relation to stressor events, disabling effects of traumatic stress, and life in general.

The model also hypothesizes that functional impairment caused by health effects of trauma contributes to resource loss (e.g. loss of employment, social status, or employment / business / educational opportunities) and leads to additional life stressors. Similarly, traumatic stress reactions may lead to reduced social / emotional support, either by blocking the person's ability to process and utilize available support or by leading to an actual reduction in support through their alienating effects on people in a person's close social environment. Thus, there may be a two-way interaction between post-trauma stressors and health outcomes. As this issue needs to be confirmed by further research, the contributions of PTSD and depression to loss of resources and social / emotional support, and stressful life events are represented by dotted arrows in Figure 1.1.

To summarize so far, available literature evidence does not allow reliable conclusions regarding the role of resource loss and lack of social / emotional support in traumatic stress reactions. Nevertheless, these variables are tentatively included in the model, because they may conceivably affect post-trauma health outcomes through their effects on sense of control over stressor events and / or life in general. Clearly, further research is needed to investigate this issue by more carefully defining and operationalizing these constructs. Such research also needs to examine how these factors relate to individual post-trauma outcomes, such as PTSD and depression. This issue is important, considering that differential stress-response associations have implications for treatment. For example, if social support relates to depression and not to PTSD, as one of our studies (Şalcıoğlu, 2004) suggests, this would imply that social support might be helpful in preventing or treating depression but it would not reduce PTSD, which would require interventions specifically targeting this problem.

Loss of close ones may lead to two distinct outcomes: grief and depression. Grief is a natural and time-limited reaction that is phenomenologically distinct from depression and PTSD (Bonanno et al., 2007). Whether loss of close ones relate to PTSD, depression, or both is not yet clear, as few studies examined these associations using uncorrelated measures of these conditions. Furthermore, most studies did not control for the effects of trauma severity in examining the effects of loss of close ones on post-trauma health outcomes. In mass trauma survivors loss of close ones is often associated with exposure to many other traumatic events. In the Şalcıoğlu (2004) study, for example, 52% of survivors who lost a family member were also trapped under rubble and 16% of them witnessed the death of family members trapped with them. In studies (Kılıç et al., 2006; Livanou et al., 2002; Şalcıoğlu et al., 2003; Şalcıoğlu et al., 2007) that circumvented these two methodological limitations, loss of a first-degree relative related to depression but not to PTSD. Loss of close ones might aggravate depression by increasing certainty about future helplessness and hopelessness. The latter effect might be mediated by loss of a significant source of emotional support.

Role of beliefs about safety, justice, and trust

Many psychological theories of trauma maintain that emotional responses to trauma are mediated by a change in beliefs about safety, justice, and trust (Ehlers and Clark, 2000; Foa et al., 1999; Horowitz, 1986; Janoff-Bulman, 1992). The few studies that examined this issue in trauma survivors failed to support the role of beliefs about justice and trust in traumatic stress. Although some studies (Başoğlu et al., 2005; Foa et al., 1999; Şalcıoğlu, 2004) found more negative beliefs about self and others and the world in trauma-exposed people, there is little evidence to suggest that such trauma effects on beliefs are associated with PTSD. In another study (Bodvarsdottir and Elklit, 2004) no difference was found between earthquake survivors and controls in their appraisal of the benevolence and meaningfulness of the world and self-worth. Furthermore, beliefs about these issues did not relate to PTSD. Similarly, in the Şalcıoğlu (2004) study loss of faith in people, beliefs about the benevolence of the world, just-world thinking, beliefs about justice, self-blame, fatalistic thinking, and attributions of responsibility for trauma, and emotional responses to perceived impunity for people held responsible for trauma showed no association with PTSD. PTSD and depression were most strongly associated with loss of control over fear of ongoing threat to safety. Findings from a study (Başoğlu et al., 2005) of war and torture survivors using similar measures of beliefs also suggested that fear-induced helplessness responses play a more important role in traumatic stress problems than do post-trauma beliefs about self and the world, though some trauma-altered beliefs may conceivably contribute to helplessness responses (see Chapter 2). In view of these findings the impact of trauma on beliefs is not included as a process variable in Figure 1.1.

Unpredictability and uncontrollability of earthquake stressors

Contrary to popular belief, earthquake trauma is not a single event but rather a prolonged trauma period of stressor events starting with the initial major shock and followed by hundreds of aftershocks that may last for months or even more than a year. The stressor events include (1) violent tremors during the initial major shock, (2) life-threatening events, such as collapse of buildings, being trapped under rubble, secondary fires, exposure to extreme weather conditions, etc., (3) exposure to grotesque scenes, such as people trapped under rubble, mutilated bodies, etc., (4) loss of close ones and resources, (5) stressful life events associated with the consequences of the disaster (e.g. relocation to shelters, hardships of post-disaster daily life, problems arising from loss of resources, etc.), and (6) ongoing aftershocks. The post-earthquake period characterized by these events lasted more than a year in Turkey. Hence, the DSM-IV definition of acute trauma phase as 1 month after the traumatic event does not apply to earthquake trauma. We use the term trauma phase to refer to the period of continued exposure to unpredictable and uncontrollable stressors and post-trauma phase to refer to the period after cessation of these stressor events. These considerations also apply to war and torture trauma, as these events occur over an extended period of time and pose a realistic threat to safety. Furthermore, the DSM-IV distinction between acute and chronic trauma phase does not make much sense from a learning theory perspective, as the mechanisms of traumatic stress are the same in both phases.

The initial major shock

Exposure to earthquakes is an intensely frightening experience, as anyone with such an experience would know. The intensity of fear experienced during an earthquake and associated physiological responses may indeed explain the increased rates of myocardial infarction, abortions, premature births, and normal deliveries after earthquakes (Noji, 1997). While a typical earthquake lasts about 30 seconds, durations up to 10 minutes have also been recorded. The first major shock is most often unexpected, catching people by surprise. Much of the devastation caused by earthquakes most commonly occurs during the initial major shock. The first shock is often followed by thousands of aftershocks, which may last for months. Unlike the first major shock, their occurrence is often expected but they occur in unpredictable time intervals.

The August 17, 1999 earthquake in Turkey occurred at 3 am, catching most people asleep in their homes. It lasted 45 seconds. Most people were unable to leave their homes and some did not even feel the tremors, because their house collapsed within the first few seconds of the earthquake. Turkey is an

Table 1.1 Endorsement rates of and intensity of distress associated with stressors during the initial major shock

	Endorsement	Mean[1]	SD
Walls moving	53%	3.2	1.1
The rumbling noise of the earthquake	61%	3.1	1.2
Sound of buildings collapsing and other noises	50%	3.1	1.2
Being thrown about during the earthquake	24%	3.0	1.3
Furniture moving	57%	2.7	1.3
Cracks on the walls	35%	2.7	1.3
Falling during the tremors	27%	2.6	1.5
Being left in darkness during the earthquake	81%	2.2	1.6

[1] 0 = no fear / distress, 1 = slight, 2 = marked, 3 = severe, 4 = very severe fear / distress.

earthquake-prone country and many people have a previous experience of earthquakes. Nevertheless, the tremors were so violent that some people at the epicenter, failing to recognize it as an earthquake, thought that it was judgment day.

What is it about earthquakes that make them so frightening? It is worth examining some of the stressors during an earthquake that might explain the frightening nature of earthquake tremors. These stressors fall mainly into three groups: visual and auditory stimuli and loss of postural control. Table 1.1 shows the intensity of distress associated with these stressor events rated on a 0–4 scale. These data are based on an *Exposure to Earthquake Stressors Scale* (EESS; Şalcıoğlu, 2004) that we used to obtain information about the relative stressfulness of 44 events during the earthquake and its early aftermath.

What are the reasons that might account for the intensely distressing nature of these stressors? Perceptually, a moving physical environment is quite an extraordinary phenomenon, well out of the range of ordinary human experience. This is perhaps because spatial or proprioceptive orientation in humans (and possibly in other sub-human living organisms) is defined in reference to a stable physical environment. The extremely alien nature of this perceptual experience might indeed explain why earthquake survivors have a very high rate of re-experiencing symptoms (74%) in the early aftermath of the disaster (Başoğlu et al., 2001), many of which (e.g. nightmares, flashbacks, intrusive thoughts) involve such visual images. The distressing nature of this experience might be further enhanced by equally alien auditory stimuli, such as the rumbling noise that comes from under the ground and the noise made by moving structures and objects in the environment. A shaking physical environment is also a physiologically aversive experience, which perhaps might be due in part to a transient disturbance in the vestibular system. While there are no systematic studies of physiological responses during an earthquake, survivor reports (consistent with the first author's own experience of the same earthquake) suggest that cardiovascular responses, such as tachycardia, are quite common. An increased heart rate may be accompanied by a subjective experience of fear in some people, whereas in others it may occur on its own. Such cardiovascular responses might indeed explain increased rates of death from cardiac events after an earthquake (Kloner et al., 1997; Leor et al., 1996; Ogawa et al., 2000; Trichopoulos et al., 1983). Given that vestibular dysfunction is associated with autonomic nervous system stimulation (Balaban, 1996; Yates, 1992; Yates, 1996), this might perhaps explain such cardiovascular responses in some people.

Lack of control over the events during the earthquake is an important mediator of distress, particularly when the tremors are sufficiently violent to render postural control impossible. Loss of postural control is a particularly distressing situation, as it makes any self-protective action very difficult. Indeed, survivor accounts of an experience of a 7.4-magnitude earthquake indicate that it is quite difficult to stand up, walk, and engage in any meaningful self-protective action during the tremors. Findings from the Şalcıoğlu (2004) study regarding coping responses during the earthquake are meaningful in this regard. The responses reported by the 280 survivors from the epicenter region were attempts to reach close ones in the house (39%), attempts to leave the building (38%), freezing or panic (38%), passive waiting for the tremors to end (21%), seeking a safe place in the house (16%), praying (15%), crying for help (8%), and jumping off the balcony (3%). Given that the recommended action during an earthquake in Turkey is to seek 'life saving spaces' in the house (e.g. next to solid metal objects, such as refrigerators, washing machines, metal cupboards, etc.) that are said to afford some protection in

a collapsing building, most survivors could not engage in any rational self-protective behaviors. While this might be due in part to lack of training in earthquake-preparedness, it also reflects fear-induced disorganized behavior. Indeed, 76% of the survivors described severe / very severe fear and 40% reported marked to total loss of control during the earthquake (based on 0–4 ratings of fear and loss of control during the earthquake). A significant correlation between these measures ($r = 0.27$, $p < 0.001$) supports the point that fear is closely associated with the uncontrollability of earthquake stressors.

The aftermath

Post-earthquake stressors are best examined under two headings: stressor events caused by devastation and aftershocks. The devastating impact of the earthquake is most intensely experienced in the early aftermath of the disaster, lasting a few days or perhaps a week or two. This period is characterized by rescue and relief efforts and involves intense exposure to a wide range of stressors, including frequent aftershocks.

Stressors caused by devastation

Table 1.2 shows the EESS data (Şalcıoğlu, 2004) on the most common stressors in the early aftermath of an earthquake and their relative psychological impact. Note that the events with highest distress ratings are those that would evoke feelings of helplessness in most people. Indeed, most survivors, being unable to save their close ones from rubble, found themselves in a state of total helplessness. Many people made frantic but often futile efforts to save their close ones, digging through rubble with primitive tools or even bare hands. Perceptions of delayed or inadequate rescue efforts aggravated feelings of helplessness. These findings provide further evidence showing that the intensity of distress during a traumatic event is closely associated with the uncontrollability of stressors. It is worth noting that witnessing grotesque scenes such as sights of people trapped under rubble dead or alive, mutilated bodies, or smell of rotting bodies was also among the most distressing experiences.

Aftershocks

As noted earlier, major earthquakes are often followed by numerous aftershocks that usually last several months or sometimes much longer. Following the August 17 earthquake in Turkey, 2000 aftershocks were registered until October 2, their magnitude ranging from 2 to 5.8 on the Richter scale (Ito et al., 2002). There are striking similarities between exposure to aftershocks and inescapable shock experiments in animals; both situations involve repetitive stressors that are unpredictable and uncontrollable and they lead to similar psychological responses, i.e. anxiety, fear, and helplessness. Several factors contribute to appraisal of risk of threat and consequent anticipatory fear in earthquake survivors. The initial shock demonstrates the nature and extent of devastation that can be caused by major earthquakes. This is particularly true for developing countries, where earthquakes cause extensive devastation because of poor quality of constructions and lack of preparedness for earthquakes. People whose houses collapse during the earthquake are directly exposed to the devastating impact of the earthquake, while others are indirectly affected by witnessing its destructive effects on other people. Everyone knows the same events could happen again. Second, the aftershocks, although usually less strong than the initial shock, demonstrate that further devastation is possible, however limited it might be. Third, as the second (November 12) earthquake in Turkey demonstrated, there is always a risk of further major earthquakes in a seismically active region and not necessarily in the too distant future. Finally, as noted earlier, aftershocks occur at variable intervals in an unpredictable fashion. They can catch people while they are asleep, in the bathroom, having sexual intercourse, or in an enclosed space from which escape is difficult. Thus, 'protection' from a possible earthquake requires high levels of constant vigilance.

Cognitive and behavioral responses to earthquakes

In this section we review some observations on individual and collective responses to earthquakes and various cognitive and behavioral strategies that people commonly utilize in coping with fear. These observations highlight the prevalent and pervasive nature of fear among earthquake survivors and provide remarkable examples of how humans respond to unpredictable and uncontrollable stressors.

Quest for safety

As noted earlier, the August 17 earthquake occurred at 3 am. Most people outside the epicenter region (e.g. in Istanbul) thought it was just one of the many

Table 1.2 Endorsement rates of and intensity of distress associated with common stressors in the early aftermath of the earthquake

	Percent endorsement	Mean[1]	SD
Waiting helplessly near rubble unable to save close ones	21	3.8	0.6
Waiting without knowing whether close ones trapped under rubble were alive	22	3.7	0.8
Close ones dying because of rescue teams arriving late	11	3.6	0.7
Close ones dying under rubble despite rescue efforts	14	3.6	0.8
Sights of rubble under which close ones were trapped	42	3.5	1.1
People dying because of rescue teams arriving late	21	3.5	0.8
Sights of close ones' dead bodies under rubble	15	3.5	1.1
Slow death of close ones under rubble (e.g. voices fading)	7	3.4	1.2
Rescue teams arriving late while close ones trapped under rubble	14	3.4	1.0
Rescue teams not making sufficient efforts to save close ones	9	3.4	1.0
Waiting helplessly near rubble unable to save people	38	3.3	1.0
Slow death of people under rubble (e.g. voices fading)	21	3.3	1.2
People's indifference to one's close ones being trapped under rubble	19	3.3	1.1
People dying under rubble despite rescue efforts	28	3.3	1.0
Close ones' dead bodies being taken out from rubble	22	3.2	1.2
Mutilated bodies	29	3.2	1.2
Rescue teams not making sufficient efforts to save people	13	3.2	0.9
Rescue teams not arriving while close ones trapped under rubble	11	3.2	1.2
Collapsed buildings	86	3.2	1.1
Smell of rotting bodies under rubble	68	3.1	1.1
Dead bodies being taken out from rubble	46	3.1	1.2
Sight of dead bodies under rubble	38	3.1	1.2
People's indifference to others being trapped under rubble	35	3.1	1.2
Voices coming from rubble	43	3.0	1.2
Close ones' voices coming from rubble	12	2.8	1.5
Witnessing rescue work for close ones	22	2.7	1.5
People screaming	79	2.7	1.3
Sight of fire in destroyed buildings	23	2.6	1.4
People in panic	73	2.5	1.3
Injured people	68	2.5	1.4
Sights of people trapped alive under rubble	31	2.3	1.6
Sights of close ones trapped alive under rubble	10	2.3	1.7
Witnessing rescue work	50	2.2	1.4
People being taken out of rubble alive	37	1.3	1.5
Close ones being taken out of rubble alive	12	1.3	1.7

[1] 0 = no fear / distress, 1 = slight, 2 = marked, 3 = severe, 4 = very severe fear / distress.

earthquakes that occur in the country. This response, however, began to change dramatically when the TV channels began to broadcast images of devastation in the disaster region at around noon the same day. The realization of the extent of devastation caused by the earthquake led to a noticeable increase in people's fear, consistent with the view that re-appraisal of an already experienced traumatic event as dangerous enhances its traumatic impact (Foa et al., 1989). In the days and weeks that followed, public fear was aggravated by the appearance of seismology experts on TV screens, predicting yet another major earthquake (with a likely magnitude of 7.0+) in the region, this time much closer to Istanbul. Although these seismologists emphasized that this earthquake could occur anytime in the next 30 years, many people perceived these predictions as a warning of an impending earthquake. This is consistent with what we already know about cognitive effects of trauma; people exposed to a traumatic event tend to overestimate the probability of a similar event and other aversive events occurring in the near future (Foa et al., 1989; Smith and Bryant, 2000; Warda and Bryant, 1998).

The aftershocks were quite frequent in the early weeks and months of the disaster, occurring at variable intervals and variable times of the day. Many people used various coping strategies to reduce their fear. A typical behavioral pattern involved a search for any information that would help them assess the extent of danger they were facing. Millions of people were glued to their TV sets, watching earthquake-related programs and listening to seismologists, trying to understand where the active fault lines are located and the risks they posed for various locations in the region. Some people were relatively relieved to find out that they were not living in the first-degree threat zones. Many people living in such zones moved to relatively safer locations. Consequently, property prices plummeted in first-degree earthquake zones and rose sharply in others said to be safer.

Some people rushed to get an expert assessment of their house and felt relatively relieved if the experts concluded that the building was safe. If they felt that the assessment was not conducted reliably, they sought private firms to do the assessment. Others engaged in an eager search to find out whether their house was originally built according to building regulations. If the house was built before the early 1990s when the current building regulations came to force, they tried to find out whether the building regulations of the time conformed to the current ones. Those people who could not afford to have an expert damage assessment tried to make the assessment themselves as best as they could. They felt more secure if they heard from their neighbors, for example, that their house was sitting on a solid rocky terrain, rather than on soft ground. Some people traced the building contractor who had built their house and sought reassurance from them about the quality of the construction. People who knew or discovered that the contractor who built their house was living in the same building felt safer, as they reckoned that the contractor would not have lived there if the building were not safe. At the bottom of this pyramid were people who faced no uncertainty about the state of their house, as experts had already confirmed serious structural damage (e.g. cracks in supporting columns or walls). Some of those who could not afford to have the building repaired or to move to a new place simply had the walls plastered to hide away the cracks (visual fear cues for many survivors) and went on with their lives.

Some people who could not find comforting information about their safety simply created them. For example, some tried to estimate how their house would collapse during an earthquake and, if they decided, for example, it was likely to go to the left, then they would sleep in a room that was on the right side of the building. Some people who lived in the upper floors of a building tended to believe that they were safer because they had easy access to the roof where they felt they would stand a better chance of surviving in case the building collapsed. Others who lived in the lower floors were comforted by the thought that they had a better chance of getting out of the building during an earthquake. Such estimations were in stark contrast to the fact that the overwhelming majority of the people could not get out of their home in 45 seconds during the August 17 earthquake (including the first author who was fully awake and dressed on the second floor of a building when the earthquake started). Some people conducted drills to find out how many seconds it took them to get out of their house; the shorter the time, the safer they felt.

Reliance on safety signals

Many people developed safety signals that seemed to reduce their fear. Safety signals are cues, objects, or situations that reduce anxiety by virtue of their safety value (Rachman, 1984a; Rachman, 1984b). Use of

safety signals to ward off danger is a characteristic behavior of people with anxiety disorders. For example, agoraphobics carry anxiolytic tablets in case they find themselves in a feared situation. Particular behaviors of animals (e.g. birds making a noise or dogs barking), a particular color of the sea, clear visibility of the stars at night, or an unusually hot and windless day were perceived as signaling danger and their absence signaling safety. Some people sought the company of their close ones or friends during times of heightened fears, feeling safer with them. People visited relatives and friends more often and spent more time with them, particularly when rumors about an impending earthquake were going around. Such behavior was not necessarily motivated by a belief that the presence of others during an earthquake might facilitate survival. Rather, other people's presence appeared to have a safety signal value. For example, a woman felt less anxious staying at home with her 1-year-old child. Many people stayed with their next-door neighbors in the same building on the day of an expected earthquake, simply because the company of others made them feel safer.

Many people displayed a remarkable tendency to believe in frequently emerging rumors of a major earthquake that was going to occur on a particular date. Endless public reassurances by seismologists who repeatedly emphasized the fact that there was no way of predicting the timing of earthquakes did not prevent such rumors from spreading widely throughout the country. Both the media and the public were particularly interested in the opinion of a seismologist, who had become a household name due to his frequent TV appearances. This seismologist, the then head of a university institute of seismology, became a well-known public figure after the earthquake. A few days after the earthquake, he reported unusual seismic activity in the region, which he thought might be signaling an impending major aftershock. He therefore advised the people to stay outdoors for the next 24 hours and millions of Istanbul residents spent the (uneventful) night on the streets. After this event the public closely watched his statements for any clues or predictions about future aftershocks. When rumors about an impending earthquake broke out, reporters closely watched his actions to find out whether he was staying in his house on the day of the expected earthquake. His actions were perceived as signaling danger or safety and people wanted to know if he was staying outdoors that day so that they could do the same. At times he came under so much public pressure that he had to make public announcements on TV channels, reassuring the public about his intention to stay in his house on that day.

These rumors appeared to serve an important psychological function by making unpredictable shocks predictable and thereby controllable. The 'certainty' about the timing of the next earthquake seemed to reduce people's fear because it also signaled safety until that day. When the expected date came, many people simply avoided the danger by spending the day outside. Interestingly, when the rumors were eventually disconfirmed by an eventless day, this did not appear to reduce people's tendency to believe in future rumors. Soon enough, another rumor appeared, which in effect postponed the expected disaster to a later date. This process continued for some years, albeit with reduced frequency.

These observations are consistent with findings from experimental work with animals. When given a choice, animals generally show a strong preference for predictable or signaled aversive events in comparison to unpredictable or unsignaled aversive events (Badia et al., 1979). According to Seligman's safety signal theory (Seligman, 1968; Seligman and Binik, 1977), preference for predictability derives from the fact that having a signal when the event is going to happen also means functionally that when the signal is not on, the organism can relax and feel safe. In other words, when the organism has a reliable signal for when bad things are going to happen, the absence of the signal can be used as a safety signal. For organisms experiencing unsignaled or unpredictable aversive events, the absence of a reliable signal also means the absence of a reliable safety signal. If the organism is in a context where aversive events are occurring unpredictably, this means that they may be in a state of chronic fear (Seligman, 1968; Seligman and Binik, 1977). Another theory accounting for the preference for predictability is that it reduces uncertainty (Imada and Nageishi, 1982), which may in and of itself be rewarding. Evidence in support of the safety signal theory in humans has largely been drawn from clinical cases with anxiety disorders. As noted earlier, characteristic examples of reliance on safety signals have been observed in agoraphobic patients. What is interesting with our observations is the fact that the safety signal theory appears to be able to account for a social phenomenon or the collective behavior of large masses of people.

Fatalistic thinking and Tawakkul

Another commonly observed attempt to reduce fear was to resort to philosophical, religious, or fatalistic beliefs. Thinking in the form of "*There is no running away from earthquakes*" or "*If death is fated to happen, it will happen*" became increasingly more common among people. A taxi driver told the first author that his intense fear of earthquakes disappeared when his father, a religious man, told him "*Son, there is no escape from earthquakes; you have to accept it.*" Total acceptance of helplessness in uncontrollable situations reflects a particular state of mind described and reinforced by Islamic philosophy, namely 'tevekkül' in Turkish or 'Tawakkul' in Arabic. Although this concept does not have an exact equivalent in English, it can be loosely translated as 'to resign oneself unto God.' Essentially, it denotes passive acceptance of fate by 'putting one's trust in God.' The case of the taxi driver described above is an illustrative example of this phenomenon. Some bereaved survivors also resorted to this form of thinking to cope with the grief and pain associated with their loss (e.g. "*It was God's will*").

A tendency in people to resort to religious thinking or an increase in religious faith after traumatic events has been reported by other studies (Carmil and Breznitz, 1991; Falsetti et al., 2003; Valentine and Feinauer, 1993). Nevertheless, whether this form of thinking has a direct fear-reducing effect remains unclear. In our studies fatalistic thinking related to either greater trauma exposure (Şalcıoğlu, 2004) or more severe PTSD (Başoğlu et al., 2005). It might thus well be a cognitive coping process secondary to severe traumatic stress. Such coping is unlikely to have much effect on conditioned fears, considering their irrational nature that makes them resistant to cognitive processes (Öhman and Mineka, 2001). On the other hand, fatalistic thinking might perhaps have an indirect effect on traumatic stress by prescribing total acceptance of an anticipated threat event. Such acceptance implies more risk-taking behaviors, less behavioral avoidance, and therefore greater opportunities for learning of control over fear cues. In the case of the taxi driver, for example, the father's words might have encouraged him not to avoid earthquakes and his fear might have reduced *after* having done so. Fatalistic thinking might also make it easier to accept the consequences of disasters (e.g. loss of close ones, loss of resources, personal injury, disability, etc.) *after* they have occurred. Nevertheless, available evidence does not allow definitive conclusions on the causal relationship between fatalistic thinking and traumatic stress. Prospective controlled studies would be needed to examine whether it has a direct effect on fear and other psychological responses to trauma. It would also be interesting to examine in future research whether fatalistic thinking reduces avoidance and facilitates exposure to feared situations.

Avoidance

Avoidance of various earthquake-related situations was one of the most common psychological responses among survivors. In five field surveys (Başoğlu et al., 2002; Başoğlu et al., 2004; Livanou et al., 2002; Şalcıoğlu et al., 2003; Şalcıoğlu et al., 2007) conducted at different stages after the earthquake (range mean 8 to 40 months), the rates of cognitive and behavioral avoidance ranged from 41% to 70%. In these studies the survivors avoided a mean of 7 to 11 different trauma-related situations or activities (measured by a 35-item *Fear and Avoidance Questionnaire*, see Appendix A). Avoidance behaviors related to two types of situations: (a) those that signaled danger in case of a future earthquake and (b) those that acted as distressing reminders of the past earthquake. The most common example of the first type of avoidance related to concrete buildings. Many people avoided entering buildings, even when they knew that a particular building was safe. This reflected realistic fears to a certain extent, because information on the safety of the surviving buildings was not available in the early months of the disaster. These fears were also reinforced by certain slogans repeatedly broadcast by seismologists on TV screens (presumably to alleviate public fear of earthquakes!), such as "*Earthquakes don't kill. Buildings do.*" As expert assessment of the buildings became increasingly available in time, many people still continued to avoid their houses, even when the experts reported them as safe. This reflected in part their mistrust of expert assessments, which were sometimes conducted in a rather cursory fashion. The extent of avoidance among earthquake survivors is best demonstrated by the fact that 58% of the 15 000 people who were living in shelters 6 months after the earthquake had a safe and inhabitable house (Committee for Tent Cities in Kocaeli, 2000). Similarly, behavioral avoidance due to fear was the strongest predictor of relocation to shelters in our three field surveys conducted a mean of 1.3

years after the earthquake (Şalcıoğlu et al., 2008). Many survivors preferred to live under difficult conditions in camps rather than moving back to their homes or alternative accommodation.

Other common examples of the first type of avoided situations included staying alone at home, staying in the dark, taking a shower, getting undressed before going to bed, sleeping with lights off, sleeping with the bedroom door closed, or sleeping before 3 am (the time of the night when the earthquake happened), having sexual intercourse, or being in places from which escape during an earthquake would be difficult. Some people could not go near the sea, because parts of the land near the sea had sunk during the earthquake, causing many people to drown. Many people devised a rota at home to have a family member stay awake and keep vigil during the night, while the others slept. This type of avoidance clearly reflected a state of constant vigilance caused by the unpredictable nature of aftershocks. Indeed, one needs to be vigilant all the time if the exact timing of a threatening event cannot be predicted. Such avoidance often caused significant social and occupational disability, because it interfered with normal daily functioning.

The second type of avoidance reflected conditioned fears or distress with respect to a wide range of trauma reminders. For example, some people stopped sleeping in the room where they had experienced the earthquake and slept in another room. Others avoided sights of rubble or destroyed buildings, which were distressing reminders of the earthquake. Some survivors could not go to work, because that meant having to go through the devastated neighborhoods. Others stopped reading newspapers or watching TV news to avoid being reminded of the earthquake. Conditioned fears often generalized to a wide range of situations. For example, some people avoided wearing the same clothes they had on during the earthquake. A woman who was brushing her teeth during the earthquake had to change the toothbrush and the brand of the toothpaste she was using, because they evoked fear. She complained to her therapist that she was also distressed by the presence of her husband (whom she had married recently and who was with her during the earthquake), because he served as a reminder of the earthquake. Many people avoided places where they experienced shaking sensations, such as hung floors in shops that shook when people walked over them or other locations where the ground vibrations created by passing trucks could be felt.

Fear of earthquakes: an evolutionary perspective

Evidence reviewed so far suggests that exposure to earthquakes leads to high rates of fear and avoidance responses that are quite resistant to extinction in the long term. This might perhaps reflect an evolutionarily determined response geared towards self-preservation. It is long known that defensive responses such as heightened vigilance, flight or fight, and avoidance of threat have played a fundamental role in the survival of the species for millions of years (Marks, 1987). Several lines of evidence suggest that earthquakes have an evolutionary significance for living organisms. For example, there are close parallels between human and animal responses to earthquakes. Snarr (2005) has noted that animal responses to earthquakes have been observed as far back as 3000 years ago, including responses before, during, and after the earthquake. Among the documented responses of non-human primates to earthquakes are increased restlessness and changes in space utilization in chimpanzees (Shaw, 1977), freezing responses in langur monkeys (*Presbytis entellus*; Krusko et al., 1986), and stress, nervousness, and fear in orangutans (Antilla, 2001). In a study Snarr (2005) documented the response of a group of wild mantled howlers (*Alouatta palliata*) on the north coast of Honduras to an earthquake that occurred 341 kilometers away in El Salvador. The response of the howlers to the coseismic activity was very similar to a ground threat, such as the appearance of a dog or an unknown human. Following the seismic event and at the approximate time when the body waves arrived at the study site, the howlers rapidly moved from mid-canopy to the higher inner canopy and showed signs of restlessness and alertness.

Another line of evidence concerns anecdotal and retrospective reports of seismic-escape behavior in some animals living in seismically active regions (see Tributsch, 1982 for a review). As an explanation for such behavior, Kirschvink (2000) suggested that evolutionary processes might have led to tilt, hygroreception (humidity), electric, and magnetic sensory systems in animals that enable them to detect certain earthquake precursors, such as P waves. Tectonic plate activities have existed for at least the past two billion years on Earth, giving rise to sufficiently frequent earthquakes to allow living organisms to develop a capacity for self-preservation. In this connection, Kirschvink (2000) noted that

> ... we now realize that great earthquakes occur with average repeat intervals of 100 years or so ... Although moderate earthquakes of M ~ 6 + affect smaller geographic areas, they are more numerous and may dominate the local seismic hazards for an area. Furthermore, zones of high seismic activity have existed on Earth for at least the past two billion years or more, as they are a by product of plate tectonic processes. A small selection pressure acting over a vast interval of geological time can be just as effective at gene fixation as is stronger selection acting over a shorter time interval. Second, evasive action can, in many instances, reduce mortality during an earthquake. Earthquakes can kill animals or reduce their fitness in a variety of ways, from direct physical shaking (e.g. causing burrows to collapse, shaking eggs out of nests, breaking honeycomb, etc.) to indirect action of mudslides and tsunamis. Fitness can also be reduced in the interval after an earthquake as a result of the disruption of normal behavior from aftershocks. For many organisms, behavioral action taken prior to an earthquake could reduce mortality: fish and cetaceans leaving coastal zones, rodents exiting from collapsible burrows or dwellings, bees swarming, parents delaying egg-laying, etc.
>
> (pp. 313)

Preparedness theory in fear acquisition

Further evidence on the evolutionary significance of fear comes from experimental work with animals. It has been suggested that primates may have a preparedness to acquire fear of certain kinds of objects or situations that have evolutionary significance (Öhman and Mineka, 2001; Seligman, 1971). Mineka and Zinbarg (2006) noted that

> ... people are much more likely to have phobias of snakes, water, heights, and enclosed spaces than of bicycles, guns, or cars, even though the latter objects (not present in our early evolutionary history) may be as likely to be associated with trauma ... this is because there may have been a selective advantage in the course of evolution for primates who rapidly acquired fear of certain objects or situations that posed threats to humans' early ancestors ... Thus, prepared fears are not seen as inborn or innate but rather as very easily acquired and / or especially resistant to extinction.
>
> (pp. 4)

In a series of experiments using mild shock as the unconditioned stimulus (US), Öhman and his colleagues found superior conditioning effects with fear-relevant conditioned stimuli (CS) such as snakes and spiders than with fear-irrelevant CSs, such as slides of flowers, mushrooms, or electric outlets (see a review by Öhman and Mineka, 2001). In addition, using videotaped model monkeys, Cook and Mineka (1989; 1990) showed that naïve monkeys can easily learn to fear fear-relevant stimuli (e.g. a toy snake or a toy crocodile) but not fear-irrelevant stimuli, such as flowers or a toy rabbit. In their review of the evidence in support of this issue, Mineka and Zinbarg (2006) concluded that

> In both monkeys and humans, therefore, evolutionary fear-relevant stimuli more readily enter into selective associations with aversive events, and these same stimuli seem more likely than others to become the objects of human phobias. Moreover, the special characteristics of fear learning seen with fear-relevant (but not fear-irrelevant) stimuli (e.g. its automaticity and its resistance to higher cognitive control) suggest that the acquisition of phobias involves a primitive basic emotional level of learning that humans share with many other mammalian species (Öhman and Mineka, 2001).
>
> (pp. 5)

The preparedness theory might thus explain why people respond to earthquakes with such intense fear, rapidly acquire conditioned fears and avoidance in relation to a wide range of situations or activities, and why such fear is resistant to extinction in the long term. This theory would predict a higher rate of fear and avoidance responses associated with earthquakes than with other life-threatening events without an evolutionary significance (e.g. road traffic accidents). This hypothesis seems to be well worth testing in future research.

Observational learning of fear

While the prevalent nature of conditioned fears and avoidance among earthquake-exposed people is consistent with evidence of an association between inescapable shocks and conditioned fears (Desiderato and Newman, 1971; Mineka et al., 1984; Warren et al., 1989), another contributing factor might be acquisition of fear through observational learning. Experiments with animal and human subjects showed that observing others experiencing a traumatic event or acting fearfully could lead to the development of

phobias (Mineka and Öhman, 2002; Mineka and Zinbarg, 2006; Öhman and Mineka, 2001). Mineka and Zinbarg (2006) also noted that humans are susceptible to acquiring fear vicariously through watching movies and TV. Our observations provide some indirect support for the role of observational learning in fear and avoidance. Devastating earthquakes affecting millions of people indeed provide ample opportunities for observational learning of fear. In the early aftermath of the disaster survivors often witnessed people suffering, horrified, panicking, screaming, etc. Those who participated in rescue efforts in the early days of the disaster had even more intense exposure to such scenes. In addition, throughout the period of aftershocks, people observed others acting fearfully in anticipation of future earthquakes, panicking during aftershocks, and avoiding a wide range of situations in daily life. Various examples of pervasive fear that gripped the public were provided earlier.

The possible role of the media in promoting observational learning also deserves attention. Following the disaster more than 20 national TV channels endlessly (and rather irresponsibly) broadcast graphic images of severely injured, distressed or bereaved survivors, people trapped alive under rubble (some of them for days), and rescue teams recovering survivors from rubble. Evidence from the Şalcıoğlu (2004) study suggests that such exposure did have an impact on public fear of earthquakes. This issue was examined in 273 survivors who did not have a personal experience with the kind of events displayed on TV screens (e.g. collapse of house, being trapped under rubble, etc.). In response to a question about whether watching TV in the early days of the disaster led to an increase in their anticipatory fear of earthquakes, 51% of the survivors reported marked to very much increase, with a further 17% reporting only slight increase. This study also showed that women and those who experienced greater fear and loss of control during the earthquake were more vulnerable to the impact of such TV broadcasts. The effect of TV on fear is further supported by another analysis showing an association between self-reported increase in fears and more severe and extensive avoidance behaviors (as measured by the *Fear and Avoidance Questionnaire*) at the time of assessment. While such increase in fear might have been due in part to a re-appraisal of the danger posed by the earthquake (e.g. *it could have happened to me / my close ones* or *it may happen to me / my close ones next time*), consistent with an unconditioned stimulus re-evaluation process (Davey, 2006), it might also reflect the direct observational learning effects of watching people's expressions of distress or fear in response to their traumatic experiences. These findings are consistent with reports (Blanchard et al., 2004; Schlenger et al., 2002) of an association between exposure to TV images of 9/11 events and subsequent PTSD.

Natural recovery processes and associated factors

In a review of the evidence on the role of evolutionarily determined defensive responses in PTSD, Cantor (2005) noted that vigilant avoidance was the most commonly used strategy early in our evolutionary history, because of reptilian energy limitations. The use of this strategy, however, is said to be dependent on an appraisal of the relative costs and benefits of avoidance behavior or the 'cost-benefit ratio' (Kavaliers and Choleris, 2001). In other words, avoidance has a survival value in animals as long as it does not interfere with feeding and mating opportunities. There is indeed evidence (Lima, 1998) to suggest that animals are prepared to take greater risks with predators when they are hungry. It has also been suggested that hunger might cause a transient decrease in post-traumatic stress (Cantor, 2005).

This theory would predict that the development or persistence of avoidance of concrete buildings (the primary cause of death during earthquakes) following an earthquake would be dependent on an appraisal of the relative costs and benefits of living out of buildings (e.g. in tents or other shelters). The study by Şalcıoğlu (2004) provided an opportunity to examine this issue. Some survivors had left their home immediately after the earthquake but then had gone back to live in the same place, either within the same day or soon after the earthquake. Others were relocated to a shelter (camps, tents, makeshift barracks, etc.), either because they had lost their house or were too afraid to go back home. These survivors had moved out of the shelters at some stage to go back to their home or other alternative accommodation. Home or alternative accommodation meant concrete buildings in all cases. We examined the reasons why these survivors (n = 156) did not avoid concrete buildings from the outset or stopped avoiding them in the longer term. The mean time it took them to move back home or to an alternative accommodation (i.e. resettlement) was 126 days

(SD = 162, range 1–905). The most commonly stated reason for resettlement was the inconvenience or hardships of living in shelters (67%). Other reasons that reflected a voluntary decision for resettlement included the belief that their house was safe enough (8%), having built or found a safe house to live in (6%), to overcome fear of earthquakes (4%), and feeling no longer frightened (4%). Only 8% of the survivors resettled involuntarily for reasons outside their control (e.g. pressure from the family, closure of camps). It is of interest to note that resettlement took place about 4 months after the August 17 earthquake, when the particularly harsh winter of 1999 began to set in. These findings are indeed consistent with the cost-benefit theory of avoidance. What is not clear from these findings, however, is whether the survivors experienced a reduction in their fear and related stress problems for some reason *before* resettlement. The fact that only 4% of the survivors reported a reduction in their fear before resettlement suggests that this is unlikely. This is also supported by a field survey (Şalcıoğlu et al., 2007) that found high levels of fear and avoidance in survivors shortly after resettlement, reducing in time with increased opportunities for exposure to fear cues.

The foregoing account of possible evolutionary factors in fear and avoidance suggests an important role for risk-taking behaviors in natural recovery processes.[1] Evidence indeed supports this point. Several factors counteract avoidance by reinforcing motivation to confront fear. An important factor is the inconvenience of living in the shelters, as noted above. We observed that many survivors whose houses survived the earthquake needed to enter their house at some stage to fetch various items, such as clothes, blankets, electric heaters, etc., even though that meant taking a risk of being caught up in the building during an aftershock. In the Şalcıoğlu (2004) study, among 80 survivors who avoided going back to their house for at least one day after the earthquake, 94% entered their house for the first time within the first month, thus displaying risk-taking behavior at a time when the aftershocks were most frequent. The reasons for doing so were mainly to fetch various essential items, to go to the bathroom, to take a shower, etc. This is yet another finding that supports the cost-benefit theory of avoidance (Kavaliers and Choleris, 2001). The time taken to enter the house for the first time was not associated with the intensity of fear experienced during the initial major shock (the strongest predictor of PTSD), suggesting that the survivors took risks regardless of the severity of their fear and related traumatic stress reactions.

We also observed that some survivors, also motivated by the inconvenience of living away from their homes, made attempts to overcome their fear of earthquakes by entering their homes in a graduated fashion. A common feature of these survivors was a realization of the fact that letting fear take control of their lives and, consequently, having to live in a state of total helplessness and under difficult conditions away from home was too high a price to pay for the relative safety of shelters. Thus, many eventually came to the conclusion "*I cannot continue to live like this. I've got to do something to overcome my fear. I will go back home and take the risk. If it is fated to happen, it will happen anyway*." Such cognitive change did not necessarily reduce fear initially. Faced with intense fear at the first attempt, many could not do this at once and thus employed a graduated approach in moving back to their house, in pretty much the same way it would be prescribed by a therapist delivering CFBT (see Chapter 4). For example, they first spent a couple of hours in their home, cleaning the debris and tidying up things. Feeling more confident, they spent more time in the house next time, drinking tea or coffee, for example. Then they started spending the whole day in the house, going back to the camp for the night. At the next step they started spending one night a week in the house and so on. This continued until they felt comfortable with the idea of staying in the house. The following case vignette illustrates this process.

Case vignette

We met Semra in a café in the epicenter region about 1 month after the earthquake. She and her family had experienced the earthquake in her lower ground flat in a six-story building, which had survived the earthquake with minimal damage. The family had been living in a tent city that had been set up locally for

[1] It is also worth noting in this connection that certain forms of risk-taking behaviors in some trauma survivors with PTSD, such as reckless driving or getting themselves into other dangerous situations (often labelled as 'trauma addiction') might simply be a manifestation of evolutionary processes designed to overcome fear by challenging it. The fact that such behavior is regarded as maladaptive in our modern world does not necessarily rule out this possibility, as in ancient times it might have been adaptive. It would be interesting to examine the impact of such behaviors on PTSD symptoms.

survivors. After a month of living under difficult circumstances in the camp and facing serious limitations in her daily functioning because of pervasive fear and extensive avoidance of a variety of situations, she had finally decided to do something about this problem. When we met her in the café, she was about to go back to her home for the first time after the earthquake and try to overcome her fear by entering her flat. She did not care about the possibility of an aftershock happening while she was in the building and thought it was about time she started taking risks. We asked whether we could accompany her to videotape this process and she agreed. To avoid 'contaminating' the natural self-help process, we refrained from encouraging her or answering any questions that would imply approval of what she was about to do. When we arrived at her place, we waited outside the building, while she made her first attempt to enter the building. Initially, she displayed signs of intense anxiety but then summoned up sufficient courage to go into the building. Half an hour later, she signaled to us from the balcony asking us to come in. When we went in, she was in a state of joy for having accomplished the dreaded task and wanted to share it with us. She repeatedly said "I've done it! I have beaten my fear!" She went around the flat focusing her attention on the plaster cracks on the wall and pieces of broken objects and glass strewn across the floor (fear-evoking cues for many earthquake survivors) in an effort to challenge fear, in exactly the same way that would be prescribed during a therapist-aided exposure session. She said she would come back again and stay longer in her flat and clean up the place. She also said she would invite us for coffee when she was permanently resettled. When we visited her a month later, she was indeed living in her flat with her family, almost completely free of fear and other traumatic stress problems.

Our observations suggest that such risk-taking behavior is the most important factor that reverses the traumatization process and protects against the traumatic effects of earthquakes. In fact, it is such observations that led us to focus on a largely self-help approach in care of disaster survivors (detailed in Chapter 7) that essentially capitalizes on people's naturally existing potential for risk-taking behaviors. Risk-taking behaviors might also be initiated by certain life changes. For example, resettlement in concrete buildings often becomes unavoidable when survivor camps are eventually closed down. Evidence from our studies (Şalcıoğlu et al., 2007; Şalcıoğlu et al., 2008) shows that resettlement is associated with some improvement in traumatic stress symptoms, possibly due to the beneficial effects of exposure to fear cues.

We have also seen survivors who discovered the beneficial effects of exposure after an unintended or unavoidable exposure to a particular feared situation and then went on to use this strategy intentionally to overcome their fear of other situations. Indeed, total avoidance of all earthquake-related cues is practically impossible, because of the pervasive nature of earthquake-related fears that permeate almost every aspect of life. Avoidance of sexual intercourse for fear of being caught unprepared (e.g. naked) in an earthquake, a common problem in earthquake survivors, is a case in point. Social and occupational obligations that necessitate certain activities (e.g. travelling, visiting friends or relatives in their homes, etc.) also render total avoidance difficult. Such occasions provide opportunities for testing risk-taking behaviors, which may then lead to the discovery of exposure as an effective method of overcoming fear. In some cases this strategy, once discovered, might even be used to overcome earthquake-unrelated fears. For example, we have seen a woman who told us that, after having successfully utilized exposure to overcome her fear of earthquakes, she went on to treat her snake phobia by searching for snakes in the region. She eventually found some and came back home free of her phobia.

Another factor in natural recovery from fear that deserves attention is possible immunization against traumatic stress through repeated exposures to earthquakes. In the Şalcıoğlu (2004) study, when the participants were asked (mean 21 months after the earthquake) if they experienced any change in their fear of earthquakes, 60% reported some decrease (slight to very much), 25% no change, and 15% slight to very much increase. This suggests that fear reduction is possible despite continuing earthquakes. Although the mechanisms of such change are not entirely clear, some evidence (reviewed later in this chapter) from our studies suggest that such fear reduction occurs with learning of coping with earthquake tremors and increased sense of control over fear. A regression analysis showed that increased sense of control over aftershocks and fear reduction were associated with prior experiences with earthquake-like shaking sensations (e.g. as in sailors or people living near a busy road used by heavy trucks or a railway bridge). The latter finding is consistent with findings

from stress immunization experiments, which showed that animals (dogs or rats) that were first exposed to a short series of escapable (controllable) shocks prior to receiving a long series of inescapable shocks did not show the learned helplessness deficits (Seligman and Maier, 1967; Williams and Maier, 1977). Interestingly, in the Williams and Maier experiment (1977) these immunization effects occurred even when different kinds of aversive stimuli were used in the immunization and helplessness induction phases (e.g. experience of escaping from cold water immunized rats against the effects of exposure to uncontrollable foot shocks). This might explain why repeated exposures to earthquake-like shaking, which bears only some resemblance to real earthquake tremors, was sufficient in producing a protective effect against fear of real earthquakes. This is indeed one of the findings from our studies that inspired the idea of using an earthquake simulator in enhancing survivors' resilience against the traumatic effects of earthquake tremors (see Chapter 4). Consistent with previous evidence (Başoğlu et al., 1997) pointing to the protective role of psychological preparedness for trauma in torture survivors, this finding also suggests that immunization against traumatic stress is possible in humans through repeated exposures to a traumatic stressor, provided that such experience allows learning of control over the stressor event.

Mechanisms of traumatic stress in earthquake trauma

Earlier in this chapter we described the unpredictable and uncontrollable nature of various earthquake-related stressors and how such stressors lead to various cognitive and behavioral coping responses in survivors. These stressors include the initial major shock, stressor events in the early aftermath of an earthquake, and aftershocks. In this section we review further evidence regarding the role of these stressors in helplessness and hopelessness responses and how these responses relate to traumatic stress reactions, such as PTSD and depression.

In our field surveys (Başoğlu et al., 2002; Başoğlu et al., 2004; Livanou et al., 2002; Şalcıoğlu et al., 2003; Şalcıoğlu et al., 2007) we investigated the role of fear experienced during the initial major shock in the development of traumatic stress reactions, using a 0–4 rating of fear intensity. This measure was validated in our previous studies (Başoğlu et al., 2002; Livanou et al., 2002; Şalcıoğlu et al., 2003) and demonstrated to reflect actual fear during the earthquake, independent of PTSD-related recall bias in retrospective assessment. In all studies this measure was the strongest predictor of PTSD and comorbid depression, explaining more variance in symptoms than all other trauma exposure variables combined, including collapse of house, being trapped under rubble, loss of close ones, and participation in rescue work. Similar findings were reported by other studies in Turkey (Kılıç et al., 2006; Kılıç and Ulusoy, 2003), Greece (Bergiannaki et al., 2003; Livanou et al., 2005), and the United States (Asarnow et al., 1999). These findings support our earlier discussion regarding the intensely frightening nature of earthquakes and their helplessness effects.

Helplessness and hopelessness effects of earthquakes

Şalcıoğlu (2004) examined the cumulative helplessness effects of the initial major earthquake and subsequent aftershocks at mean 21 months post-disaster (range 13–32 months) using an 11-item *Fear and Loss of Control Scale*. Table 1.3 shows the item endorsement rates (i.e. items rated as markedly to very true) in two groups of survivors. The group with 'low' earthquake exposure includes survivors who experienced the earthquakes with no damage to their house, whereas the group with 'high' earthquake exposure includes survivors with additional trauma experiences, such as the collapse of their house or being trapped under rubble.

Both groups had fairly high rates of anticipatory fear and feelings of helplessness that persisted well beyond the cessation of the aftershocks. The groups did not significantly differ in their mean total scale scores, suggesting that additional trauma events did not contribute to fear and helplessness responses in the long term. The fear and loss of control items were strongly intercorrelated, suggesting that anticipatory fear of earthquakes was the primary factor in generalized feelings of helplessness.

The hopelessness effects of earthquakes are evidenced by the fact that 69% of the survivors reported hopelessness (as assessed by the *Traumatic Stress Symptom Checklist*; Başoğlu et al., 2001). Furthermore, the presence of hopelessness was associated with 10-fold increase in risk of major depression (95% CI = 4.8–21.7, $p < 0.001$). These findings were

Table 1.3 Comparison of fear and helplessness responses in survivors with high versus low earthquake exposure (Fear and Loss of Control Scale[1])

	High EE (n = 169) %	Low EE (n = 210) %[2]
Fear responses		
I fear for my life.	37	37
I feel I am in danger.	31	39
I feel my loved ones are in danger.	53	56
I have developed fears that I did not have before.	52	41
I cannot lead my normal life for fear of earthquakes.	46	31**
Helplessness responses		
I feel helpless about future earthquakes.	78	70
I think I cannot change anything in my life.	42	42
I feel I have no control over my life.	45	40
I learned how to cope with aftershocks.	49	57
I can control my fear during the aftershocks.	53	60
I got used to the aftershocks.	62	66

High EE = High earthquake exposure (severe structural damage to home, partial or total collapse, having been trapped under rubble); Low EE = Low earthquake exposure (no severe damage to home).
[1] Item scale: 0 = not at all true, 2 = slightly, 4 = moderately, 6 = markedly, 8 = very true.
[2] Chi-square comparison of endorsement rates (moderately to very true); Bonferroni adjusted p value = 0.005
** p = 0.003.

corroborated in a much larger sample of survivors. In a pooled sample of 4332 survivors from five field surveys, hopelessness was present in 63% of the cases and associated with a 22-fold increase in comorbid depression (95% CI = 16.7–28.4, $p < 0.001$). These findings point to a strong association between hopelessness and depression.

Evidence from experimental work with animals shows that exposure to uncontrollable electric shocks is associated with various associative, motivational, and emotional deficits (Overmier and Seligman, 1967; Seligman and Maier, 1967). Associative deficit involves an impaired ability to detect response-outcome contingencies in future situations where responses do exert control over outcomes (Seligman et al., 1971). Animals initially exposed to uncontrollable shocks later fail to learn to escape or avoid shocks that are potentially controllable in a different situation, because they learn to expect that they have no control over outcomes. The items *I feel I have no control over my life* and *I think I cannot change anything in my life* may reflect such an associative deficit. A motivational deficit involves a reduced incentive to attempt to gain control in future situations resulting from a belief that responses would be ineffective in producing relief. Emotional deficits, on the other hand, include decreased aggressiveness and decreased competitiveness (Rapaport and Maier, 1978; Williams, 1982), loss of appetite and / or weight (Desan et al., 1988; Weiss, 1968), anhedonia (Bowers et al., 1987), and stress induced ulceration (Weiss, 1971a; Weiss, 1971b; Weiss, 1971c; Weiss, 1977). Although the *Fear and Loss of Control Scale* did not specifically tap motivational and emotional deficits, the fact that it correlated highly with *Beck Depression Inventory* (Beck et al., 1979)($r = 0.62$) and symptoms of depressed mood, loss of interest, loss of pleasure, hopelessness, loss of appetite, fatigue, and loss of libido (Pearson correlation coefficients ranging from 0.26 to 0.52, all $p's < 0.001$) was suggestive of such deficits among the survivors.

Consistent with the integrated helplessness / hopelessness model of anxiety and depression (Alloy et al., 1990; Mineka et al., 1998), PTSD and depression were closely associated in all our studies. In the pooled sample of 4332 survivors from five field surveys, 72% of the survivors who had PTSD also had depression. Among the survivors with PTSD in the Şalcıoğlu (2004) study, 53% also had current depression, whereas among those without PTSD, only 15% had depression (odds ratio = 6.4, 95% CI = 4.0–10.4, $p < 0.001$). Thus, the presence of PTSD was associated with more than a 6-fold increase in the risk of depression. In addition, among the survivors with depression, only 14% had 'pure' depression without any comorbid anxiety disorder (including PTSD), whereas among the cases with at least one anxiety disorder 53% had 'pure' anxiety without depression. This finding accords with Alloy and colleagues' (1990) review of the evidence showing that cases of pure depression without concomitant anxiety are rarer than cases of pure anxiety without concomitant depression. This might be explained by the fact that people who are hopeless also perceive that they are helpless but the reverse is not necessarily true (Alloy et al., 1990; Mineka et al., 1998). It is worth noting that

Table 1.4 Correlations among measures of helplessness, avoidance, PTSD, and depression

		1	2	3	4
1	Loss of control during initial shock	–			
2	Anticipatory fear and helplessness	0.25	–		
3	Avoidance behaviors	0.29	0.70	–	
4	PTSD symptoms	0.31	0.64	0.73	–
5	Depression symptoms	0.26	0.62	0.65	0.69

All p's < 0.001.

depression in the Şalcıoğlu (2004) study did not overlap with grief reactions due to bereavement, as the diagnosis of depression ruled out bereavement in the last 2 months as a possible cause.

Associations among helplessness, avoidance, and traumatic stress reactions

The model in Figure 1.1 hypothesizes that helplessness and avoidance are the underlying causal processes in PTSD. Testing of this hypothesis requires prospective studies examining the temporal sequence of these processes. Although correlations based on cross-sectional data do not allow inferences regarding causality, they nevertheless provide some idea about the associations among the variables. Table 1.4 shows the correlations among the measures of helplessness, avoidance, PTSD, and depression in the Şalcıoğlu (2004) study. Helplessness during the initial major shock was measured by a 0–4 assessor-rated scale (0 = completely in control, 4 = total loss of control / completely helpless). Avoidance behaviors were assessed by the *Fear and Avoidance Questionnaire*. This scale measures only avoidance behaviors and not fear, whereas the *Fear and Loss of Control Scale* measures only fear and helplessness but not avoidance behaviors. As such, the two scales do not tap the same constructs. PTSD was assessed using the *Clinician-Administered PTSD Scale* (CAPS; Blake et al., 1990). The items relating to cognitive and behavioral avoidance were omitted in calculation of total CAPS scores to avoid overlapping between the CAPS and the *Fear and Avoidance Questionnaire* in their measurement of avoidance. The correlation between these scales thus reflects the association between avoidance and all other PTSD symptoms. The correlations in Table 1.4 point to strong associations among helplessness, avoidance, PTSD, and depression.

A multiple regression analysis (Table 1.5) was conducted to examine the relative contributions of helplessness and avoidance to PTSD and depression. Background variables were entered at step 1, followed by loss of control during the earthquake at step 2, other trauma exposure variables at step 3, and helplessness and avoidance measures at step 4.

Controlling for all other variables, helplessness and avoidance explained 31% and 27% of the total variance in PTSD and depression symptoms, respectively. Trauma exposure variables accounted for a much smaller portion of the variance in PTSD and depression. In the full regression model avoidance was the strongest predictor of both PTSD and depression, followed by helplessness. Helplessness measured in the long term was a stronger predictor of PTSD than loss of control during the earthquake, possibly reflecting the cumulative impact of exposures to aftershocks during the first year of the disaster. The impact of stressors in the early aftermath of the earthquake (EESS distress score) was a relatively weak predictor of PTSD and did not relate to depression.

To examine the relative contributions of helplessness and avoidance to PTSD, the analysis was repeated twice, first entering helplessness variable at step 3 and the avoidance variable at step 4 and then entering them in reverse order. When the helplessness variable was entered first, it explained 21% of the variance in PTSD scores, while avoidance explained a further 10%. When the avoidance variable was entered first, it explained 28% of the variance, whereas the helplessness variable explained a further 3%. The same analyses using depression score as the dependent variable revealed similar findings. These findings point to the important role of avoidance in earthquake-related PTSD and depression, consistent with findings from other studies (Başoğlu et al., 2001; Pynoos et al., 1993).

The direction of causality between helplessness and avoidance is difficult to ascertain. While avoidance might be regarded as a coping response to helplessness anxiety, this does not explain why blocking avoidance responses to feared situations (e.g. as in exposure treatment) reduce helplessness (see Chapter 6 for discussion of mechanisms of change during treatment). Perhaps there is a two-way interaction between the

Table 1.5 Multiple regression analysis of factors associated with PTSD and depression in earthquake survivors

	PTSD[a]		Depression[b]	
	R^2	Change statistics	R^2	Change statistics
Step 1[c]	0.14	$F_{6,334}$ = 9.4***	0.16	$F_{6,334}$ = 10.2***
Step 2[d]	0.06	$F_{1,333}$ = 23.6***	0.04	$F_{1,333}$ = 16.0***
Step 3[e]	0.09	$F_{5,328}$ = 7.8***	0.05	$F_{5,328}$ = 4.1***
Step 4[f]	0.31	$F_{2,326}$ = 125.2***	0.27	$F_{2,326}$ = 90.5***
Overall model	0.60	$F_{14,326}$ = 34.4***	0.51	$F_{14,326}$ = 24.4***
		β		β
Age		0.05		0.07
Male gender		0.01		0.03
Single marital status		0.00		0.07
Lower education		0.01		0.03
History of past psychiatric illness		–0.01		0.09*
Family history of psychiatric illness		–0.01		0.02
Control during earthquake (0–4)[g]		0.11**		0.07
Damage to home (0–4)[h]		–0.04		0.00
Trapped under rubble		0.08		–0.04
Lost family members		0.05		0.08
Participated in rescue work		0.02		0.01
EESS total distress scores		0.10*		0.04
Fear and Loss of Control Scale score		0.27***		0.28***
Fear and Avoidance Questionnaire score		0.49***		0.44***

[a] Clinician-Administered PTSD Scale total score.
[b] Beck Depression Inventory total score.
[c] Age, gender, education, marital status, personal and family history of psychiatric illness.
[d] Degree of control during the initial major shock.
[e] Extent of damage to home, trapped under rubble, lost family members, participated in rescue work, Exposure to Earthquake Stressors Scale total distress scores.
[f] Fear and Loss of Control Scale and Fear and Avoidance Questionnaire total scores.
[g] 0 = completely in control, 1 = slight loss of control, 2 = marked loss of control, 3 = severe loss of control, 4 = total loss of control / helplessness.
[h] 0 = no damage, 1 = minimal, 2 = moderate (uninhabitable until structural repair), 3 = severe (serious structural damage beyond repair), 4 = total collapse.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

two phenomena, each having reinforcing effects on the other.

Role of catastrophic cognitions in traumatic stress

Cognitive theory of trauma (Ehlers and Clark, 2000) views PTSD as resulting from appraisal of trauma and / or its consequences in a way that produces a sense of serious current threat. In other anxiety disorders catastrophic cognitions are viewed as mediators of fear responses. For example, agoraphobic patients avoid crowded places often for fear of fainting, losing control, or embarrassment. In people with panic disorder various bodily sensations, such as dizziness, chest pain, or shortness of breath, might evoke panic because they are interpreted as signaling an impending heart attack. Thus, when applied to earthquake trauma, cognitive theory would predict a close association between perceived threat to safety arising from anticipated catastrophic consequences of future earthquakes and PTSD. As this hypothesis has treatment

implications, it was tested in the Şalcıoğlu (2004) study by using an *Anticipatory Fears Scale* to obtain anticipatory fear ratings (0 = no fear, 4 = very severe fear) in relation to 14 stressor events during an earthquake. These included (1) exposure to earthquake sensations (e.g. tremors, walls and furniture moving, the rumbling noise from the ground), (2) the devastating impact of earthquake on buildings (e.g. dying under collapsing house, dying and leaving close ones behind, suffering while trapped under rubble, close ones suffering or dying under rubble, being left physically disabled), and (3) catastrophic events, such as being engulfed by the sea, disappearing in large cracks appearing in the ground, or the arrival of judgment day. More than 50% of the survivors had marked to severe fear of catastrophic events and exposure to earthquake sensations, while more than 70% had fear of harm to self and close ones. Fear of catastrophic events reflected in part memory of certain geological events in the region, such as the sinking of part of the coastline into the sea, taking away half of the central town park and some buildings on the coast, and fault line cracks in the land.

A principal components analysis of the scale items yielded three components (66% of the total variance), which represented *fear of earthquake sensations*, *fear of harm to self and close ones*, and *fear of catastrophic events*. These components closely paralleled the item groupings indicated above. To examine the relative contributions of these fears to PTSD symptoms (total CAPS score), a multiple regression analysis was conducted, entering the background variables at step 1, loss of control during the earthquake at step 2, trauma exposure variables at step 3, and the *Anticipatory Fears Scale* component scores at step 4. The variance explained in PTSD symptoms at each step (15%, 6%, 7%, and 8%, respectively) was significant. In the full regression model, significant predictors were fear of earthquake sensations ($\beta = 0.30$, $p < 0.001$), greater distress associated with stressors in the early aftermath of the earthquake (EESS score, $\beta = 0.20$, $p < 0.001$), loss of control during the earthquake ($\beta = 0.19$, $p < 0.001$), and fear of catastrophic events ($\beta = 0.10$, $p < 0.05$). Thus, controlling for other trauma exposure variables, loss of control during the earthquake, and fear of earthquake sensations were more closely associated with traumatic stress than fear of devastating consequences of earthquakes.

Why were fears of possible disastrous consequences of earthquakes not so strongly associated with traumatic stress, given the extent of devastation caused by the earthquake? A possible explanation is that the likely outcomes of an earthquake were not perceived as entirely unpredictable and uncontrollable. As described earlier, people use various cognitive and behavioral strategies to avoid the devastating consequences of earthquakes or reduce anticipatory fear associated with catastrophic thoughts (e.g. by avoiding buildings, strengthening their homes, keeping survival kits at home, moving to a safer location, reliance on safety signals, unrealistic beliefs in safety, etc.). Earthquake tremors, on the other hand, are totally unpredictable and uncontrollable, hence with intensely distressing effects. Furthermore, earthquake tremors have strong fear conditioning effects, which are quite resistant to cognitive control. Indeed, we have seen many examples of irrational fear that cannot be explained by appraisal of threat to safety alone. In survivor camps we frequently observed people displaying intense fear during aftershocks, rushing out of their tents in panic or running around in the field aimlessly. When asked about why they were frightened later, they were often unable to state a plausible reason for their fear and acknowledged the irrational nature of their behavior (e.g. '*I know it is silly but I couldn't help it*'). The irrational nature of fears can also be observed in some people who jump out of windows in panic during even mild aftershocks, breaking limbs or seriously endangering themselves. Another demonstrative example is the fear that survivors experience in an earthquake simulator (see Chapter 4), even when they know that the tremors are not real and that there is no real danger involved.

There is similar evidence from other studies to suggest that earthquakes cause considerable fear and helplessness, even when they do not lead to devastation and casualties. Indeed, the 2000 Hella earthquakes in Iceland – the first major earthquakes occurring in the last 88 years of the country – provided almost experimental evidence in this regard. These two 6.6-magnitude earthquakes occurring 4 days apart caused no structural damage or casualties. Yet, in a study (Bodvarsdottir and Elklit, 2004), 60% of the participants reported fear and helplessness during the tremors and 24% developed PTSD. Fifty-four percent of the participants experienced fear during aftershocks and 44% had anticipatory fear of another large earthquake. Such anticipatory fear was the strongest predictor of PTSD, whereas fear of dying during the earthquake did not relate to PTSD. Interestingly,

none of the control group subjects who did not experience the earthquakes developed PTSD.

Concluding remarks

Perhaps the most striking and informative aspect of our experience with earthquake survivors was observations of collective responses to unpredictable and uncontrollable earthquake stressors. These observations, together with other evidence reviewed in this chapter, lend support to the role of unpredictability and uncontrollability of stressors in the development of fear, helplessness, avoidance, and traumatic stress responses, such as PTSD and depression. Our observations also provide valuable insights into some natural recovery processes in trauma survivors. While fear and avoidance of life-threatening events may have their origins in the evolution of living organisms, evolutionary processes also appear to have gifted us with a capacity for risk-taking behaviors to ensure that our survival is not threatened by such avoidance itself. Repeated exposures to earthquake tremors appear to play a more important role in traumatic stress than direct exposure to the devastating impact of an earthquake. Consistent with preparedness theory (Öhman and Mineka, 2001), fear conditioning effects of earthquakes might reflect a preparedness to acquire fears of situations that have evolutionary significance. These findings have important public health implications in the aftermath of major earthquakes (reviewed in Chapter 7). They also shed light on aspects of earthquake trauma that need focus in treatment and interventions likely to be effective in reducing fear and helplessness.

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