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A Bioecological Model of Mass Trauma: Individual, Community, and Societal Effects

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Abstract

Biopsychosocial consequences of catastrophic events create an ongoing need for research that examines the effects of mass traumas, developing psychosocial interventions, and advocacy to address the needs of affected individuals, systems, and communities. Because it is neither possible nor necessarily desirable to intervene with all touched by disasters at an individual level, a systems approach that allows conceptualization and response at the individual, family, community, and societal levels seems optimal. Many of the models commonly used in counseling psychology to explain coping with difficult events focus on individual effects and do not adequately capture the complex, multisystemic effects of large-scale catastrophic events and disasters. A bioecological model of mass trauma, which provides a conceptual framework for understanding the effects, intervening in the aftermath, addressing prevention, and researching aspects of large-scale disasters, catastrophes, and mass traumas, is presented. Relevant literature and illustrative examples from three categories of mass traumas or catastrophic events (disasters, war, and terrorism or violence) that currently contribute

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to a persistent atmosphere of stress for many are reviewed using the bioecological model. Recommendations for future research are provided.

Keywords

disaster, trauma, bioecological, posttraumatic growth, terrorism

Humans have encountered traumatic events and catastrophes since the beginning of time. Sudden, unexpected, and uncontrollable catastrophic events often contribute to chronic stress and distress and can even lead to immediate or eventual mortality. The direct effects of such events (e.g., mortality, injury) are relatively easy to identify. The more indirect effects (e.g., chronic stress, ineffective coping, loss of social networks, feelings of injustice, and physical illness secondary to stress reactions) are more difficult to assess and are often underestimated (Parker, Barnett, Everly, & Links, 2006). Stress results from both primary and secondary exposure.

Because it is neither possible nor necessarily desirable to intervene with all touched by disasters at an individual level, a comprehensive systems approach that allows conceptualization and response at the individual, family, community, and societal levels seems optimal. Therefore, we believe that an ecosystemic model more accurately provides a conceptual framework that can account for the complexity of trauma. One of the best-known ecosystemic models was originally proposed by Bronfenbrenner (1979) and later expanded to include bioecological elements (Bronfenbrenner & Ceci, 1994). Their expanded model provides an integrated conceptual structure for understanding the effects, intervening in the aftermath, addressing prevention, and researching aspects of large-scale disasters and catastrophes. Another reason we selected a bioecological perspective was that it fits well with the core values of counseling psychology and provides a framework that utilizes our unique skills and perspectives. Specifically, counseling psychology's core values focus on hygieneology, or promoting healthy development across the life span, rather than psychopathology. We also strive to facilitate vocational adjustment, promote social justice, and emphasize multicultural aspects of experiences. These emphases contrast sharply with the bulk of the psychological literature on mass trauma, which focuses on individual effects such as stress and other mental health reactions (e.g., Srinivasa, 2007) or on family disruptions (e.g., Wieling & Mittal, 2008) and has ignored other effects such as vocational disruptions and multicultural and social justice factors in relation to individual, community, and systems outcomes.

Using a bioecological model, we reviewed relevant literature and provide illustrative examples for three categories of mass trauma, exposure events (natural and technological disasters, war, and community violence or terrorism). Most days some aspect of these events affects individuals and communities directly or indirectly and dominates the news, creating a persistent environment of stress for many. A common theme woven through these traumatic events is that traditional resources of the individual, family, and community are either lost or severely compromised. Stressors created by exposure to one mass trauma (e.g., fear, loss of employment, fewer community resources) event may have a “ripple” effect and affect subsequent resources available to manage future exposure to mass traumatic events. Or one type of event (e.g., terrorism) might lead directly or indirectly to another mass trauma event such as war. Our goal was to identify the biopsychosocial effects that extend beyond initial injury and mortality. We focused our literature review on aspects and consequences of mass trauma that are especially relevant to the values, tenets, and skills of counseling psychologists. Specifically, we examined what effect these events have on survivors’ individual psychological resources and well being as well as the way trauma influences key relationships within family, community, and societal networks. Throughout our review we examine the role of multicultural variables and social justice in mass traumas and their eventual effects. Then, we examine the literature on posttraumatic growth to see if under certain circumstances exposure to mass trauma events might provide opportunities for posttraumatic growth. These events in some instances might promote or support resilience. This emphasis on posttraumatic growth is especially relevant for counseling psychologists given that historically most research has focused on the negative or deleterious effects of traumatic events. Finally, we conclude with themes relevant to counseling psychology that emerged from this literature and discuss how these translate into areas for future research. We first describe our bioecological model of mass trauma.

Bioecological Model of Mass Trauma

Bronfenbrenner (1979) initially proposed a model of human development in which an individual is significantly affected by interactions among a number of nested systems. These nested systems form the social context that determines the impact of life events on the individual as well as his or her response to events. Disasters and community-based catastrophes are merely one type of life event that can be understood using an ecological model. Bronfenbrenner and Ceci (1994) expanded the original model adding a *bioecological* element.

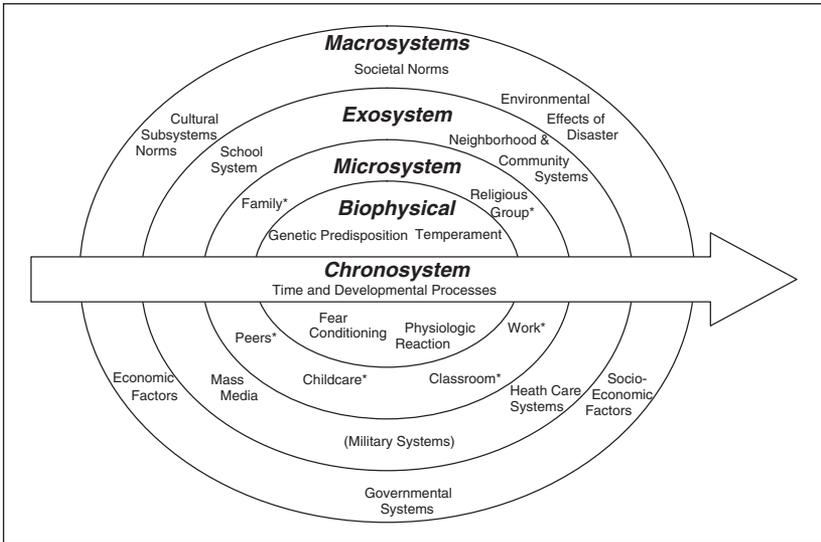


Figure 1. Bioecological model of mass trauma

Mesosystems are the connections between systems, for example, the relationship between family and school.

In this model life transitions and the life course are referred to as chronosystems, and there is an added focus on biomedical factors such as temperament and emotional reactivity. We applied a counseling psychology perspective of this model to large-scale disasters and community-wide catastrophes. Figure 1 displays the hierarchical nature of the nested systems in the bioecological model with the chronosystem transcending the levels across time and development.

Biophysical

This integrative model starts with the biophysical underpinnings of the trauma response. This is consistent with the current concept of interpersonal neurobiology, an interdisciplinary approach where the biological, psychological, and social aspects of human experience are woven into a coherent whole whereby each is understood separately and in connection to each other. Interpersonal neurobiology serves as the fundamental underpinning of all human experience, including trauma (D. Siegel, 2010). Exposure to a

traumatic life event is the genesis of a trauma response. A physical or emotional exposure can trigger a biophysical stress reaction (Pfefferbaum, 1997). Biophysical factors compose the innermost ring of the bioecological model of mass trauma (see Figure 1). Modern stress reaction theory originated with Selye's (1952) "fight or flight" response described by the characteristic behavioral and physiological responses displayed by humans to environmental stressors. Threatening situations such as those encountered in catastrophic events precipitate neurochemical changes in the body that trigger a stress response, including arousal and vigilance (Cohen, Perel, DeBellis, Friedman, & Putnam, 2002). Automatic psychological and physiological reactions to environmental stressors seem to precipitate a "fear conditioning" response (LeDoux, 1996) that is minimally influenced by higher cortical functions (van der Kolk, 2003). These responses appear to be classically conditioned fear reactions to stimuli associated with the trauma (Foa, Zinbarg, & Rothbaum, 1992) and may underlie the reexperiencing symptom cluster of trauma and posttraumatic stress disorder (PTSD), especially nightmares and intrusive memories (Cohen et al., 2002).

The diathesis-stress perspective further influences current biological models of trauma (Flouri, 2005). This perspective suggests certain individuals are predisposed via genetic predisposition or temperament to develop PTSD symptoms after exposure to a disaster or catastrophic event. Although there is an apparent predisposition to stress (Pfefferbaum, 1997), the heritability of PTSD is not yet clear, and estimates suggest that genetics may account for 13.6% (Chantarujikapong et al., 2001) to 30.0% (True & Lyons, 1999) of the variability in PTSD symptomatology. Sack, Clarke, and Seeley (1995) found that children with a parent diagnosed with PTSD were 5 times more likely to develop PTSD themselves. However, the specific genetic and environmental components reflected in this increased vulnerability were unclear.

Although these biophysical elements of trauma response are well documented and important, they must be understood in terms of the social context within which they occur *and* as they unfold across the life span. The additional systems of the bioecological model provide the conceptual framework for those context and developmental variables in trauma response and recovery and are described in the next sections with brief examples to illustrate each system.

Microsystems

Microsystems form the next level of the nested systems (see Figure 1) and include those systems that most directly and immediately shape human

development and responses to life events. Traditional developmental models have focused on the family, friends, neighborhood, and religious groups as core microsystems. For children, the microsystems also include peer groups, day care settings, and school. For adults, the microsystems include the work setting and coworkers. The family is consistently identified as a crucial microsystemic factor affecting trauma response, especially in vulnerable populations (Pfefferbaum, 1997; Pynoos, 1994; L. J. Siegel, 1998; Srinivasa, 2007). Symptom contagion may also occur within peer groups in trauma responses for children, teens, and adults (e.g., Tyano, Iancu, & Solomon, 1996).

Exosystems

The next level (see Figure 1) is the exosystem, which includes those environments that are external to the individual but still influence the person. Exosystems include the more immediate networks or systems that indirectly affect the individual such as neighborhood and community systems, health care systems, school systems, and the mass media. The military system is a salient microsystem for a subset of individuals (e.g., military personnel and their families). The inadequacy of these exosystems in responding to mass trauma has been highlighted in our nation's lack of preparedness in dealing with recent such traumas. However, schools and health care systems, in particular, appear to have heeded the "wake-up" call to improve their role in disaster response (Cook-Cottone, 2004). Although there is a burgeoning body of literature on emergency preparedness to manage mass casualties in the school and health care systems, it is based largely on anecdotal response to previous disasters (Cohen, 2004).

Macrosystems

Microsystems and exosystems operate within the context of the broadest ecosystemic level or the macrosystem. The macrosystem is the larger cultural context (see Figure 1) and includes societal norms, sociopolitical factors, cultural subsystem norms, governmental systems, economic factors, and the environmental effects of the disaster. Social class, race, ethnicity, and gender have all been found to correlate with trauma response (McCann & Pearlman, 1990). The more widespread and significant the devastation from the disaster or catastrophic event, the greater the impact will be on the community. Societal and cultural subsystem norms can either mitigate or hinder adaptive coping and response (de Silva, 1999).

Mesosystems

Originally, mesosystems emphasized the bidirectional influence among the various microsystems (Bronfenbrenner, 1986). They were connections among the different contexts within which any given individual functions. These interactions include aspects such as the relationship of family and school experiences, family and peer relationships, and family and neighbor relationships. In a later revision of his model (Bronfenbrenner & Ceci, 1994), the mesosystem was expanded to include the bidirectional influence successive layers of systems have on one another and the interactions among the hierarchical systemic levels (see Figure 1).

Effects of catastrophes extend beyond the immediate impact on the individual by directly and indirectly affecting social and societal networks. The bidirectional influence of disasters represents the mesosystemic influence of these events. That is, not only do they directly affect the individuals in a community, but also the compounded impact on those individuals reciprocally influences broader social and community systems. For example, existing social services may become strained, social support networks may become fractured as survivors are displaced, and work settings may become inefficient as employees are absent or incapacitated (Erikson, 1994).

Chronosystem and Developmental Processes

Life transitions and life course are referred to as chronosystems in the most recent model (Bronfenbrenner & Ceci, 1994). Chronosystems are those changes that occur over time in a person (developmental processes) that are the result of changes in the environment (see Figure 1). Bronfenbrenner and Ceci's (1994) expanded model includes a bioecological developmental component as well in which they describe proximal processes as the building blocks of human development. Proximal processes are those enduring forms of interaction with the environment that form the basis for all growth and development. Examples include parent-child relationships, peer relationships, play and leisure activities, and school or work. Adaptation to a traumatic life event is expressed through these proximal processes.

Life transitions include both normative and nonnormative events (e.g., disasters). These life events not only directly influence the person but also indirectly influence her or him via the effect they have on family processes and the community in which the events occur. That is, these chronosystem changes occur within multiple ecological contexts, and these contexts

include all the original levels of Bronfenbrenner's (1986) nested systems: microsystems, exosystems, macrosystems, and mesosystems. Therefore, reaction of an individual to a disaster can be fully understood only in the context of both these developmental processes *and* the ecosystems within which she or he functions. For example, mass traumas can lead to environmental changes that affect schools, jobs, and neighborhoods, which in turn affect individuals and families across time.

Furthermore, expression of traits is reciprocally influenced by internal and external developmental processes. In the case of trauma, internal processes are composed of physical, emotional, and cognitive reactions to traumatic events. There appear to be critical life stages in terms of impact in that trauma experienced before the age of 11 results in 3 times greater risk of later PTSD (S. Davidson & Smith, 1990), and the separation of parents before the age of 10 increases vulnerability to subsequent PTSD with later stressors (J. R. Davidson, Hughes, Blazer, & George, 1991).

Application of the Bioecological Model to Three Types of Mass Trauma

Next, we examine three types of mass catastrophes or disasters: natural and technological disasters, war, and terrorism or violence. For each, the bioecological model of mass trauma serves as a guide in selecting literature relevant to counseling psychology to illustrate aspects of the model and to provide examples demonstrating core tenets or values of the field including multiculturalism, vocational issues, a strength-based perspective, and social justice.

Natural and Technological Disasters

We appear to have entered an era in which global disaster response has become the norm (McGuinness, Coady, Perez, Williams, & McIntyre, 2008). Recent global natural disasters including earthquakes, hurricanes, tsunamis, floods, and tornadoes received widespread media coverage, as have technological disasters such as the recent Gulf of Mexico oil spill. We as counseling psychologists experience a pull to offer our expertise and knowledge in response. A wealth of research exists about the impact of disasters on subsequent psychological functioning and on variables affecting both individual and community response to disasters. The bioecological model provides a useful conceptual tool for organizing contemporary research on disasters.

Biophysical. Personal variables can interact with exposure to a disaster to result in varying responses. For example, women experienced more

depressive symptoms after a hurricane than their male counterparts, and social networks seemed to mitigate the adverse impact of psychological distress for women (Haines, Beggs, & Hurlbert, 2008). Prior life experiences such as experience of an earlier trauma exacerbated symptom development in adolescents after hurricane exposure (Garrison et al., 1995). Being female, having learning and psychological difficulties in childhood, exposure to violence in the home, subjective appraisal of life threat, level of anxiety, and adjustment in the postdisaster period along with subsequent social support and traumatic life events led to PTSD in young adults exposed to a shipping disaster as teens as many as 8 years postdisaster (Udwin, Boyle, Yule, Bolton, & O’Ryan, 2000). The strongest predictors of PTSD were predisaster vulnerability in the forms of social, physical, and psychological difficulty 5 months following the disaster. Similarly, children with high versus low levels of trait anxiety were more adversely affected by the Three Mile Island technological disaster (Handford et al., 1986). Mills, Edmondson, and Parks (2007) found that 62% of adults living in a shelter several weeks following Hurricane Katrina met criteria for acute stress disorder. Furthermore, increased life threat, decreased sense of personal control, and experiencing an injury during the hurricane were predictive of higher levels of distress. Similar to the Udwin et al. findings, being female, being Black, and having a prior history of psychological problems were related to greater symptom severity.

Research suggests that the adverse impact of a disaster can be mitigated by trauma and grief focused interventions. Early adolescents with earthquake exposure experienced a reduction in PTSD symptoms and comorbid depression after receiving treatment (Goenjian, et.al., 1997). Furthermore, children and teens with positive competency beliefs, cognitive understanding, and social support demonstrated a capacity for post-traumatic growth following a natural disaster (Cryder, Kilmer, Tedeschi, & Calhoun, 2006).

Microsystems. The majority of existing research at the microsystems level focuses on how family factors influence trauma recovery. Some of those factors were reflected in the Udwin et al. (2000) longitudinal study described above. Goodman and West-Olatunji (2008) even proposed a transgenerational trauma model for response to disasters. Interestingly, these family factors (i.e., separation from parents immediately after a natural disaster, ongoing maternal preoccupation with the event and altered family function postdisaster) were more predictive of children’s symptom development than exposure or loss (McFarlane, 1987). Similarly, elementary-school-aged children reporting high parental conflict postdisaster (in this case Hurricane Andrew) endorsed more PTSD symptoms than those describing low parental conflict

(Wasserstein & LaGreca, 1998). A more recent study with post-Katrina teens revealed that although these adolescents reported more distress and internalizing symptoms in addition to poorer self esteem as compared to nonexposed peers, their families mobilized extrafamilial and community support to cope with the increased familial stress (Vigil & Geary, 2008).

Exosystems. There is some literature to support the impact of disasters within the various described exosystems. Mass media clearly play a role in reaction to mass trauma. Even the mere prediction of a potential disaster (i.e., New Madrid earthquake) without actual exposure led to mild PTSD symptoms (Kiser, Heston, Hickerson, & Millsap, 1993), and media exposure appears to have a stronger effect in younger children (3rd graders) versus older youth (10th graders). For these reasons, minimizing media exposure to both potential and actual disasters may be important, especially with young children who may not have the emotional and cognitive resources to cope with the accompanying thoughts, feelings, and images.

Neighborhood and community systems play a significant role in postdisaster recovery. Roughly 1 in 10 worldwide disaster victims reported psychosocial resource loss that resulted in deficits in social support, social embeddedness, self-efficacy, optimism, and perceived control, factors that mediate the adverse impact of trauma and thus become risk factors for negative coping and outcomes (Norris, Foster, & Weisshar, 2002). Social support is one of the most consistently identified protective factors when coping with mass trauma. For example, social support appeared to reduce PTSD symptoms in elementary-school-aged children at several points (3, 7, and 10 months) post-Hurricane Andrew (La Greca, Silverman, Vernberg, & Prinstein, 1996). Social systems likely promote an individual's capacity to process and integrate experiences of postdisaster trauma by providing a safe context within which to experience thoughts and feelings associated with the mass trauma exposure (Pynoos et al., 1993b). Again there is evidence that community-based intervention can reduce PTSD symptomatology in elementary-school-aged children following natural disaster (i.e., an earthquake in Italy). However, when the breadth of destruction in certain communities resulted in a longer amount of time to reorganize and develop supportive interventions, subsequently there were greater amounts of symptomatology in at-risk children (Galante & Foa, 1986).

School systems are another important exosystem that can promote resiliency and coping in the aftermath of both natural and technological disasters. Following a technological (shipping) disaster, participation in a school-based intervention was associated with less severity and duration of PTSD symptoms in young adults (Udwin et al., 2000). Moderating variables included

adaptive predisaster social, learning, and psychological functioning as well as a lack of depressive symptoms immediately after the disaster. Similarly, school systems often served as a “home base” to foster broad community engagement for disaster responses to Katrina (Dean et al., 2008). In response to Katrina, school professionals often found themselves stretching beyond their prior areas of expertise to facilitate coordinated, community-based interventions and provide direct mental health services to adults and children.

Health care systems are often thought of as the “first line” in disaster response. Currier, King, Wofford, Daniel, and deShazo (2006) reviewed administrative and clinical records after Hurricane Katrina to assess medical facility responsiveness. They noted significant problems and issues needing to be addressed to improve quality of care in the wake of future disasters. One issue was that Red Cross regulations prevented volunteers from providing medical care other than first aid. In a situation with mass casualties there were not enough trained medical personnel to provide adequate coverage. These authors felt there were certain supportive functions their volunteers could have provided but were not allowed. Furthermore, most patients seen at medical facilities along the evacuation route had multiple medical problems, lacked insurance coverage, and had limited ability to access and purchase needed medications. For these reasons, the greatest issue was management of chronic illnesses in evacuees. There were also many difficulties with coordination of care when evacuees were living in shelter situations.

Macrosystems. Recall that macrosystems include the environmental effects of disaster, societal norms, cultural subsystem norms, economic factors, governmental systems, and sociopolitical factors. The severity of survivors’ psychological reaction to trauma is affected by degree of exposure as well as intensity and level of destruction in both natural (e.g., Goenjian, Najarian, & Pynoos, 1994) and technological disasters (e.g., Handford et al., 1986). For example, proximity to a natural disaster (Armenian earthquake) and amount of devastation to the community were the strongest predictors of PTSD symptomatology in children (Pynoos et al., 1993a), and these effects persisted for years following the disaster (Bland, O’Leary, Farinero, Jossa, & Trevisan, 1996). Similar effects related to proximity of the event and amount of devastation to home, belongings, and community were found in adults following an Oklahoma tornado (Middleton, Willner, & Simmons, 2002).

The effect of cultural subsystem norms on response to trauma is less clear. Research has yielded contradictory results in terms of racial differences in response to trauma (de Silva, 1999). It is likely that the cultural subsystem norms interact with a host of other factors to influence the trauma response of

any given individual. For example, elementary-school-aged children who reported high parental conflict postdisaster (Hurricane Andrew) endorsed more PTSD symptoms than those describing low parental conflict. In this study, there was also an *interaction between ethnicity and conflict* with Hispanic children in high-conflict households showing the greatest PTSD symptomatology. Interestingly, there was no interaction between ethnicity and parental conflict in generalized anxiety symptoms (Wasserstein & LaGreca, 1998). These authors believed the differences in PTSD symptomatology may have resulted from Hispanic family norms. Specifically, Hispanic families traditionally rely on multigenerational support more than community-based support. The Black and Caucasian families in the study may have had the support of broader community systems, which moderated the impact of parental conflict.

Another study of teens after Hurricane Andrew highlights the complexity of this issue (Garrison et al., 1995). PTSD symptomatology varied by ethnic group. Hispanic teens displayed the highest incidence of PTSD symptoms, followed by Black and non-Hispanic minorities. White teens demonstrated the lowest incidence of PTSD symptoms. However, no significant difference was found across ethnic teenagers. Overall, there were more similarities than differences in PTSD symptomatology and frequency of symptoms increased significantly with age as opposed to ethnic minority status. Furthermore, in that study parental exposure to the disaster and parental symptomatology were not associated with PTSD in the teens. "Undesirable" life events post-disaster, such as moving and changing schools, seemed to be the critical variable in predicting greater PTSD symptoms. Alternatively, in a study of students exposed to Hurricane Hugo, Black adolescents reported lower symptoms of PTSD than Caucasian teens (Hardin, Weinrich, Weinrich, Hardin, & Garrison, 1994). These results were surprising given that the Black youth reported higher levels of exposure to the hurricane per se, community violence prior to the disaster, and additional nonviolent stressors. Surveying adult responses to Hurricane Katrina, both race (African American) and lower socioeconomic status were related to psychological distress, although it is likely that exposure to the event was significantly greater for these individuals (Elliott & Pais, 2006). These studies highlight the complexity of the nature of cultural subsystem reactions to disasters.

In the absence of a clear understanding of the complex interplay of culture and individual response to disaster, Dean et al. (2008) highlighted the need to actively work to respect the complex and diverse cultural issues of students and families in their school-based response to Hurricane Katrina. Dass-Braileford (2008) noted the need for not only multicultural competence in

disaster response but also an awareness of language barriers (including nonverbal and physical forms of communication). Kinship bonds resulting from racial and cultural affiliation often become more important during traumatic times and relocation may heighten adherence to these religious and subculture norms. These norms also can be a positive lens through which survivors understand and make meaning of the traumatic event. Adaptive recovery is enhanced when counselors working with survivors access these norms via culturally sensitive language and communication styles. Acknowledgment of the collective worldview of many subcultures is often an important component of understanding their experience.

Historically, most disaster research focused on identifying individual, family, and cultural subsystem responses to trauma and looked at broader community systems only as mechanisms for postdisaster service delivery. McGuinness et al. (2008) recommend that in a new era of global disaster response psychologists need to be prepared to provide macrosystem and organizational consultations postdisaster to facilitate the restoration of infrastructure as well as to support implementation of broad-based, community-wide services. He and his colleagues suggested psychologists need to define new roles within governmental systems and serve as advocates for social change. Specific macrosystem-level interventions and population-based initiatives would include promotion of federal–state agency interface, state-level interagency collaboration, and evidence-based disaster responses. However, it is important to recognize that existing sociopolitical and economic difficulties can be exacerbated by the disaster. Subcultures that have a history of institutional and cultural mistrust may be reluctant to access community- and government-provided support postdisaster (Dass-Brailsford, 2008).

Mesosystems. To date there is minimal research addressing mesosystem factors in disasters, and existing studies have focused primarily on school systems. Dean et al. (2008) described several mesosystem issues in their school-based response to Hurricane Katrina. Specifically, the fact that caregivers and school personnel themselves were often struggling with postdisaster coping may have limited their efficacy in response to students and families. Mechanisms for collaboration within and across levels of systems are needed.

Chronosystem and developmental processes. Research on age at time of exposure reveals that trauma exposure affects children regardless of age. Children as young as preschool age who were exposed to a flood had more subsequent emotional and special educational needs than those in the same school who did not experience the flood. The flood exposure effect was a stronger predictor of later emotional and academic deficits than level of poverty (Burke, Borus, Burns, Millstein, & Beasley, 1982). More recent studies of

children and teens exposed to natural disasters indicated that delayed evacuation, fear for one's own or another's life, and feeling extreme panic and fear were significantly correlated with PTSD symptomatology both 2 and 9 months after the disaster (Thienkrua et al., 2006). In addition, older age at time of exposure and fear for one's own or a family member's life correlated significantly with depression. Vulnerable teens exposed to Hurricane Katrina may be at greater risk for development of substance abuse postdisaster given increased life stress and family disorganization that co-occurred with this disaster (Rowe & Liddle, 2008). Similarly, the Mills et al. (2007) study conducted on adults post-Katrina (described in the biophysical section) projected that about 40% of their shelter sample who displayed levels of acute distress would eventually meet PTSD criteria 2 years postdisaster.

Afghanistan and Iraq Wars

In a recent speech, Defense Secretary Robert M. Gates described the United States as being in "an era of persistent conflict" resulting in soldiers becoming physically, socially, and culturally insulated from the rest of the country because the all-volunteer force represents such a small proportion of the population (Gerhart, 2010, p. A3). He further notes that most Americans view the wars as an abstraction that does not affect them personally, which further contributes to the isolation that military members, their families, and their communities experience. Because many counseling psychologists work in Veterans Administration medical centers and see individuals affected by war on their campuses, in their community, and in private practices, understanding the widespread effects of persistent war on individuals and their systems is critical.

Biophysical. This component of the model is evident in the fear and stress reactions and physiological responses found in military members and their families. Negative outcomes for deployed service members have been well documented, with the greatest emphasis on stress-related effects on the mental health of veterans. In a recent RAND Corporation study, Tanielian et al. (2008) showed that one in five service members returning from Iraq or Afghanistan reported symptoms of PTSD or depression. This represents more than 300,000 of the approximately 1.5 million service members who have returned over a 5-year time period. Depression and PTSD rates are higher in reservists versus active-duty troops (25% vs. 17%). Although much of the research focus has been on PTSD, recent studies show that a significant proportion of individuals exposed develop a range of stress-related disorders

beyond PTSD and that the level of exposure (dose response) contributes to a higher prevalence of distress (Srinivasa, 2007).

A new and enduring consequence of recent wars is the high rate of nonfatal traumatic brain injuries (TBIs), primarily because of the effects of roadside bombs. At least 30% of U.S. troops involved in active combat in Iraq and Afghanistan are estimated to have TBIs, which translates to hundreds of thousands individuals. Small portions of these injuries are caused by penetrating wounds and are therefore easy to diagnose. Most remain invisible but can lead to significant neurological and psychological effects including memory loss, short attention span, poor reasoning, headaches, confusion, anxiety, depression, irritability, rage, and impulse control (Glasser, 2007). TBIs in veterans are linked to impairment in personal functioning, leading to interpersonal and occupational difficulties that are discussed later (Glasser, 2007).

Although veterans from previous wars experienced stress reactions such as PTSD as well as depression and physical consequences following deployment, the rate is higher for the Iraq and Afghanistan Wars in terms of both psychological and physical effects ("War's New Wounds," 2007). Although there have been fewer fatalities, those who survived have experienced significantly more psychological and physical effects. One reason is that military personnel are experiencing higher levels of exposure because of more and lengthier deployments than in any other war in which the United States has been involved. For example, combat exposure may be the primary mediator of the impact of length of war deployment on substance abuse rates (Volkow, 2009). In addition, increased exposure translates into a large percentage of service people returning with significant, ongoing problems that affect their family members and community subsystems.

Microsystems. The effect of deployment on partners and other family members is significant, and multiple deployments have greatly increased this type of stress. About 40% of servicemen and servicewomen deployed to war zones are parents, with most having children younger than 12 years of age (Levin, 2008). Deployment can lead to temporary effects for children that include coping with an absent parent and adjusting to new roles and responsibilities as well as the stress of a returning parent (e.g., Mari, Roche, Sudhinaraset, & Blum, 2009). These effects are strongest when children have preexisting psychological issues or there are family risk factors such as violence or substance abuse (e.g., Lincoln, Swift, & Shorteno-Fraser, 2008) or when a parent returns with significant mental health or physical effects or when the family structure is altered as a result of the deployment. These examples show the interaction of biophysical factors with microsystem

factors. From a systems perspective, the number of persons affected by the wars in Afghanistan and Iraq far exceeds the approximately 300,000 service members believed to have PTSD and the hundreds of thousands returning with TBIs.

Microsystem effects include increasing rates of divorce, more behavioral problems in children, greater family violence, and other changes in family functioning. Youth who have at least one parent serving in the military report elevated levels of conduct problems based on clinical norms, although factors such as maternal support are protective (Morris & Age, 2009). Prevalence of reported family problems increases with length of deployment and when deployed family members return diagnosed with PTSD, TBIs, and/or other injuries (Doll & Bowley, 2008). Family adjustment problems and domestic violence are higher in families of veterans with mental health disorders (Sayers, Farrow, Ross, & Oslin, 2009). For example, the majority of the married or cohabiting veterans reported a problem in the past week including feeling like a guest in their home, their children or partner being afraid of them, and physical or verbal altercations.

Even among those U.S. Army officers and their families who are well prepared for the effects of deployment, are better educated, and receive higher pay for their work, higher levels of stress are reflected in divorce rates, which tripled between the years 2001 and 2004 (Doll & Bowley, 2008). This study found that about 20% of married service members currently said they were considering divorce or separation. Stress related to family and home was the most common reason soldiers sought psychological assistance in the war zone, and “failed relationships with spouses or intimate partners” is the highest risk factor for suicide (Levin, 2008, p. 1). Divorce rates for women service members are nearly triple those for men, although the reason for this has not been studied. Factors often cited as creating the greatest strains for relationships—between both partners and children—are extended and multiple deployments that lead to increased stress and mental health problems and family stressors with each deployment.

War injuries disrupt partner and parent–child relationships when a veteran is treated for an acute injury (Levin, 2007). However, little is known about the long-term effects on significant others when soldiers experience long-term and persistent effects from injuries such as amputations and TBIs that affect partner and parenting relationships. Extended and multiple deployments have also been linked to poorer work performance while in the military (Levin, 2008). Less is known about occupational outcomes for veterans once they leave the military.

Other factors that contribute to under- and unemployment include the high rates of PTSD and other psychological problems, TBIs, physical injuries such as amputations, hearing and vision loss, increased substance use, and homelessness (Doll & Bowley, 2008). Disruptions caused by involuntary conscription (recalling “inactive” service members to active duty) likely affect educational and career trajectories as well.

Exosystems. Military communities reflect the effects of wars on schools, neighborhoods, and health care. For example, Killeen, Texas, is home to Fort Hood, an army base. More than 90% of the students at the nearby high school have one or more family members in the military (Block, 2007). Children and teens in military communities may react to disruptions in schedules and in caregivers, may show signs of emotional distress and changes in behaviors, or may have difficulties in school when a parent is deployed (Waldrep, Cozza, & Chun, 2008). Yet active-duty families often live in military communities where more resources are available to address their needs. In contrast, because Reserve or National Guard members are typically activated from civilian jobs and from communities where relatively few others may be deployed, they and their families may find fewer resources to support them.

There is evidence the long durations of the recent wars paired with multiple deployments have intensified the typical effects that military communities experience (Gerhart, 2010). Current military families may struggle with balancing their perceptions of the value of the invasions with the sacrifices they have made. In contrast to other wars such as World War II where the majority of Americans had some involvement either at home or abroad, a small minority of Americans are currently involved in any manner, raising social justice issues in terms of who goes to war and the psychological, social, and economic factors and opportunity costs for military families.

Macrosystems. Enlistment rates provide one way to examine how military service may reflect societal norms, cultural norms, and socioeconomic factors. Department of Defense enlistment rates for various wars show that rates were highest for World War II, where about 12% of the population was in the military. In contrast, only about 0.5% of the population has enlisted for the all-volunteer military serving currently, which, according to Secretary of Defense Robert M. Gates, contributes to the increasing detachment of most Americans from the Iraq and Afghanistan Wars (Gerhart, 2010). This suggests that the vast majority of Americans have little connection to the wars in terms of the active involvement of a family member and subsequently few immediate effects on their families from a social and economic perspective.

Cultural, geographical, and demographic variables play a role in who enlists for the military. Enlistees are predominantly male high school graduates (most in the middle 50% of their high school class, with only about 11% having been in college) disproportionately from southern and rural areas. Research finds three factors associated with voluntary enlistment: lower socioeconomic status, living in an area with a high military presence, and having future (but not current) college aspirations (Kleykamp, 2006). Finally, a propensity to serve is a key factor in enlisting, as is viewing the military as a potential career versus as an occupational step to other careers (Woodruff, Kelty, & Segal, 2006). Propensity to serve is declining, and there are not enough “high-propensity” youth to meet needs (Woodruff et al., 2006). For example, African American enlistee numbers have plummeted in recent years (from 23% to 13%), attributable largely to negative attitudes toward the war and to military service. Resistance to volunteering during wartime is also seen in the Latino or Hispanic community. These findings have implications for counseling psychologists’ research on vocational aspirations and opportunity costs.

Mesosystems. The effect of trauma on individuals reciprocally influences broader family, social, and community systems. For example, existing social services may become strained or ineffective, social support networks may be similarly stressed, and neighborhood, school, and work settings may become less effective in serving as buffers as employees and family members are absent or incapacitated (Erikson, 1994). Perhaps nowhere is this effect more pronounced than in Fort Hood, Texas, home of the nation’s largest army base. In the past year, this base has experienced a mass shooting of 13 people by an army psychiatrist, the highest suicide rate among soldiers in the country, a rate that is nearly 4 times that of the civilian population and includes four suicides in a single recent weekend, and an increase in crime when brigades of soldiers return home (Gerhart, 2010). A growing concern is that characteristics and skills of soldiers that are functional in war may make them dysfunctional once home. Although Fort Hood and military centers have psychological supports in place, these appear to be failing many—in part because of stigma associated with seeking help, concerns about its effect on career advancement, and a lack of confidence that these services can help.

Chronosystem and developmental processes. Because the rate of diagnosed mental health problems increases dramatically with time since deployment, the influence of individual and environmental factors over time on returning military personnel is salient. A study of more than 88,000 service people returning from Iraq showed that mental health referrals increased more than 100% in just a 6-month time period because of stress-related mental health

problems and reports of conflicts with significant others (Milliken, Aucterlonie, & Hoge, 2007). One explanation was that number and length of deployments created unexpected and previously unseen effects. Another explanation is inadequate postwar mental health and health treatment as well as deficient military support to aid in work and other life-role adjustment (Priest & Hull, 2007). Finally, fighting two wars over 10 years is likely creating unprecedented stressors and effects.

Chronosystem effects also may result from deployment exposure. There is mounting evidence that the level of exposure (dose response based on number, frequency, and length of deployments with shorter leave times) relates to a higher prevalence of distress and that this distress often increases post-deployment (Srinivasa, 2007). Finally, studies of World War II veterans suggested that PTSD symptoms persist over many decades and can become exacerbated in the elderly because of life stressors such as retirement and poor health (Kaup, Ruskin, & Nyman, 1994).

Terrorism and Community Violence

Violence is a persistent and salient feature of the world community. War is probably the most extreme and obviously devastating form of violence; however, terrorism and community violence also generate mass trauma. The recent spate of shootings at schools and community institutions are other examples of violence that can result in mass trauma. When viewed with a bioecological lens, school violence affects not only the students and school personnel who directly experience the trauma but also multiple levels of systems where these individuals are embedded. Cicchetti and Lynch (1993) proposed an ecological/transactional model of the multisystemic and developmental effects of violence on child development that is similar to the bioecological model of mass trauma presented here. Community violence in the form of terrorism has been a fact of life for many years in other countries. But it was not until 9/11 that terrorism became a more salient aspect of daily life in the United States.

Biophysical. Prevalence rates of PTSD after the 9/11 attacks ranged from 7.5% to 40.0% depending on proximity to the disaster site, and depressive symptoms were present in up to 60.0% of those close to the city (Miller & Heldring, 2004). These rates are comparable to the 30.7% found in survivors of terrorist attacks in France over a period of 5 years (Verger et al., 2004) and the roughly 50.0% found following the 1995 Oklahoma City bombing in the United States (North et al., 1999). Intrusive thoughts and hyperarousal were the most commonly reported symptoms (Miller & Heldring, 2004). In a

longitudinal study of a national sample of Jews and Arabs exposed to repeated terrorist attacks (Hobfoll et al., 2009), only 22% reported having few or no trauma or depressive symptoms, 13% initially had symptoms that dissipated over time, 54% had chronic distress, and 10% had delayed stress reactions. Even preschool-aged children demonstrated emotional and behavioral reactions to the 9/11 terrorist attacks in the form of chronic sleep disruption, fear reactions, new fears, increased clinging, and separation anxiety that persisted for up to 8 months after the event (Klein, Devoe, Miranda-Julian, & Linas, 2009).

Gender, age, and ethnicity were not related to the development of post-traumatic symptoms following a sniper attack on an elementary school playground in California (Nader, Pynoos, Fairbanks, & Fredrick, 1990). Proximity and exposure to the shooting correlated most with a number of symptoms. However, Miller and Heldring's (2004) more recent review of the literature on the 9/11 attacks was more consistent with the general trauma literature. Their review suggested that gender, age, and ethnicity were important predictors of stress reactions. Most studies found higher prevalence rates of PTSD symptoms in women and girls as compared to males. School-aged children appeared to be at greater risk for PTSD symptomatology than adults, and non-White ethnic groups experienced greater psychological distress than Whites. Furthermore, both adults and youth in divorced or separated families had higher rates of stress symptoms as compared to those in married or coupled families. Their review revealed additional factors related to trauma response. Specifically, survivors experienced higher rates of stress-related medical leave as well as increased health problems and somatic complaints than the general population. Prior physical or psychological illness and general life stress were both related to symptom severity. Loss of friends, family, possessions, or job also was associated with more severe postattack symptoms.

Microsystems. Several microsystem factors have been explored in the context of terrorism or mass trauma as the result of community violence. Anxiety in the home environment was the best predictor of PTSD in Palestinian children living in East Jerusalem and the West Bank who were repeatedly exposed to terrorism (Khamis, 2005). Furthermore, there is some evidence that community violence results in a lack of trust in peer relationships in urban adolescent girls with compounded community trauma (Horowitz, Weine, & Jekel, 1995). In addition, inner-city youth with community violence exposure are more likely to exhibit aggressive behavior or depression within 1 year postexposure (Bell & Jenkins, 1993).

A post-9/11 longitudinal survey revealed that adaptive coping responses included seeking social support (Stein et al., 2004). Dass-Brailsford (2008) suggested agencies and professionals working with mass trauma survivors

may need to expand their definition of family, especially with certain minority groups, to include neighbors and friends. Almost three fourths of those surveyed reported turning to friends and family for advice in addition to engaging in risk-reduction strategies. For example, many were being cautious about situations such as flying and avoiding large public activities. These postterror behaviors have been termed the “new normal” (North & Pfefferbaum, 2002), in which initial shock and trauma subside but there remains a sense of persistent and widespread distress that adversely affects adaptive social functioning.

Exosystem. As with other forms of mass trauma the mass media play a significant role in terrorism and community violence. After 9/11, nearly half of the adults in a random survey indirectly exposed via the media reported one or more symptoms of PTSD in the days after the event and reported being worried about their own or their loved ones’ safety. Just more than one third said their children had one or more stress symptoms. The majority, 84%, had talked to their children about the attacks, and one third restricted television viewing, particularly for children, because they believed viewing the events was traumatic (Schuster, et al., 2001). Elementary-school-aged children with media exposure (i.e., television, internet & print) were surveyed 1 month after the attack. More exposure, especially when it included images of death or injury in conjunction with fear a loved one might have died, resulted in greater PTSD symptoms. Older children and boys had greater media exposure and more trauma-specific PTSD symptoms. Interestingly, there was no benefit to seeing heroic or “positive” images (Saylor, Cowart, Lipovsky, Jackson, & Finch, 2003). Comer, Furr, Beidas, Weiner, and Kendall (2008) found parents could use modeling, media literacy, and reinforcement to minimize the impact of terror-trauma media on their children. High television exposure, without direct exposure to the Oklahoma City bombing, resulted in PTSD symptoms weeks after the bombing (Pfefferbaum, 2001) and 2 years later (Pfefferbaum et al., 2000). This media exposure effect was exacerbated by indirect interpersonal exposure such as having a friend who knew someone injured or killed.

Macrosystems. Exposure to terrorism and violence may have a reciprocal impact on societal and cultural subsystem norms. For example, urban teenage girls exposed to high and repetitive levels of community violence expressed “fatalistic” and “apocalyptic” perceptions of long-term prospects for a successful life and longevity for African Americans in general (Horowitz et al., 1995). These girls had prolonged and repeated exposure to multiple types of community-based violence (drive-by shootings and gang violence) that was akin to living in a war zone. It is noteworthy that repeatedly hearing about

violence without direct contact resulted in more PTSD symptomatology in these young women and higher feelings of vulnerability than exposure to an isolated traumatic incident. Similarly, Richman, Cloninger, and Rospenda (2008) found indirect exposure to the events of 9/11 exacerbated psychological distress, alcohol abuse, and negative terror belief or fears for those in Midwestern communities already experiencing macro-level stressors (i.e., job loss and poverty).

It appears the relationship between community cohesion and trauma reactions is influenced by level of exposure. High community cohesion appears to lead to more PTSD symptoms in communities with low to moderate exposure to the traumatic event, whereas high cohesion seems to mitigate PTSD in communities with high trauma exposure (Somer et al., 2008). These authors suggested high community cohesion with low to moderate exposure may precipitate a contagion-like effect in reaction to the trauma, whereas the increased support that accompanies cohesion in the high exposure group is a protective factor. This interpretation is consistent with the findings of Littleton, Axson, and Grills-Taquechel (2009) after the Virginia Tech shootings. These authors found that students with higher social support experienced greater resource gain following the trauma. Specifically, they were better able to access resources than those students with low social support.

Community-wide mistrust of government and management systems after 9/11 exacerbated issues with providing disaster relief in already disenfranchised (i.e., minority and immigrant) populations (Steury, Spencer, & Parkinson, 2004). As with other types of mass trauma, trust and communication must be developed with these groups before events occur to promote civic engagement in all social groups and to facilitate successful liaisons between these groups and governmental agencies or management systems. Nevertheless, 60% of a broad national sample reported social benefits including increased prosocial behavior, religiousness, and political engagement as a result of 9/11 (Poulin, Silver, Gil-Rivas, Holman, & McIntosh, 2009).

Mesosystem. There is little research specifically focusing on mesosystem factors, but a few examples of research related to these issues follow. There may be an interaction between teachers' PTSD symptomatology and the classroom behavior of their students following mass trauma. For example, after the Los Angeles riots, just fewer than half of school teachers reported moderate to severe symptoms of PTSD. Concurrently, the classroom behavior of children in this school system became more aggressive, noisy, and oppositional. There were more peer relationship problems following the riots as well (Stuber, Nader, & Pynoos, 1997). Although teacher symptomatology

was not the sole reason for these classroom behavior changes, it likely contributed to the difficulties.

More recently and broadly, Steury and colleagues (2004) suggested that we draw on concepts from social capital theory as a framework for intervention after terrorism, in this case 9/11. Social capital theory (Cullen & Whiteford, 2001, as cited in Steury et al., 2004) refers to the bonding that occurs between groups with common social frameworks, such as family, neighbors, friends, and demographic groups. These authors recommended that interventions following terrorism and violence utilize previously existing groups to promote recovery.

Chronosystems and developmental processes. One of the earliest studied school violence events was the Chowchilla school bus incident in California. Children and teens were kidnapped and buried alive in an underground trailer. Many children displayed regression in previously acquired developmental skills after exposure to this traumatic event (Terr, 1981).

Furthermore, there appeared to be developmental trends in the type of reaction to school shootings. Younger children displayed more avoidance symptoms and spontaneous intrusive memories and affect, whereas older children had more reexperiencing and arousal symptoms and stronger distress in reaction to specific triggers (Schwartz & Kowalski, 1991). When school shootings occur in communities that already experience high levels of violence, affected children and teens may experience what Horowitz and her colleagues (1995) refer to as “compounded community trauma.” These vulnerable teens’ exposure to mass trauma disrupts normal relationship development processes, as they are unable to experience the basic interpersonal trust necessary to develop meaningful and caring relationships. These teens also are at risk for high rates of teen pregnancy, and when they do have a child they describe their relationship with the baby as one that will provide safety, connection, and trust that is absent in their other relationships. This reaction has implications not only for these teens’ interpersonal relationship development but also for their academic and vocational development.

Posttraumatic Growth or Benefit Finding After a Mass Trauma

Our review of the literature suggests much more is known about trauma exposure leading to posttraumatic stress than to posttraumatic growth (PTG). PTG, or benefit finding, represents one way to view positive coping and outcomes that may result from mass traumas and catastrophes. Few studies

exist that examine PTG in individuals exposed to the three broad mass traumas discussed in this article. These are discussed, followed by a brief overview of PTG, as it may be relevant to understanding growth following a mass catastrophe.

Several studies examined PTG following the September 11, 2001, attacks. A longitudinal, Internet-based study measured perceived PTG as well as trauma symptoms, cognitions, and coping strategies at two points in time following 9/11 (Butler et al., 2005). At Time 1 (about 9 weeks post-9/11), PTG was associated with higher trauma symptoms, more denial, and more positive changes in worldview. Although PTG was associated with higher trauma symptoms, this relationship was curvilinear, as those who reported intermediate levels of symptoms reported the highest levels of growth. At Time 2 (about 6 months post-9/11), PTG was highly correlated with levels at Time 1 but had declined over time. At Time 2, higher reported PTG was associated with decreases in trauma symptoms (from Time 1) and increases in positive worldview and positive reframing. Although this study used a convenience sample and covered only a 6-month time period, the results are interesting as they suggest that level of trauma symptoms reflected at the individual, bio-physical level as well as cognitive and coping variables grounded in micro- and macrosystemic norms play important roles in benefit finding. For example, Koenig (2006) found support for the positive impact of religious organizations in providing emotional and spiritual care to facilitate social support and recovery postdisaster.

A longitudinal study of individuals working and living in Manhattan on 9/11 examined whether respondents reported benefit finding and, if so, what types of benefits were reported. Nearly half of respondents reported finding benefits from the event, with these benefits coded by raters into three broad categories: finding new meaning in life, serving others (usually through volunteer activities, although not always in areas related to 9/11), and reconnecting with significant others (Hoffman et al., 2004). It is noteworthy the majority of the respondents reported negative effects of 9/11 that persisted and were reflected across the chronosystems of time and development. The most common effects appear to be grounded in biophysical reactions and included negative sensory perceptions (auditory, visual, smell), intrusive thoughts or images of the actual event, fear of flying and of airplanes, and distrust of individuals who appeared to be Middle Eastern. These findings suggest that even with positive benefits, there are often negative effects and that finding benefit coexisted with high levels of distress in many of the participants.

Because findings have been inconsistent across various trauma contexts, Hobfoll and colleagues (2007) addressed the question of whether psychological distress arising from terror exposure was reduced or increased by PTG. They utilized samples from both New York City and Israel, and PTG was related to greater psychological distress as well as to more support for retaliatory violence. Positive benefit in PTG was found only when individuals were able to translate their cognitions into what the researchers termed action-focused growth. This suggests the importance of translating growth thoughts into actual growth to find benefit in certain mass trauma contexts. Micro-, exo-, and macrosystemic factors appear to all play a role in an individual's action potential. Again, certain family, religious, and cultural subsystem norms likely influence a person's ability to translate growth cognitions into action-focused growth, and this coping approach may be easier to do with some types of mass traumas than with others. For example, Steury et al. (2004) noted volunteerism posttrauma seems to mitigate adverse response to trauma, yet lower socioeconomic groups might not have the resources to engage in and benefit from these activities. These studies suggest PTG may result from the bidirectional impact of the individual on other systems—a mesosystem effect.

Although PTG and its correlates have been identified in adults, few studies have examined this construct in children and teens. PTG attributed to September 11 was examined among middle school adolescents residing in California (Milam, Ritt-Olson, Tan, Unger, & Nezami, 2005). About one third of the participants reported positive changes post-9/11 in macrosystemic factors such as life priorities, relationships, and spirituality. Factors positively related to PTG included optimism, religious identification, and discussion of the attacks, whereas alcohol use, depression, and anxiety were inversely associated with PTG.

Few studies have examined PTG in veterans. In a study of combat-exposed veterans, both overall PTG as well as several subcategories were examined (Maguen, Vogt, King, King, & Litz, 2006). A greater appreciation of life was predicted by higher military status, an exosystemic factor, and by greater perceived threat. Consistent with other literature on other mass traumas, PTG was predicted by microsystemic social support postdeployment.

Several broad questions might guide future research on PTG in persons exposed to mass traumas. First, does PTG reflect actual positive change or rather the illusion of gains or benefits (e.g., Frazier et al., 2009; Zoellner, Rabe, Karl, & Maercker, 2008)? For example, Frazier et al. (2009) found actual growth was related to decreased distress, whereas perceived growth

was linked to increased distress in an undergraduate population. However, a 2-month time span was utilized, and what is unknown is whether and under what circumstances illusory PTG may follow a trajectory where it may initially serve one function (e.g., denial to manage a threatening situation) but later lead to transformative change (e.g., Tedeschi, Calhoun, & Cann, 2007).

Another broad question is, what are the correlates of PTG? A meta-analytic review examining the role of optimism, social support, and coping strategies found that positive appraisal coping and religious coping produced the largest effect sizes; social support coping, optimism, and spirituality produced moderate effects; and acceptance coping showed the smallest effects (Prati & Pietrantonio, 2009). Other studies found that social support coping and gender (being female; e.g., Swickert & Hittner, 2009) and anger (Park, Aldwin, Fenster, & Snyder, 2008) correlated with higher levels of PTG whereas negative coping and depression correlated with stress rather than growth (Park et al., 2008). Similar findings, especially in terms of the relationship to seeking social support, were found in many of the studies cited in the current article.

Finally, researchers are seeking to identify moderators and mediators of constructive PTG. For example, seeking social support coping was found to be a partial mediator of the relationship between gender and PTG (Swickert & Hittner, 2009), age and gender were found to moderate certain types of coping such as religious coping (Prati & Pietrantonio, 2009), and PTSD severity was found to moderate PTG (Zoellner et al., 2008). This latter finding is noteworthy because other researchers have suggested PTG may be more likely to occur when trauma survivors show initial distress *and* attach lasting significance of the trauma for their lives. Many bioecological factors, including mesosystem variables, may contribute to both the initial distress and the enduring meaning of a mass trauma to individuals and their systems and therefore to the likelihood of utilizing PTG as a constructive and positive change.

Summary and Implications

The wide-ranging effect of major disasters and catastrophes underscores the need for knowledge about risk and recovery from trauma for individuals, systems, and communities. Merrill, Thomsen, Sinclair, Gold, and Milner (2001) described a three-generation view of sexual abuse research that parallels similar trends reflected in the mass trauma literature. The first generation of research identified the negative sequelae associated with trauma exposure including behavioral, psychological, and interpersonal difficulties. Although

this research identified individual factors associated with poor adjustment following trauma exposure, there was no way to identify a causal pathway between mass trauma exposure and these outcomes because of the methodologies used. Most existing research has focused narrowly on the effects of mass trauma on individuals at a single point in time after the traumatic event. This research has tended to use convenience samples following a specific catastrophic event, and the vast majority of the research has used a cross-sectional design that did not allow for identification of causal relationships between short- and long-term outcomes. Furthermore, the literature has typically focused narrowly on the more serious individual psychological consequences such as PTSD. In addition to PTSD, catastrophes are related to the development of mood disorders such as anxiety and depression. Although understanding deleterious psychological outcomes of disasters is important, research is needed to identify predictors of resilience to stressors as well as a better understanding of how biological, psychological, social, and environmental factors interact and mediate posttrauma outcomes.

The second generation of research worked to identify those factors affecting risk and resiliency in response to mass trauma. This generation began to expand beyond the biophysical level to include exploration of specific systemic factors that interacted with biophysical and psychological factors to affect trauma response. Although this generation of research has been useful in highlighting the complex nature of trauma response, it has not yet been able to capture the nature of the interaction among factors at the various systemic levels. The third generation of research should utilize process models in which causal pathways among the multisystemic factors affecting trauma response and trauma outcomes are identified and empirically assessed. We propose that the prior research conceptualized in terms of the bioecological model described herein serves as the theoretical basis for making predictions about causal pathways that then could be tested empirically. When viewed with a bioecological lens, several themes emerged from the literature on mass trauma and have implications for both research and practice. These themes are reviewed below, and suggestions for future research guided by the core values of counseling psychology are discussed within each section.

Biophysical

Exposure, physical and emotional, to a traumatic event and repeated exposure to multiple traumatic events emerged as a key factor in contributing to long-term and ongoing posttrauma symptomatology in the form of stress reactions, depression, and anxiety (Pfefferbaum, 1997). This outcome following

exposure was found across populations and types of mass trauma. Individual characteristics such as temperament, coping skills, and emotional regulation appear to play an important role in moderating the effect of mass trauma. Furthermore, there is limited research that evaluates aspects of an individual's pretrauma level of functioning that predict risk and resiliency following exposure. It is important to assess aspects of individual functioning that promote adaptive coping in the aftermath of mass trauma. There was very little research on why some individuals rebound following a traumatic event, and some even perceive themselves to have grown from the experience (i.e., Tedeschi et al., 2007). Research on the myriad other systemic variables may answer these questions about individual risk and resiliency.

Microsystems

Social support was the most consistently identified protective factor in terms of moderating response to trauma. Mass trauma affects most major aspects of social function including family, career, school, peer, and cultural networks. Yet these areas have received little research focus, with one exception, the family and child literature, although even this literature has tended to focus on family and to a lesser extent on school variables that are related to individual functioning following the traumatic event. By and large, other systems, for example the workplace, religious institutions, and community agencies, have not been examined in terms of their role in influencing outcomes following mass trauma.

Social advocacy, to promote and support microsystemic and macro-systemic interventions that foster social support, is needed. Furthermore, evidence-based research should guide and inform both prevention and intervention programming across the levels of systems. Recent guidelines for mass trauma intervention generated by a group of internationally recognized experts on trauma (Hobfoll et al., 2007) were an attempt to synthesize what is currently known in the mass trauma literature to inform "best practices." These authors noted there was not sufficient research yet to generate an evidence-based consensus for the guidelines. However, there were some basic trends in the literature that could be used to guide interventions at both individual and community levels, including fostering a sense of safety, calmness, self- and community-efficacy, connectedness, and hope. These trends need to be studied in more detail to operationalize how they might be applied to psychosocial interventions. For example, Landau, Mittal, and Wieling (2008) have developed a multisystemic model for intervention that they call the linking human systems approach. This approach uses an ecological perspective as the basis for a

comprehensive, multisystemic approach to intervention following mass trauma. Their research is an initial attempt to provide outcome research that is congruent with the strength-based approach of counseling psychology and is a good beginning toward evidence-based practice research using a bioecological model for intervention.

Finally, there is a dearth of research on the impact of mass trauma on work and career. The natural disaster and war literature demonstrates mass trauma can disrupt the development of a work identity and the trajectory of a career. Because school experiences are precursors to work experiences, the sections of this article on natural disasters and terrorism and violence presented many studies identifying the importance of schools during times of mass trauma and the negative effects when these systems were disrupted. Counseling psychologists should lead the way in exploring the effects of mass trauma on work environments and careers.

Exosystems

The literature clearly supports the impact of media exposure in mass trauma response both for those directly exposed to trauma and for secondary stress reactions in those exposed to the trauma only via the media. This phenomenon needs further research. In particular, developmental factors in media influence and factors moderating the negative impact of media across the life span should be investigated. Furthermore, counseling psychologists could serve as consultants and advocates to inform public policy in terms of guidelines for media exposure following traumatic events. Social advocacy is also needed to inform public health policy, especially in terms of promoting integrative systems of care among medical, school, community, and religious groups and governmental agencies. Another theme we identified was the disproportionate effect of these three types of traumas at the community level. Defining communities as either geographical or social entities, research is needed on how to make communities more resilient as individual benefits from interventions are difficult to maintain if the community is overstressed.

Macrosystems

Many studies have investigated the relationship between ethnic group and culture and response to mass trauma. However, the research to date has yielded no clear patterns (de Silva, 1999). This lack of consistency may be because most research to date has failed to distinguish emic versus etic multicultural factors. Most probably, cultural subsystem norms interact with

other factors to influence an individual's trauma response. Furthermore, although females (across developmental continuum) consistently demonstrate more psychopathology in response to trauma (Norris et al., 2002), the causative factors underlying these reactions are not clear. It is likely that as with culture, complex multisystemic influences are at play. Understanding the relationship of gender and culture in stress reactions following mass trauma requires complex conceptual process models such as the bioecological model proposed herein to identify and understand the myriad systemic factors that interact to form the basis of any given individual's response to mass trauma. Counseling psychologists could clearly lead the way in this research, and findings from the body of literature we generate could then be used to inform public policy in responses to mass trauma.

Another broad macrosystemic theme was that the resources individuals, systems, and communities have can mitigate exposure and response to mass trauma. Perhaps one of the most salient resources was socioeconomic status, which includes educational attainment, job skills, and financial assets (Steuery et al., 2004). Socioeconomic status appears to often buffer the effects of mass trauma. For example, persons with more financial resources were more likely to evacuate during a weather-related disaster such as a hurricane, to have the resources to rebuild their lives, and to have access to resources such as psychotherapy and medical care after a mass trauma.

Mesosystems

The research to date on mesosystemic influences is extremely limited, and mesosystemic issues are described in a conceptual rather than empirical manner (i.e., Dean et al., 2008). There was only one study that appeared to examine mesosystemic relationships in trauma response following mass trauma (Stuber, et al., 1997). This study explored the association between teachers' PTSD symptomatology and classroom behavior of their students following mass trauma as well as peer relationship problems following the Los Angeles riots. The bioecological model highlights the fact that catastrophes have effects that extend beyond the immediate impact on the individual as they directly and indirectly affect social and societal networks.

It is in the area of mesosystems that counseling psychology could make significant contributions to the understanding of mass trauma response and recovery. The bioecological model provides a conceptual framework to guide this research by identifying mediating and moderating variables among the systems. For example, we could contribute our expertise in the area of work and career development to investigations of the interface between work or

school and family factors following traumatic events. Similarly, we could further understanding about how social and cultural subgroup factors interact with other systems to either facilitate or hinder trauma recovery. We could also work to ensure multicultural competence in first responders and other professionals or agencies that interact with individuals and groups following mass traumas.

Chronosystems and Developmental Processes

Chronosystem influences might better be viewed through the lens of recovery rather than of resilience shown at the time of the event. Thus, it may be important to identify those elements within each of the bioecological systems that promote recovery in the wake of mass trauma. Trauma recovery appears to be most affected by social support, especially in the immediate microsystems. Women, children, and minorities are typically more vulnerable populations, especially in the context of macrosystems, and adult males demonstrate better outcomes and recovery. Furthermore, there does seem to be emerging evidence for the construct of community resilience in avoiding or mitigating the effects of mass trauma. It will be important to investigate those meso- and exosystemic factors contributing to community resilience. A theme across all of these studies was that some mass catastrophes have such devastating effects that immediate and ongoing exposure to the disaster and its aftermath may tax even the most resilient individual and community. In those cases, it will be important to intervene also at macrosystemic levels over time to ameliorate the devastating effects of these types of mass trauma.

Longitudinal studies are needed to investigate the developmental processes that influence risk and resiliency. To date, most research has focused on risk factors. For example, chronosystem factors likely contribute to military personnel returning from Iraq actually getting worse over time once they return. Counseling psychology's core values suggest we emphasize resiliency and adaptive coping following mass trauma. Future chronosystem research might examine the relationship of PTG to resilience. Although many individuals report PTG when experiencing major crises, it is important to note it is not expected to occur whenever an individual experiences a bad event. Rather, it is hypothesized to occur when core beliefs are challenged. It can coexist with stress symptoms, making it difficult to discern beneficial growth over time, suggesting the importance of longitudinal studies to adequately study this construct (Tedeschi et al., 2007). Furthermore, there is great inconsistency in the manner in which this construct is measured, and the same is true for resiliency. An important question is whether people report

PTG as a means of coping when they lack the resilience to manage the psychosocial consequences of a mass trauma (see Westphal & Bonanno, 2007).

Furthermore, there is evidence of developmental differences in the types of coping methods utilized (Thienkrua et al., 2006). Research to better understand the interplay between developmental stage at time of exposure and subsequent coping would provide a developmental model for intervention. Finally, as previously stated in the biophysical section, the majority of the research indicates exposure is a primary determinant of adverse impact. Although we may not be able to control exposure, an increased understanding of the interaction of developmental stage at time of exposure as well as factors affecting risk and resiliency factors could be used to help mitigate the adverse impact of trauma exposure and promote healthy life-long development.

In sum, much remains to be learned about the bioecological effects of large-scale disasters and catastrophes on individuals, systems, and communities. In moving beyond a focus on the individual, researchers face substantive and interesting challenges. The bioecological model of mass trauma can provide a framework for research and practice. Furthermore, it is congruent with core values of counseling psychology because it incorporates a developmental perspective, including career development, and an emphasis on maximizing growth potential by enhancing both individual and systemic strengths. Moreover, this model allows for an examination of multicultural variables. It can be used to promote not only posttraumatic growth and resiliency in the wake of mass trauma but also social justice by informing public policy.

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