A MULTILEVEL APPROACH TO SOCIAL SUPPORT AS A KEY DETERMINANT OF POST-TRAUMATIC STRESS DISORDER ONSET AND TRAJECTORIES AFTER A MASS TRAUMATIC EVENT

by

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Abstract

A MULTILEVEL APPROACH TO SOCIAL SUPPORT AS A KEY DETERMINANT OF POST-TRAUMATIC STRESS DISORDER ONSET AND TRAJECTORIES AFTER A MASS TRAUMATIC EVENT

by

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Types of social support and the meaning attributed to each type vary across individuals, contexts and time. Widely studied across disciplines is the role of social support during periods of distress. Factors at multiple levels of social support (individual, network, and community) are often important predictors of psychopathology, including post-traumatic stress disorder (PTSD), in the aftermath of such events. The trajectory of PTSD after traumatic event exposure, in turn, varies markedly between individuals, differing with regards to onset, symptom patterns, recurrence, comorbidity, response to intervention, and recovery.

Recent literature has considered how each of these levels may influence the development and persistence of PTSD. This dissertation is an attempt to bring together substantively overlapping, but disciplinarily siloed discussions related to how individual, network, and community levels of social support contribute to mental health functioning in the aftermath of a population-level disaster. The data demonstrate a clear association between individual (and not network) level social support covariates and PTSD onset as well as resilience/recovery and chronic PTSD. Delayed onset PTSD, on the other hand, was equally associated with network-level variables. Community level variables were excluded from the analyses as they did not show a robust pattern of association with PTSD trajectories in

preliminary analyses. Given these findings, it is arguable that the history of defining social support simply as one's actual network or how one perceives of his/her network fails to capture the relational nature of social support as an exchange of resources between two or more unique individuals that can prove beneficial or harmful to the functioning of the recipient. Moreover, this paper argues that individual level social support, which includes individual characteristics and behaviors, is central to the successful exchange of resources (interpersonal and professional) and subsequently to health.

Keywords: social support, posttraumatic stress disorder, resources, distress, disaster, trauma

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Chapter 1: Introduction

There is an abundance of literature from a range of disciplines and perspectives on the role of social support during periods of high distress. Social support is a broad term that encapsulates "actual supportive acts that are exchanged between individuals," "personality like factors...[influencing] how an individual views the likelihood that someone is supportive," and community resources that promote individual and community resilience (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; Uchino, 2004). This dissertation will focus on a number of conceptual frameworks of social support at the individual, network, and community levels. It will explore the interrelations between characteristics of social support across these levels in the aftermath of trauma. Lastly, this study will further our understanding of how a multilevel framework can jointly shape post-traumatic stress disorder (PTSD) onset and trajectory.

PTSD is one of the most prevalent pathologies following the experience of traumatic events. However the trajectory of PTSD after an exposure to a traumatic event varies markedly among individuals, differing with regards to onset, symptom patterns, recurrence, comorbidity, response to intervention, and recovery. Individual and contextual characteristics at multiple levels (individual, network, and community) are important predictors of psychopathology in the aftermath of traumatic events. Specifically, recent literature has considered how each of these

levels may influence the development and persistence of PTSD symptoms and diagnosis. However, our understanding of how these levels jointly influence the evolution of PTSD needs further examination.

There is remarkable overlap among the core social support theories across the individual, network, and community levels, despite the use of a distinct vocabulary and inadequate discourse between perspectives and across disciplines. Taken together, these theories suggest that social support may serve a protective and/or constraining function in the experience of trauma and PTSD recovery. By bringing to light commonalities across individual, network, and community levels, this paper aims to establish a dialogue defining the individual, network, and community levels as layers of social support that jointly either reinforce the healthy individual and/or enhance his vulnerability to PTSD after traumatic event exposure.

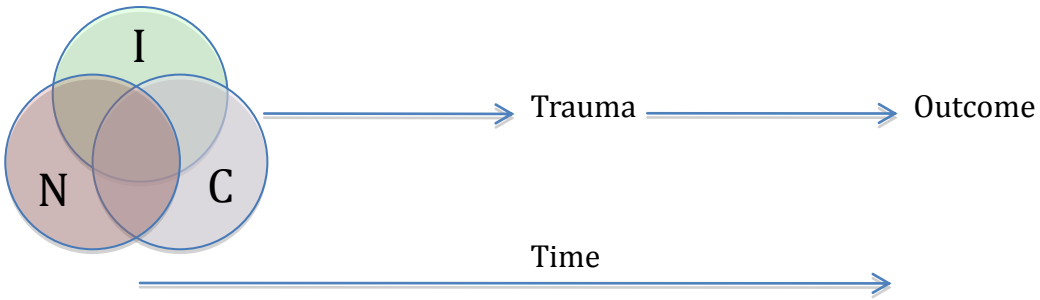
Part One: Individual, Network, and Community Level Social Support

Humans are social beings. From birth relationships play a central role in an individual's survival and development. In addition, Stryker & Burke (2000) argue that meaningful social relationships help to shape an individual's sense of self (Uchino, 2004). Literature across disciplines documents the myriad ways that social support serves as a resource for individuals from infancy through adulthood, providing such supports as nurturance, financial assistance, companionship, and emotional counsel. Given the life-long nature of social support and the many forms that social support can take, understanding the complexity of social support for individuals in distress is critical. For example, Lepore (2001) recognizes the protective nature of social support as intertwined with the potential that it can become constraining if the type of

support provided is not what the receiver desires. This notion mirrors psychoanalytic theory of attunement, which suggests that the caretaker shares with the infant the experience of the infant's internal states, ensuring intersubjective relatedness (Stern, 1985).

The following sections outline the central frameworks of social support in the post trauma context across the individual, network, and community levels, highlighting the commonalities in the core ideas, despite differences in terminology and discipline. Understanding these similarities is critical to integrating different realms of discourse and will enable us to more fully understand the experience of a person as an individual, a member of a network, and as one who lives within a particular community, in the face of trauma.

Figure 1.
Social Support System



*Interconnectedness of social supports at the individual (I), network (N), and community (C) levels and their role in shaping mental health outcomes (PTSD) in the context of trauma

Individual level: Located at the heart of the network and community. An individual's early experiences as a participant in intimate relationships form a blueprint for his future relationships, how he perceives of support, seeks out resources, and values social support

systems (Berkman, Glass, Brissette, & Seeman, 2000; Sarason, Sarason, & Shearin, 1986; Siegel, 1999; Stern, 2010). As a result, social support at the individual level is arguably the foundation for how we come to understand what constitutes successful supports at the network and community levels (van der Kolk, 2007). Schwarzer & Knoll (2007) draw a distinction between an individual's perception of his social support resources and the supports that the individual actually receives during a time of need (Uchino, 2004). The former suggests that there is a subjective nature to an individual's social supports. For example, experiences in early relationships and/or different personality attributes may modify an individual's expectation of and the accessibility of social support resources. Neuroticism and self-motivation to seek help are personality attributes shown to mediate the availability of resources and the types of supports provided (Quartana, Schmaus, & Zakowski, 2005; Uchino, 2004). For the purposes of this paper social support at the individual level represents the ways that the individual contributes to his social support system. Three illustrations of this are an individual's expectation of the types of social support resources available, the role that social support can have in his coping with distress, and his openness to receiving resources during times of distress.

The importance of individual level social support within a post-trauma context shifts over time and may vary depending on the type of trauma experienced. This section will focus specifically on the role of individual level social supports in the context of population-level trauma (e.g. natural, technological, and human-made disasters), which produce a unique individual as well as communal experience.

Population level trauma is an extraordinary phenomenon that disrupts the lives of everyone. It has the potential to shatter expectations about oneself and the world or to disrupt life temporarily or for the long-term (Janoff-Bulman, 1999). Yet, despite shared experiences, such events cause greater damage to the inner psyche and functioning of some individuals than to others. Understanding more deeply how social support promotes health may provide a deeper understanding of what goes awry for those individuals who experience considerable and/or chronic dysfunction after traumatic event exposure.

Several theories of early development, each placing a different emphasis on the role of the caretaker or contextual factors, offer useful frameworks for understanding individual level social supports. Winnicott (1965) stressed the importance of an integrated self as an outcome of consistent experiences of attunement and reliable availability of the caretaker. Winnicott recognizes the importance of the child's ability to adapt her needs to imperfect forms of support (Tuber, 2008). He differentiates a *true* self from a *false* self; elegantly describing how early experiences as an infant within one's primary relationships shapes the integration of the self, deemed as healthy, or creates a split between the true and false self, leaving the infant vulnerable to dysfunction (Winnicott, 1965). Winnicott argues that the presence of the "good enough mother," who is reliably available to the infant and provides enough moments of positive attunement, permits the infant to completely integrate his whole self (Winnicott, 1965). This sequence of events leaves the infant creative, able to play, and adaptable to new contexts (Tuber, 2008). On the other hand, the infant experiences unpredictable failures in attunement as dangerous. The infant responds by suppressing those aspects of his *true* self that lead to such interactions and putting forth a *false* self, which matches the caretaker's

intensity, timing, and shape of behavior (Stern, 1985). This split may have lasting consequences, such as limiting the infant's experience of feeling real and reducing his ability to creatively and flexibly adapt to new situations (Tuber, 2008).

As a determinant of individual level social supports, Winnicott's understanding of the infant's development of self is critical. The flexibility or rigidity of the infant's self serves as a template for understanding variations in how individuals' adapt to new contexts and different types of support. The more adaptable the individual is, the more one can adjust to all types of social support, experiencing them as protective. Whereas, individuals for whom new contexts are seen as dangerous conjure up aspects of the false self making them more likely to find unwanted or unfamiliar types of social support constraining. Ultimately using the false self may or may not be harmful. Winnicott (1949) captures the influence that the receiver of social support has on how imperfect supports will be perceived when he states:

> The need for a good environment, which is absolute at first, rapidly becomes relative…If [the mother] is good enough the infant becomes able to allow for her deficiencies by mental activity…[turning] the good-enough environment into a perfect environment, that is to say turns relative failure into adaptive success. What releases the mother from her need to be near-perfect is the infant's understanding (Winnicott, 1949, pp. 245).

Winnicott, in essence characterizes *good enough* care taking as a two-way process for the healthy individual. Provided an initial environment in which to thrive, the infant develops the capacity to adapt to unwanted care giving. This flexibility allows the infant to find a greater variety of care protective and beneficial. Without this flexibility, the individual is more apt to experiencing imperfect care as constraining and harmful.

The variability in early relationships results in an individual developing multiple ways of relating to others and consequently an increased tolerance of sporadic and momentary

imperfection. Stern (2010) describes the direct relationship between early social experiences and the individual's sense of self as flexible when he writes, "in early life the infant is different with different people and even different with the same person depending on the context. Moreover with each significant change the infant requires a particular pattern of feeling, thinking, behaving, and being" (p.50). Stern further argues that as these patterns of being are repeated they are "internalized as self states" (Stern, 2010, p. 50). The easier the transition between such self states, the more one can adapt to the unpredictable demands of daily life. In addition, as Winnicott might claim, fluidity across states allows the individual to utilize resources from a number of "specialized mind[s]," resulting in the ability to playfully welcome each new context.

Overlapping the development of the self, is the infant's need to establish intimate relationships (Bowlby, 1969; Fonagy, 1996). Attachment theory proposed that the attachment figure ideally serves as a *secure base* allowing the infant to confidently explore the world around him. In addition, Bowlby wrote that these relationships "[provide] an external ring of psychological protection which maintains the child's metabolism in a stable state similar to internal homeostasis mechanism of blood pressure and temperature control" (Bowlby as cited by Berkman et al., 2000, p. 844). In this one sentence, Bowlby highlights the potentially protective nature that human relationships serve when they are founded on a secure attachment. They teach an infant to self soothe, a critical ingredient in an individual's later capacity for emotion regulation. Moreover, the security provided through positive attachment relationships gives children a framework for seeking and finding comfort in themselves and other people throughout childhood and adulthood (van der Kolk, 2007).

Fonagy (1996) further conceived of these early relationships as templates for future social relationships (Berkman et al., 2000). Consequently the quality of these early relationships plays a critical role in the stability and security that an individual associates with their social support relationships as an adult (Sarason et al., 1986). Of note, although each individual may have a modal attachment style that is more or less dominant, there are inevitable vulnerabilities in attachment, including that everyone has a range of attachment experiences rather than one monolithic style.

The development of the self and attachment style may serve as a prototype for future experiences of the self and relationships. Consequently, they affect a person's perception of types of social support – as perfect, acceptable, or imperfect – and the amount of flexibility she has to find value in all forms of social support, including imperfect support. In addition, understanding the developmental roots of how an individual approaches new relationships and contexts under *normal* conditions provides insight into the complexity of social support during periods of high distress.

No one is invulnerable to potentially traumatic events. In fact most people suffer mild disruptions to their normal functioning; how intense or chronic the dysfunction is in part determined by these early templates of themselves as social beings. Winnicott may argue that having an integrated self before the trauma would make an individual more robust and adaptable to a post-trauma context. Complementing Winnicott's focus on the integrated self, Bromberg (1999) emphasizes the presence of multiple self-states, but suggests that it is the seamless transition from one self-state to another, which is experienced by the individual as integration, that serves as the bedrock of resilience (Bromberg, 1999; Howell, 2005; Stern,

2010). On the other hand, Fonagy (1996), amongst others, believes that being able to perceive of social supports as supportive and protective is due to early secure attachment. Consequently it is plausible that an individual's willingness and desire to seek out intimate relationships or professional services in times of distress is influenced by a dynamic relationship between the individual's sense of self and the subjective perception of the availability and meaning of social support.

Individual level social support, as a category, is not limited to the individual's internalized patterns of relating that are established in early development. A number of personality attributes may also foster or deter positive social support through mediating how one behaves or expresses affect during periods of distress. Schwarzer & Knoll (2007) argue that an individual's effort to overcome unfavorable contexts increases the motivation of his supportive relations to provide additional emotional and material resources. On the contrary, individuals who are passive in the face of hardship negatively influence the availability of social supports (Schwarzwer & Knoll, 2007). Quartana et al. (2005) identified patterns of affect expression that similarly can reduce the availability of social supports to an individual or modify the type of support that is available. For example, Quartana et al. (2005) suggests that neurotic behavior after exposure to a traumatic event, defined as a consistent expression of fear or insecurity, may limit the amount that one's supportive relations are willing to be available. Therefore, similar to how successful social support is a two way process, social constraints can derive from the receiver as well as the giver.

Network level: Surrounding the individual with emotional and practical resources. The individual is surrounded by a web of social relationships that comprise his social network (Berkman et al., 2000). Social support necessitates there be a provider and recipient of emotional and practical resources. Ensuring, however, that this exchange is positive for the recipient is dependent on the provider's support *matching* the needs of the recipient at that point in time. Family resilience literature, for example, has found that following the experience of trauma, children tend to "do better when there is a fit between the temperament, personality, and needs of the children and the style of parenting they receive" (Black & Lobo, 2008, p.40). In spite of the risk of misattunement, the dominant belief among trauma researchers continues to be that social support during periods of high distress or after exposure to a potentially traumatic event is critical to an individual's ability to cope with the trauma and be resilient (Brewin, Andrews, & Valentine, 2000; Galea et al, 2008; Norris et al., 2002).

Individual and network levels of social support help to define and explain the complexity of the exchange of social support, especially during periods of distress. Understanding social supports at the individual level allows us to identify attributes of the recipient that may affect his availability to positively appraise those resources provided. On the other hand, network level social support refers specifically to actual resources that are provided during defined time frames (Schwarzer & Knoll, 2007; Uchino, 2004). An individual's network can represent a spectrum of relationships ranging from family to friends, co-workers, and acquaintances. Without defining the type of relationship, *network* for our purposes will refer to those connections from which an individual may receive emotional and physical comfort, emotional or monetary reassurance, and physical safety after witnessing a potentially traumatic event

(PTE). Similar to the subjective and objective quality of social supports, those who the recipient perceives as within his network and who actually provides social support may not match perfectly.

Social support is consistently earmarked as central to recovery from a potentially traumatic event. An individual's perception of having a social support system is protective against suffering from dysfunction after a PTE (Schwarzer & Knoll, 2007; Uchino, 2004). Similarly, social support actually provided to a distressed individual, independent of the type of supports, is often characterized as minimizing the risk of chronic dysfunction. Schwarzer and Knoll (2007) suggest that it is during periods of distress that "social support might reveal its beneficial effect on health and emotions" by "[buffering] the negative impact of stressful events" (p. 245). This process, which moderates the negative consequences of distress, is called the stress-buffering effect. In optimal circumstances, the potential for social support to serve a stress-buffering function is great. However, because social support is dependent on a dynamic two-way process between the provider and receiver it is probable that within the post trauma context the support provided may be experienced by the recipient as constraining as often as it is deemed supportive.

Social support as constraining is not a new concept; however it has not become as popular as the notion of social support as protective. Within sociology social constraint is characterized as the individual's behaviors, feelings, and thoughts being molded by what an external other, such as society, deems as appropriate behaviors, feelings, and thoughts (Durkheim, 1982 as cited by Lepore & Revenson, 2007). Psychology adopts the essence of this paradigm, with slight modifications, namely that social support as constraining is the product of

the type of social support provided and the recipient's perception of the support, deeming it a two-way process (Lepore & Revenson, 2007). For example, if a woman is in need of speaking about an experienced trauma, and her partner is tired of such conversations, she may feel constrained (and not supported) despite other types of social support her partner is providing. Moreover the types of social support that an individual may experience as supportive or constraining may shift regularly depending on his general context and the presence of other coping strategies. The relationship between individual and network level social support becomes apparent in the conceptualization of social support as a two way process between the recipient and provider, specifically when conceiving of social supports as constraining or enhancing the process of coping with distress.

There are many similarities between how Lepore & Revenson (2007) discuss the nature of social constraints and the earlier discussion of social support at the individual level. Both frameworks for understanding the complexity of social supports, despite originating from different perspectives and using different terminology, suggest that successful social support, defined as social supports that are perceived as protective and supportive, require attunement between the provider and the recipient as to the recipients needs. Therefore, similar to an infant's need for a *good enough* caretaker that reinforces the infant's *true* self, an adult, especially one under distress, needs *good enough* social supports that validate his experience. Attunement, for an infant or an adult, provides a holding environment that permits the individual to process his experience in the ways he deems necessary, making him more robust.

Hobfoll's model of stress, conservation of resources (COR), extends the discussion of social support at the network level to looking at the individual's instinct to protect his resources

when threatened (Hobfoll, 1989). Hobfoll's (1989) theory of COR references material (e.g. housing) and human (e.g. friend) resources. Social support, as defined in this dissertation is limited to interpersonal and not material resources. The effect of the loss of material or monetary resources, such as income, is a stressor and in the context of this study is a confounding variable. Of note, however, sudden unemployment can result in the loss of a social support network and daily social engagement aside from creating financial hardship. Using our earlier discussion of an individual's perception of relationships and his ability to adapt to new contexts sheds light on the effect of losing a resource despite all attempts to conserve. For example, an individual's capacity to modify his expectations of social support may translate into his ability to mourn the loss of a friend, while also substituting the supports he might have received and expected from that friend with the resources that another friend may offer. Without this capacity the loss of an integral member of a supportive network, an additional stressor to the primary trauma, may significantly impede successful coping.

Achieving a positive social support exchange within a context where only the recipient is under distress is already difficult. And yet, social support networks are further complicated when a group is affected by a potentially traumatic event. Family resilience theory highlights the complexities that may exist when multiple members of a social support network are struggling to cope with distress (Walsh, 2007; Black & Lobo 2008). Any attempt to provide supportive resources to a member of an affected group must appreciate the individual differences that may exist in how the group members process and cope with crisis (Walsh, 2007). Network members (such as friends, co-workers, family) who fail to account for unique responses to trauma when providing social support risk causing further distress to the

individual or group if their choice of supportive resources is perceived to be constraining by others.

The ability of a network group to reorganize and redefine roles in the aftermath of a potentially traumatic event helps to "restore order, safety and stability," each ingredients of resilience (Walsh, 2007, p. 213). Black & Lobo (2008) differentiate between a family's tendency to be flexible or rigid as determining its capacity to rebound in the face of a threatening event. For example, they argue that flexibility allows for reorganization of the network members in order to maintain continuity and security, while rigidity leads to dysfunction due to failure to adapt to the post trauma context. Although family resilience theory is specific to the response of a family to a threatening event, the capacity for flexible reorganization of roles mirrors the individual's potential for adapting to his expectations and needs in such a way that even undesirable care giving can be supportive. Therefore central to social supports being experienced as protective and positive, at the individual and network level is the capacity of the individual or network members to be flexible and adaptive to new and adverse contexts.

Community level: The stage for individual and network development. Unlike individual and network level social support, social support at the community level is more amorphous. A community is comprised of environments and institutional structures that have the capacity to promote individual and community resilience. For example, cohesive neighborhoods, religious institutions, and schools have the potential to create secure, predictable, and supportive environments that strengthen an individual or network responding to potentially traumatic experiences. In this way, community level social support may provide the structural

underpinnings for social capital defined as “resources inherent in social relationships” such as mutual trust, reciprocity, and community participation (Black & Lobo 2008; Lepore & Revenson, 2006; Norris et al., 2008). Communities that provide social support promote reciprocity, expressed as social networks giving back to their community in a number of ways. On a community level, individuals or social networks that feel supported and protected by their environment may support local businesses and agencies or become involved in community gardens or volunteer at soup kitchens. In addition, social capital may foster a sense of social cohesion, resulting in supportive interactions between networks and individuals where information, services, and resources are shared (Black & Lobo 2008).

Before we can explore community level social support in the aftermath of population level trauma, which has the potential to disrupt a community’s institutional structures and consequently delivery pathways for support, we should first highlight briefly how social supports at the community level may be experienced under normal circumstances. Lepore & Revenson (2006) provide two scenarios that illustrate how a community’s institutions can offer social support to an individual or members of a network who are adjusting to a post-trauma context. Community-based recreation centers can offer children who lost a parent an environment for physical activity, social connections, and a feeling of belonging to a community. Specifically, mentorship programs can provide children with emotional support and an outlet for talking about the loss. In addition, religious settings can offer families a community for mourning loss as well as monetary or material resources, such as food, clothing, and shelter. Similar across these examples is the ability of community to provide a stable and

secure environment in which to foster social connections, a feeling of belonging, and at the same time, individual agency.

Population level disasters can challenge the community's ability to offer a stable and secure environment and consequently to provide additional resources and proxy supports to those at the individual and network levels. Norris and colleagues (2008) describe how population level disasters can disrupt an individual's or community's "place attachment," defined as an "emotional connection to one's neighborhood or city, somewhat apart from connections to the specific people who live there." Kaniasty & Norris (1996) argue that individual and network needs after large scale disasters may overwhelm support providers resulting in both the rapid exhaustion of material resources and of an individual's or group's stamina for providing support (Kaniasty & Norris, 1996; Uchino, 2004). Institutional structures may also struggle to maintain a supportive environment if their physical structure or managing team are threatened by the disaster.

The capacity of a community to support its members is not equal across all societies. In fact Norris et al. (2008) and Galea, Hadley, & Rudenstine (2006) describe the differential risk of communities to large-scale disasters. Traditionally we think of economic security of a community as corresponding to the availability of resources and the security of long-term support provided by public and private institutions, such as schools, hospitals, and religious institutions. The collective approach to recovery in the aftermath of disaster can also provide significant social support independent of community wealth. While there is no recipe for a community that fosters the development of social relationships and supports across and between individuals and networks, several studies have identified the ability to adapt to new

contexts as central to a community's ongoing provision of social support and resources in the face of trauma and community disruption (Norris et al., 2008). Black & Lobo (2008) argue that the provision of social support by the community is associated with positive outcomes in its social networks and individuals, such as perseverance and companionship.

Patterns in population behavior following population level trauma is another lens for conceptualizing community level social support. Two sociological theories of population behavior are helpful frameworks for thinking about dimensions of community level social support. Organizational theory, originally defined by Thompson and Hawkes (1962), has been adapted to address how institutions engage during disasters and how they influence and become a part of emerging patterns of population behaviors and support (Dynes, 1970; Kreps, 1993; Schooler, 2001). There are four dominant types of organizations that operate during disasters to enhance the collective recovery. They include: established organizations (e.g. public work departments and hospitals); expanding organizations (e.g. Red Cross and local defense agencies); extending organizations (e.g. churches and local businesses); and emergent organizations (e.g. search and rescue groups and coordination groups) (Dynes, 1970; Kreps, 1993; Schooler, 2001). Many organizations following the September 11, 2001 terrorist attacks in New York City offered supportive services to individuals coping with the event. Project Liberty and September Space are two such examples. Project Liberty, established after the September 11 attacks, offered free mental health services to New York City residents. Similarly, September Space provides a range of support services integrating mental health with holistic support for individuals affected by the September 11th attacks. These organizations, and others, created new social support networks as well as an underlying feeling of community

support for the recipients. The ranging existence and accessibility of these organizations across and within communities affected by large-scale disasters will affect how a community recovers and the degree of support its inhabitants (individuals and networks) perceive their community is providing.

Smelser's (1962) collective behavior theory suggests that an uncommon event (such as a population level disaster like the September 11, 2001 terrorist attacks) has the potential to bring individuals together across networks to seek help and coordinate a response (Smelser, 1962; Turner, 1987). Rudenstine & Galea (2011) illustrate Smelser's argument in their five-stage model of population behavior. In particular, stage two, argues that in the aftermath of a population-level disaster there is a dominant movement towards population preservation, which includes (i) altruistic behaviors in the form of resources to those immediately affected, (ii) actions to maintain the safety of those not directly affected by the disaster, and (iii) actions to prevent the effects of the hazard form affecting the wider population.

Related, Turner (1987) argues that collective behavior may only arise within conducive structural and social conditions. One dimension of collective behavior that applies to population level trauma is emergent norm theory. It suggests that collective behavior emerges and subsequently defines future social behaviors within the community's new post disaster context (Aguirre, 1998; Turner, 1987). These new collective behaviors may in turn enhance the availability of community level social supports. Stage five, *renormalization,* of Rudenstine & Galea's (2011) population behavior model, echoes and extends Turner's theory in suggesting that through renormalization behaviors that emerge during the aftermath of the disaster are absorbed into the daily fabric of life of those affected by these events. Moreover,

renormalization concludes once the new modes of behavior, initiated by the disaster experience, become dominant.

Population level disasters, such as a Hurricane Katrina in 2005 or the 2003 Madrid train bombings, have the potential to disrupt community level social supports. Norris et al. (2008) highlight the importance of a community to remain flexible and adaptive to the new context in order to maintain resilience. In addition, Lepore & Revenson (2006) suggest that a resilient community is "able to weather the storm as a unit," because it is malleable enough to maintain or modify relationships between and across social networks, governing policies, and the community's collective identity. Moreover, similar to Winnicott's *good enough mother*, the good enough community is able to adapt to the post disaster context which enables it to provide a resilient environment to individuals and networks despite a wide variety of characteristics such as poor or wealthy and individualistic or collective. Appreciating the differences between an individual, a network, and a community, it remains important to recognize that the concept of flexibility is recycled repeatedly as a central component to successful recovery, especially within the context of the provision and receipt of social support following trauma. As such, having flexibility – at an individual, network, and community level – is a marker for sustainable health and resilience.

Part Two: Social Support as a Variable in PTSD Onset and Trajectories

Social supports, as defined at the individual, network, and community levels, are significant and complex variables in one's experience of trauma. Many studies have

documented the risk of low social support on negative health outcomes (including PTSD) following traumatic events. For example, Littleton, Grills-Taquechel, Axsom (2009) found resource loss to predict PTSD at two and six months after the Virginia Tech Shooting. Similarly, Ruggiero, Amstadter, Acierno, Kilpatrick, Resnick, Tracy, & Galea (2009) found that low social support was associated with poor self-rated health ($p = .003$) in a sample of adults who experienced the 2004 Florida hurricanes (Charley, Fraces, Ivan, and Jeanne). Galea, Tracy, Norris, and Coffey (2008) also found that low social support was associated with developing PTSD two months after Hurricane Katrina. Despite the seemingly universal finding that social support is critical to maintaining good health following a trauma, there remains little data to help us dissect the complexities of social support, specifically at the individual, network, and community levels.

Additionally, there is a burgeoning literature on how social support is associated with the three PTSD symptom clusters: a) experiencing the trauma, such as recurring dreams or invasive thoughts; b) avoidance of thoughts or actions that recall the trauma; and c) hyperarousal (APA, 2000; Cordova, Cunningham, Carlson, & Andrykowski, 2001; Devine, Parker, Fouladi, & Cohen, 2003; Greenberg, 1995; Lapore & Revenson, 2007). Social support is an important resource for expression of feelings. When a person is denied this outlet, Cordova et al. (2001) found higher rates of invasive thoughts. Moreover, a person's perception that he is without social supports or the experience of social constraints may lead an individual to actively avoid thinking about the trauma, which subsequently can elicit invasive thoughts (Cordova, Cunningham, Carlson, et al., 2001; Devine, Parker, Fouladi, & Cohen, 2003; Lapore & Revenson, 2007).

Few empirical studies explore the complexity of how social support across the individual, network, and community levels and their its association with PTSD onset and trajectories. In providing a glimpse into how PTSD as an outcome of trauma is currently framed in the literature, the following discussion will set the stage for the aims guiding the proposed secondary analyses of a four wave longitudinal dataset of New York City residents following the September 11, 2001 Terrorist Attacks of the World Trade Center.

Thinking about "Trauma." Trauma is commonly defined as an extraordinary event, in which the "person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (APA, 2000). This dissertation focuses specifically on population level traumas since they provide a shared context in which to explore variables that influence an individual's mental health outcome. Many researchers define natural (e.g. hurricane), technological (e.g. nuclear plant leak), and human-made (e.g. terrorist attacks) disasters as traumatic events. However the individual's experience of such events as a trauma is dictated by a combination of unique characteristics of the individual. For example, an individual's experience of a potentially traumatic event (PTE), how one evaluates, copes, and adapts to the stressor, is dictated by a multitude of variables, such as demographics, personality attributes, personal and family history, and context (Freud, 1926).

The human capacity to withstand traumatic event experiences has been well documented (Bonnano et al., 2006; Ozer et al., 2003). Ozer et al. (2003) reported that approximately 50-60% of the US adult population has been exposed to a traumatic stress, but

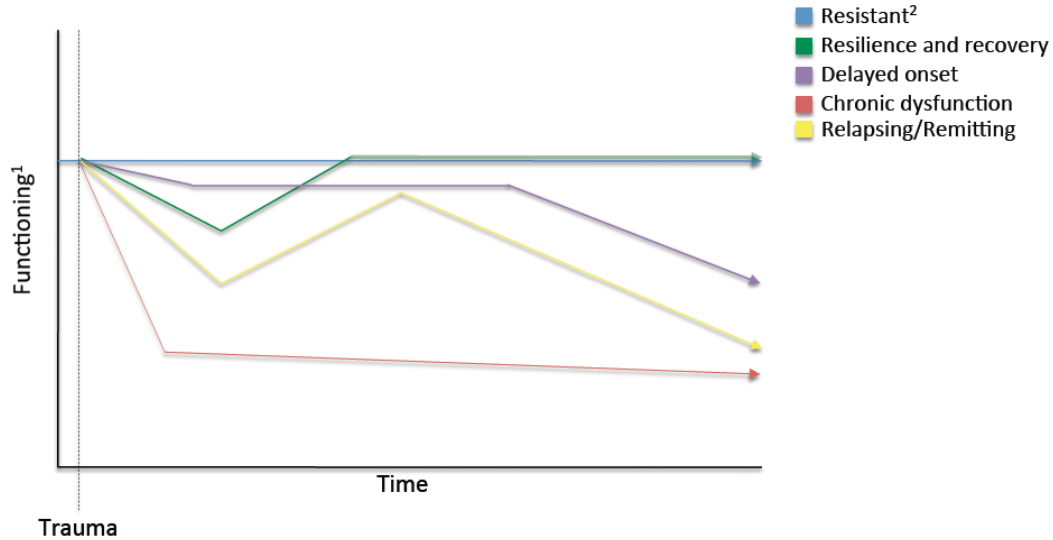
fewer than 10% develop PTSD. Breslau et al. (1998) found that risk of exposure to a PTE in the general population is greater than the risk of PTSD. Bonnano et al. (2006) documented high levels of resilience (greater than one-third) after the September 11, 2001 terrorist attacks in New York City, even among those most directly exposed to the PTE. For example, Bonnano et al. report resilience among individuals injured by the attacks (32.8%), in the World Trade Center towers during the attacks (53.5%), who participated in the rescue efforts (40.3%).

Patterns of PTSD. Aside from assessing the prevalence of PTSD after a population-level trauma, there are several other patterns of PTSD occurrence that are represented in the literature. Patterns of onset and trajectories of PTSD are useful mediums for exploring the role of social support on mental health after trauma (Norris, Tracy, & Galea, 2009). PTSD onset is defined by the point in time after exposure to a PTE that an individual meets diagnosis for PTSD. The current literature on PTSD onset does not account for a spectrum of social support experiences in the aftermath of trauma, but rather focuses mostly on the positive attributes of social support as protecting against developing PTSD. Further studies need to measure the relationship between disappointment (receiving less social support than one would expect) and feeling constrained by social support and PTSD onset. Ozer, Best, Lipsey, & Weiss (2003) report in a meta-analysis of predictors of PTSD higher rates of current PTSD among individuals who report lower levels of perceived social support after exposure to a traumatic event. As described in the individual and network literature on social supports, negative experiences of social support have the potential of being translated into stressors, therefore, putting the individual at greater risk of developing or maintaining PTSD (Fonagy, 1996; Lepore, 2006).

Patterns of trajectories of PTSD, rather than presence of PTSD at any given point in time is a valuable development in the PTSD scholarly discourse (Norris et al., 2008; Norris, Tracy, Galea, 2008; Hobfoll et al., 2009). Norris, Tracy, & Galea (2008) documented six trajectories of PTSD using longitudinal data collected after a flood in Villahermosa, Mexico and after the September 11, 2001 terrorist attacks in New York City. Three waves of data from each study revealed six naturally occurring trajectories of PTSD, defined as resistance (approximately 30% Mexico; approximately 50% New York), resilience (32% Mexico; 10% New York), recovery (11% Mexico; 9% New York), delayed dysfunction (14% New York), chronic dysfunction (22% Mexico; 13% New York, and relapsing/remitting (not identified in Mexico or New York, see Phifer & Norris, 1989).

Definitions for the six trajectories of PTSD.

Figure 2.
Five trajectories of post-traumatic stress disorder in the context of a potentially traumatic event



[1]Functioning due to PTSD
[2]Represents an arbitrary baseline for everyone

Resistance, the dominant outcome after population-level disasters, implies the absence of dysfunction due to the successful coping mechanisms, which mitigate the affect of the PTE (Hobfoll et al, 2009; Norris et al, 2008; Norris, Tracy, & Galea, 2008). Resilience is defined by transient disruptions in normal functioning immediately following a stressor resulting in adaptation to the post-disaster context and a return of the system to equilibrium (Bonanno, 2004; Norris, Tracy, & Galea, 2008). Recovery occurs after the individual's normal functioning is disrupted, resulting in symptoms of psychopathology for several months at minimum, before a steady return to normal functioning (Bonanno, 2004; Norris, Tracy, & Galea, 2008). The last three trajectories of PTSD constitute degrees of continual dysfunction after onset. Delayed dysfunction is the occurrence of PTSD only after a substantial amount of time has passed since the traumatic event. Chronic dysfunction refers to a persistent state of dysfunction after the traumatic event exposure. Relapsing/remitting is a process in which symptoms are recurring in spite of periods of normal functioning (Norris, Tracy, & Galea, 2008).

Chapter 2: Method

Using exposure variables predictive of social support at the individual, network, and community levels, I measured the presence of PTSD and PTSD symptom clusters at four time points. Measures of individual and network variables were included in The World Trade Center Disaster Sequelae Longitudinal Study (2002-2005) and community variables in The New York Social Environment Study (2005). Community variables were assigned to each WTCD study participant by matching their neighborhood to the corresponding neighborhood in the NYSES study.

The World Trade Center Disaster Sequelae Longitudinal Study

From March 25, 2002 thru June 25,2002, 2,752 participants were recruited by a telephone survey of adult residents of New York City metropolitan area to a prospective, cohort study, which is representative of NYC's population. The aim of the study was to assess population mental heath approximately 6 months after the September 11, 2001 terrorist attacks. Interviews were conducted via the telephone using a random-digit dial procedure, which is based on computer generated phone numbers. Consequently, individuals without a phone were not approached for this study. Baseline survey participation (56%) and response rate (34%) were within the accepted range for comparable random-digit-dial health surveys (Galea & Tracy, 2007). As many as ten attempts were made to conduct an interview. Adults within each household were selected randomly by choosing the adult whose birthday was closest to the interview date.

Computer-assisted telephone interviews were conducted in English, Spanish, Mandarin, and Cantonese by trained interviewers using translated and back-translated questionnaires.

This analysis makes use of four waves of data collection. The first follow-up assessment, approximately six months after baseline (September 25, 2002-January 31, 2003), aimed at assessing acute changes in prevalence of posttraumatic stress in the population after the terrorist attacks. Subsequent follow-up, at approximately yearly intervals, (September 25, 2003-February 2, 2004, December 15, 2004-November 30, 2005) was designed to document the longer-term trajectory of posttraumatic stress in the population.

At the start of each study phase interviewers provided participants a complete description of the study, after which verbal informed consent was obtained. All participants received a nominal $10.00 incentive to participate in each survey wave and a $5.00 incentive between the survey waves. Interviewers had direct access to psychiatrists and psychologists for referral if indicated or if requested by participants. The institutional review board of the New York Academy of Medicine reviewed and approved this study.

Measures. This study measured characteristics found in previous studies to be associated with posttraumatic stress (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). Using a structured interview, participants were asked about types of social support, such as emotional, instrumental, and appraisal support, in the six months prior to the September 11, 2001 attacks to assess social support (Sherbourne & Stewart, 1991). Individual covariates, including age, sex, race/ethnicity, education, income, and marital status, were collected at baseline.

Participants' experience of the September 11, 2001 attacks was assessed. Respondents were classified by whether they were directly affected by the attacks (e.g. in the World Trade Center complex during the attack, was injured in the attack, lost possession or property, had a friend or relative exposed, lost a job during the attacks, or involvement in the rescue effort). Peri-event emotional reactions were assessed using a modified version of the Diagnostic Interview Schedule subscale for panic (Robins, Cottler, Bucholz, Compton, North, & Rourke, 1999). Participants who endorsed at least four of the panic symptoms listed in the Diagnostic and Statistical Manual (DSM-IV-TR) within the first few hours after the World Trade Center attacks were classified as having had a peri-event emotional reaction.

Lifetime occurrence of any of twelve potentially traumatic events (natural disaster, serious accident at work, in a car, or somewhere else; assault with a weapon; assault without a weapon; unwanted sexual contact; serious illness or injury; other situation involving serious injury or physical damage situation causing fear of death or serious injury; seeing someone seriously inured or violently killed; death of a spouse or mate; death of a close family member other than a spouse; any other extraordinarily stressful life situation or event) was measured at baseline. Respondents were asked in all subsequent interviews whether any of these twelve events had occurred since the previous interview. Daily life stressors that are not considered to be traumatic events, as listed above, were assessed for the previous year at baseline, and at each follow-up interview respondents reported events since the previous interview. These included divorce or separation, family problems, problems at work, and unemployment (Boardman, Finch, Ellison, Williams, & Jackson, 2001). Each trauma or stressor was reported

dichotomously by respondents, and sums of these events (sum of traumas, sum of stressors) at baseline or during the previous follow-up period were included in the analysis.

The National Women's Study posttraumatic stress module questions were used to assess posttraumatic stress symptoms (Kilpatrick, Resnick, Freedy, et al., 1998). At baseline respondents were asked about lifetime occurrence of symptoms and about symptoms since the September 11, 2001 terrorist attacks. At all follow-up interviews, participants were asked about posttraumatic symptoms since the last interview. This module was validated in a field trial against the PTSD module of the Structured Clinical Interview for DSM-III-TR administered by mental health professionals. In the field trial, instrument sensitivity was 99% and specificity was 79% when compared with the Structured Clinical Interview diagnosis (Kilpatrick, Resnick, Freedy, et al., 1998). This module assesses the presence of criterion B (reexperiencing, e.g. intrusive thoughts, distressing dreams), C (avoidance, e.g. efforts to avoid thoughts associated with the trauma, avoidance of places or people associated with the trauma), and D (arousal, e.g. difficulty falling asleep or concentrating) symptoms and determines content for content-specific symptoms (e.g. content of dreams) if symptom presence is endorsed. Symptoms endorsement was dichotomous (yes/no) and symptoms were assessed in relation to any trauma at any time in the respondents' lifetime, before or after September 11, 2001 terrorist attacks. Posttraumatic stress is the presence of at least one re-experiencing symptom, at least three avoidance symptoms (content specific where relevant), and two arousal symptoms. Although all measures used were well validated in clinical samples, no diagnosis of PTSD can be established from this data due to it being a lay administered structured interview rather than a clinical interview.

The New York Social Environment Study

The New York Social Environment Study (NYSES) was a multilevel study designed to examine neighborhood level exposures, including economic, social and structural characteristics, and substance use in New York City. For the purpose of this dissertation, the NYSES was used to assess community level social supports.

The NYSES was conducted between June and December of 2005. Random-digit-dial methods were used to contact and interview 4000 NYC residents. Adults within each household were selected randomly by choosing the adult whose birthday was closest to the interview date. All interviews were conducted in either Spanish or English. Survey participation was 54%, defined by the percentage of those contacted that agreed to participate in the study (completed + screened out)/(completed + screened out + refused). Respondents received $10.00 in compensation for their participation. The study protocol was approved by the institutional review boards of the New York Academy of Medicine, the University of Michigan, and the University of California, Berkeley.

Measures. Participants were interviewed with a structured questionnaire that included questions on demographic and socioeconomic characteristics including age, race and ethnicity, gender, marital status, place of birth, education, income, employment, years lived in the current neighborhood, and interview language.

Participants provided their residential address or nearest cross-streets so that their locations could be geo-coded and linked to their neighborhoods of residents. Of the 4,000

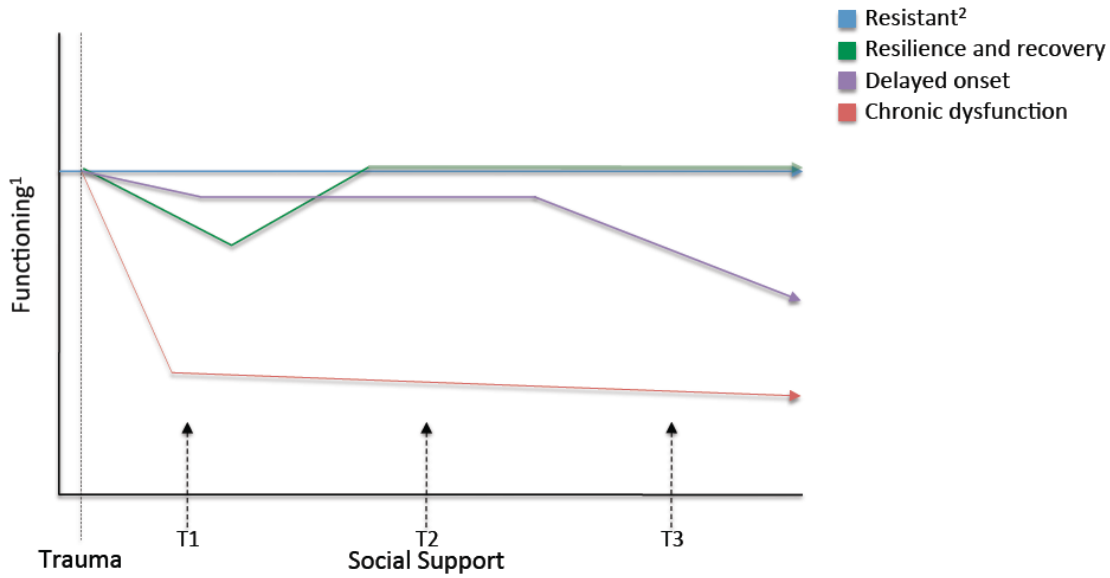
respondents, 93.1 percent (*n* = 3,725) were geo-coded by address (*n* = 2,859) or cross-streets (*n* = 866). For the remaining 275 participants, we had insufficient address or cross-street information or had only zip code information. These participants were linked to the neighborhood that had the largest percentage of overlap with their zip code (98.5 percent had more than 50 percent overlap between the zip code and the neighborhood, and 68.7 percent had more than 75 percent overlap between the zip code and the neighborhood). An indicator for linkage to the neighborhood by zip code instead of by geo-coding was considered in all analyses as a potential confounder. The neighborhood units for this analysis were the 59 community districts in New York City, well-defined units, each headed by an administrative community board, that as such have political and social relevance for their residents. Characteristics of community districts have been shown to be associated with resident behavior and health (Galea, Ahern, Vlahov, Coffin, Leon, & Tardiff, 2003; Galea, Ahern, Nandi, Tracy, Beard, & Vlahov, 2007; Hembree, Galea, Ahern, Tracy, Markham, Miller, Vlahov, & Tardiff, 2005; Marzuk, Tardiff, Leon, Hirsch, Stajic, Portera, & Hartwell, 1997; Nandi, Galea, Ahern, Bucciarelli, Vlahov, & Tardiff, 2006).

Hypotheses

The number of individual differences across a population makes thinking about the role of social support at the individual, network, and community levels on PTSD onset and trajectories a challenge. Without adjusting for confounding variables many variables will likely appear to be significantly associated. Moreover, to date there are no studies exploring the relationship between individual, network, and community levels of social support and PTSD

onset or trajectories. However, from what is known empirically, it is likely that social support is experienced differently across the three levels among those who resist trauma, are resilient and recover from trauma, and who suffer from more severe forms of PTSD, i.e. delayed, chronic, and relapsing/remitting. Similarly the weight of each level of social support (individual, network, or community) associated with PTSD onset and trajectory will likely vary across time.

Figure 3.
Social support on four trajectories of post-traumatic stress disorder in the context of a potentially traumatic event

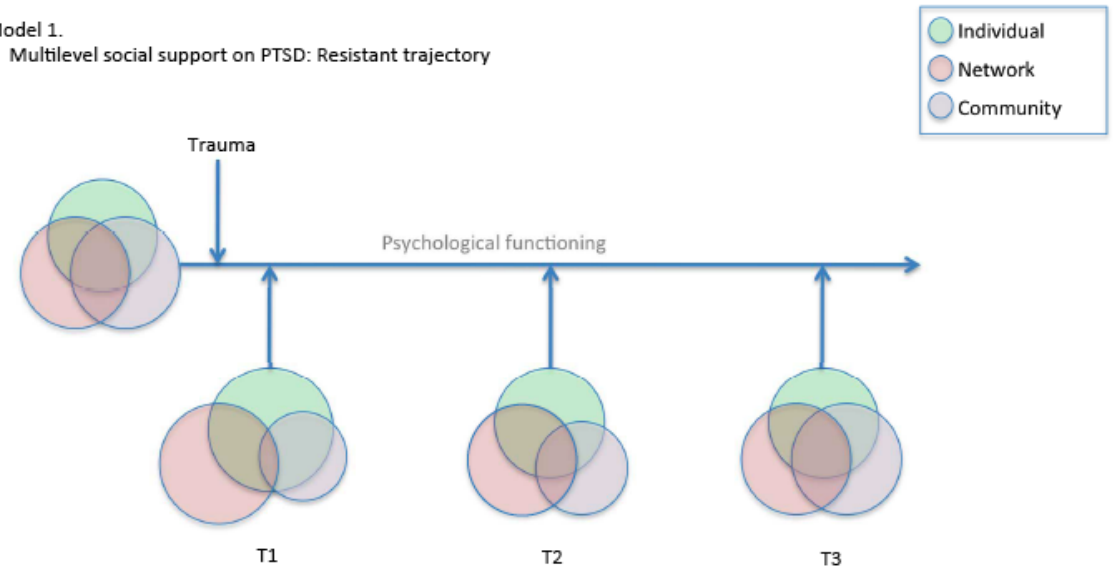


[1]Functioning due to PTSD
[2]Represents an arbitrary baseline for everyone

Applying the theoretical underpinnings of social support in the context of trauma across three levels of social support, this study will assess the differences in individual, network, and community variables of social support among individuals who are resistant, resilient and recover, experience delayed onset, and suffer from chronic PTSD in the aftermath of a population level trauma, the World Trade Center Disaster (WTCD) (Norris, Tracy, & Galea, 2008). Due to the absence of the relapsing/remitting trajectory of PTSD within the September 11, 2001 World Trade Center dataset this analysis will not assess empirically how multi-levels of

social support are associated with this trajectory. This analysis is limited to looking at social support variables post-September 11, 2001.

Model 1.
Multilevel social support on PTSD: Resistant trajectory



Model 1 illustrates the dominant role of individual level social support variables in the immediate aftermath of a trauma. T1 individual variables affect whether a PTE is in fact experienced as traumatic. Secondly these variables are determinants of whether the individual experiences his social support as helpful and available to his needs. Consequently the role of network and community level social support at T2 or T3 is in part determined by how the individual experiences and perceives support. The presence of actual social support at the network level at T1 is vital for those individuals who seek out social support in the context of distress.

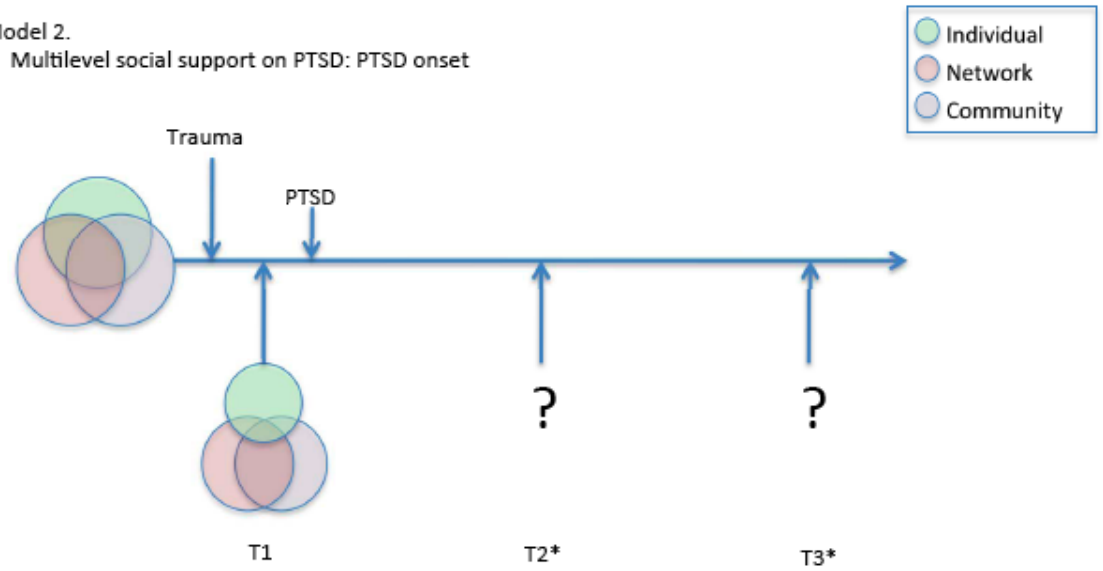
Four aims guide the analyses to be carried out. First, to gain a deeper understanding of the complexity of social support across the three levels (individual, network, and community) in determining an individual's vulnerability to developing PTSD during a time of extraordinary stress. Second, to assess the inevitable and complex interactions between individual, network, and community level social support variables and how they conjointly influence PTSD trajectories. Third, to identify differences in social support among those with PTSD, namely what social support variables, if any, are associated with recovery versus chronic dysfunction among individuals who present with probable PTSD at any point in the study. Fourth, to explore social support and demographic determinants of the delayed onset trajectory and how this trajectory may differ from the resilience and recovery or chronic PTSD trajectories.

Sociodemographics as vulnerability. Sociodemographics are commonly associated with mental illness, including PTSD. In particular, being female, non-white, and of low SES are noted to increase one's vulnerability to PTSD (Adams & Boscarino, 2009; Brewin, Andrews, & Valentine, 2000; Bromet & Dew, 1995; Norris et al, 2002; Rubonis & Brickman, 1991). As a result, it is anticipated that these variables will be similarly indicative of PTSD onset in this study. Moreover, given that being non-white and SES are vulnerabilities of chronic mental illness, it is hypothesized that these sociodemographics will be more strongly associated with chronic PTSD than with the resistant or resilient/recovery trajectories (Adams & Boscarino, 2009; Brewin, Andrews, & Valentine, 2000; Bromet & Dew, 1995; Norris et al, 2002; Rubonis & Brickman, 1991). Additionally as per the evidence that poverty and being non-white are associated with PTSD, it is predicted that communities that are predominately populated with non-whites and families of low SES will have higher rates of PTSD.

The effects of multi-level social support on PTSD onset. As reviewed previously, there is sufficient evidence supporting the benefits of network and community level social support in the aftermath of population level disasters (Galea, et al, 2008; Lepore & Revenson, 2006; Norris & Kanaisty, 1996; Ruggiero et al, 2009; Schwarzer & Knoll, 2007; Uchino, 2004). Less frequently studied is the role of individual level social support, except for the construct perceived social support, on PTSD onset following a population-level PTE. The dearth of data on individual level social support on PTSD onset is likely due to the difficulty in and cost of measuring such variables in population-level studies. And yet there is a strong theoretical basis for assuming

individual level variables, such as perception of help and tendency towards excessive and long-term fear, are determinants of resistance or dysfunction (Berkman et al, 2000; Sarason, Sarason, & Shearin, 1986; Siegel, 1999; Stern, 2010; van der Kolsk, 2007).

Model 2.
Multilevel social support on PTSD: PTSD onset



*Social support across the three levels at T2 &T3 are dependent on which trajectory. See Models 3 - 4

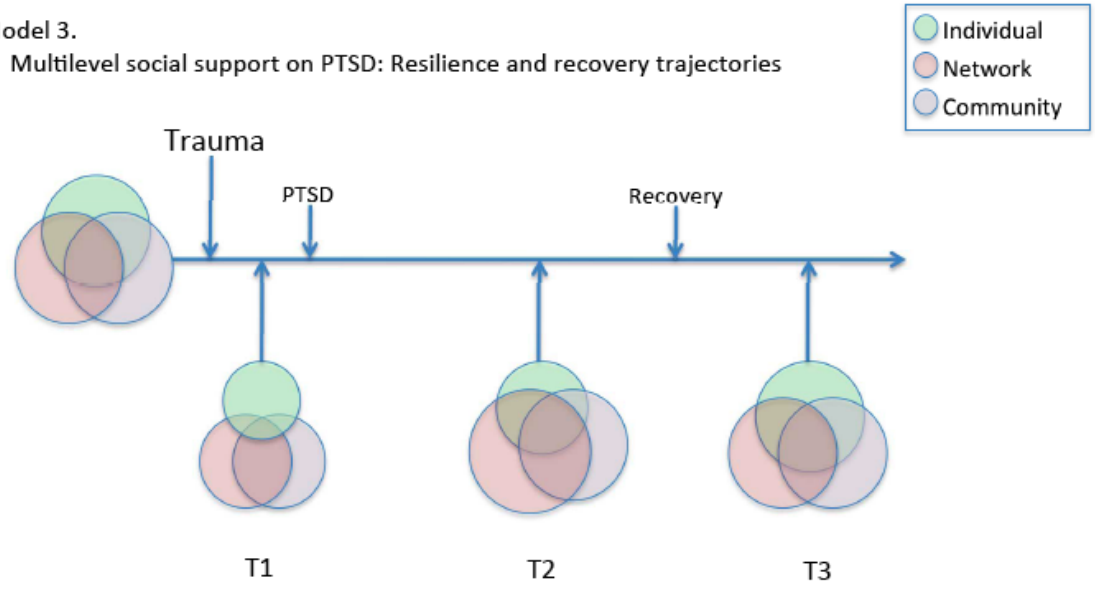
Model 2 suggests that vulnerability among individual level variables of social support at T1 is associated with developing PTSD symptoms or PTSD onset.

Less is known about how individual, network, and community levels of social support interact in the face of population-level traumas and thus how together they inform an individual's risk of PTSD. Thus, in adjusted models, it is predicted that individual-level social support variables, such as perceived social support and perception of help, will be predominately linked with PTSD onset in the immediate aftermath of the WTCD (Berkman et al, 2000; Sarason, Sarason, & Shearin, 1986; Siegel, 1999; Stern, 2010; van der Kolk, 2007). This hypothesis is consistent with the notion that one's network and community will be experienced through, and therefore influenced by, the individual's preconceived expectation of social

supports and his/her form of coping with stress (e.g. being isolative, tending towards excessive fear or anxiety following the stressor).

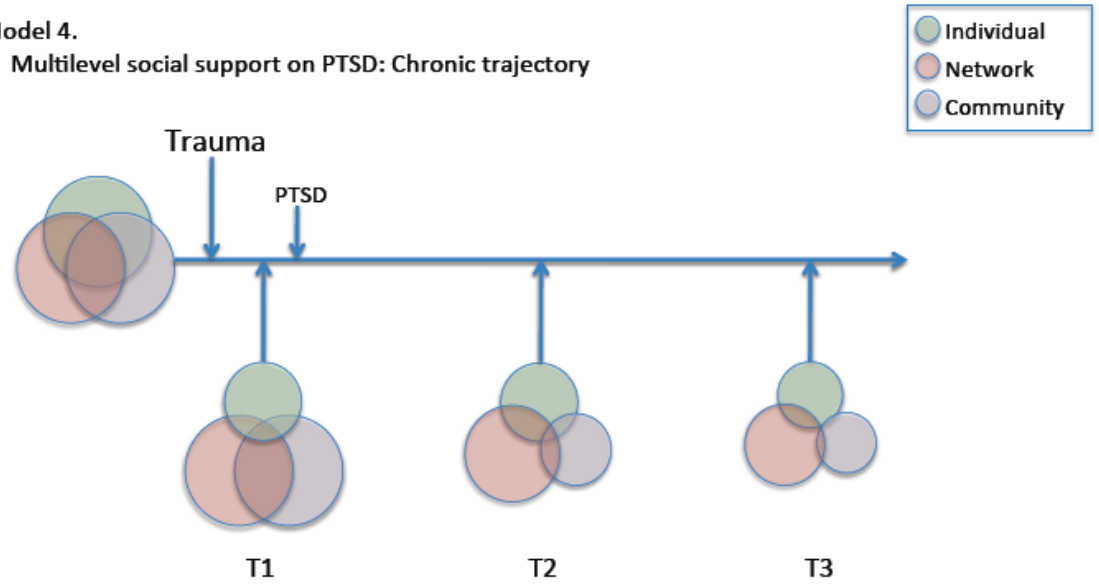
The effects of multi-level social support on PTSD trajectories. PTSD trajectories, as outlined for this study, are newly defined (Norris, Tracy, & Galea, 2008) and studying the determinants of trajectories requires longitudinal datasets with sufficient participation retention across study waves. Consequently few disaster-related studies have assessed which covariates are associated with the four PTSD trajectories examined in this study. In particular, no study has yet examined the relationship between covariates across the three levels of social support with PTSD trajectories. This study will examine how the social support levels are associated with resilience/recovery, delayed onset, and chronic dysfunction as compared to resistant.

Model 3.
Multilevel social support on PTSD: Resilience and recovery trajectories



Model 3 suggests that vulnerability among individual level variables of social support at T1 is associated with developing PTSD symptoms or PTSD onset. To achieve recovery by T3, the interaction of the social support levels change resulting in the individual experiencing supportive resources in his network and community at T2, which bolster the individual variables and allow for recovery/return to baseline.

Model 4.
Multilevel social support on PTSD: Chronic trajectory



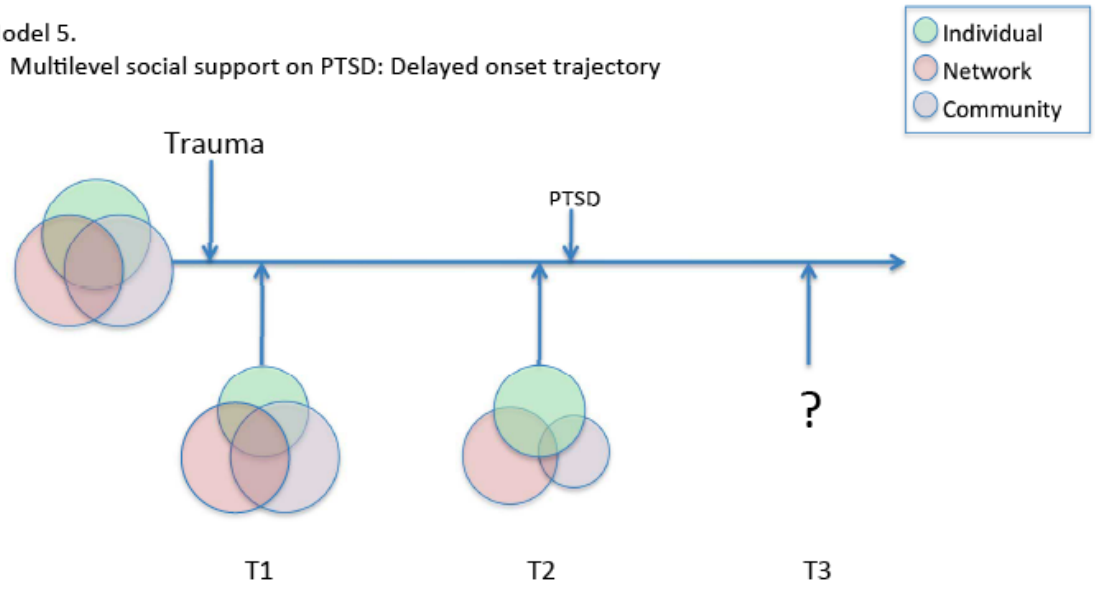
Model 4 suggests that vulnerability among individual level variables of social support at T1 is associated with developing PTSD symptoms or PTSD onset (similar to Model 2). At T2 and T3 the individual does not receive network and community supports to assist in recovery.

Extrapolating from what is known about how social support variables are associated with PTSD onset, it is predicted that the role of the three social support levels will be variable depending on the PTSD trajectory. For example, it is predicted that positive individual level social supports (e.g high levels of perceived social support, a tendency to seek assistance, and no previous experiences of trauma) will promote resistance or resilience/recovery versus delayed onset or chronic PTSD. Network and community level social support variables, will be equally associated with the delayed onset and chronic trajectories, and less significant among those who are resistant or who recovery. Moreover, it is predicted that exposure to stressors after the WTCD will be significantly correlated with the resilient/recovery, delayed onset, and chronic trajectories.

Social support as predictors of recovery. In order to examine which covariates, and thus which social support level(s), are indicative of recovery versus chronicity, these analyses will assess the relationship between the covariates and chronic PTSD as compared to resilience/recovery. It is predicted that individual and network level covariates in addition to exposure to stressors post the WTCD will be the primary indicators of chronic PTSD as compared to those who recovery after temporary dysfunction. Negative community variables (e.g poverty, high levels of drug use, and high rates of crime) will also indicate chronicity as opposed to recovery.

Delayed onset in terms of social support. Delayed onset is an anomaly. It does not fall along the same continuum of health as does resistance, resilience/recovery, and chronic PTSD. For example, in juxtaposition to resilience and chronic PTSD, which are defined by dysfunction immediately after a PTE, delayed PTSD represents individuals who do not present symptomatology until at least six months after the identified trauma. As a result, despite the symptoms revolving around the identified trauma, the actual trigger of the dysfunction is likely a different stressor.

Model 5.
Multilevel social support on PTSD: Delayed onset trajectory



Model 5 proposes that strong network and community level supports that are readily accessible and actively engaging bolster vulnerable individual level variables at T1. As described in Model 1, as network and community resources become less persistent and abundant overtime for robust individuals, those individual's whose resistance was in part dependent on the external resources available, will become vulnerable to PTSD onset. Social support at each level at T3 is dependent on if the individual moves towards recovery or remains chronically affected.

Consequently, it is predicted that the determinants of delayed onset may not be consistent with the variables associated with resilience or chronic PTSD. Rather, in addition to the already stated hypotheses, it is predicted that lifetime stressors and stressors after the WTCD will be the primary determinant of delayed onset. As this study focuses specifically on constructs of social support, it is likely that it will be limited in the degree of clarity it can provide to understanding why some individuals experienced delayed vs. immediate symptomology. However, the analyses conducted in this study will contribute to a currently limited literature on delayed onset PTSD, if only by raising questions for further exploration.

Variables

Control. The analyses controlled for four socioemographics variables: gender, race, age and household income. These variables were selected due to the extensive literature to date

on their relationship to PTSD. For example, women, minorities, individual's who are between 35-54 years old, and low SES are well-documented vulnerabilities to PTSD (Adams & Boscarino, 2009; Bonanno, Galea, Bucciarelli, & Vlahov, 2007; Brewin, Andrews, & Valentine, 2000; Bromet & Dew, 1995; Norris et al, 2002; Rubonis & Brickman, 1991).

A measure of stressors after the WTCD is also a control variable to account for the possible impact of events unrelated to the WTCD on PTSD onset and trajectories (Bonanno, Galea, Bucciarelli, & Vlahov, 2007).

Independent. Six variables were included in the multinomial models as representative of individual-level social support. Each of these variables capture a key dimension of the individual-level social support domain, as laid out in this study.

Perceived social support (nominal variable, low, medium, or high) is commonly used in studies to assess subjective social support (Barrera, 1986; Norris, & Kanaisty, 1996; Ozer, Best, Lispey, & Weiss, 2003; Schwarzer & Knoll, 2007; Uchino, 2004.)

Parent and/or sibling with a diagnosed mental illness (a dichotomous variable, yes/no) identifies a possible biological predisposition to mental illness, which increases one's risk of PTSD (Keane & Wolfe, 1990; Ozer et al., 2003). Having a mental illness or experience with a mentally ill family member may affect how one assesses and approaches new onset symptomatology.

A regular source of health care (a dichotomous variable, yes/no) may be notable for an acceptance and seeking of care when needed or desired versus an avoidance of medical care.

Considered getting help for problems related to the WTCD (a dichotomous variable, yes/no) represents an individual's perception of help as potentially useful or not during times of abnormal stress.

Fear of WTCD related experiences (nominal variable, above/below median fear) assesses an individual's ability to cope with extreme stress and contain it versus have fear and/or anxiety seep into everyday life after the threat has expired. Examples of these experiences are being in a skyscraper and flying.

Exposure to at least on stressor prior to the WTCD (a dichotomous variable, yes/no) is a common variable measured in the aftermath of disasters and is frequently found to be associated with risk of PTSD onset (Bonanno, Galea, Bucciarelli, & Vlahov, 2007). As discussed in Chapter One, multiple trauma exposures can be thought of as a domino effect; with each trauma exposure, individuals become more vulnerable to dysfunction.

Five network level social support variables were included in the analyses. They target different dimensions of *actual* social support available to the individual in the aftermath of the WTCD.

Social embededdness (nominal variable, above/below median) represents the number of significant connections an individual has within his/her "social environment" (Barrera, 1986; Kaniasty & Norris, 1993, p 400).

Number of people in one's household (dichotomous variable, only 1 person/2+ people) are potential supports - family and/or roommates - easily accessible in the home as compared to social support networks who one has to seek out and arrange to meet.

Assistance received related to the WTCD (dichotomous variable, yes/no) represents objective assistance (e.g. medical care, psychological counseling, consultation of a priest) received by an individual in response to WTCD related concerns/problems.

Participation in support groups in the 6 months following the WTCD (dichotomous variable, yes/no) represents an objective form of support likely outside one's primary network for WTCD related problems.

Participation in church after the WTCD in the 6 months following the WTCD (dichotomous variable, yes/no) represents an objective form of potential support in the WTCD aftermath.

Dependent. PTSD onset or the four identified PTSD trajectories were the outcome variables for all the analyses (Norris, Tracy, & Galea, 2009).

Statistical Analysis

To ensure that the study sample is representative of the NYC metropolitan area sampling weights were developed and applied to the data. Sampling weights therefore correct for potential selection bias related to the number of household telephones, persons in the household, and oversampling. Moreover, to account for study participants dropping out of the study across the waves post-stratification weights were applied. As a result the follow-up survey samples remained demographically representative of the NYC metropolitan area population according to the 2000 US Census.

As background to the hypotheses, this analysis examines the distribution of covariates of interest with PTSD as a dichotomous outcome (having or not having PTSD at any point in the study) and across four PTSD trajectories (resistant, resilient/recovery, delayed, chronic). In order to assess which variables were not normally distributed along a bell curve, and thus were significantly associated with PTSD onset and PTSD trajectories, chi-square associations were calculated.

Community level variables were included in the bivariate analyses, but were not included in further analyses as they did not present a pattern of association with the PTSD trajectories.

As per the hypotheses, which speculate on the relationship between social support variables and PTSD onset and trajectories, a regression framework was applied. The regression framework controls for confounding across many variables while conserving statistical power.

To assess the relationship between individual and network levels of social support with PTSD onset, logistic regression models were employed. This analysis adjusted for included covariates and identified those covariates significantly associated, positively and negatively, with PTSD onset.

Using standard logistic regression models, which allow for multinomial outcomes, analyses were conducted to examine separately the relationship of individual-level covariates and network-level covariates across the four PTSD trajectories. These analyses present the covariates within the individual and network levels significantly associated with the PTSD trajectories when not adjusting for covariates in other social support levels.

Multinomial logistic regression models were used to assess the relationship of variables across the individual and network levels of social support with the identified four PTSD trajectories. The trajectory referent for the multivariate models is either resistant or resilient/recovery. Variables included in these analyses are described above.

To ensure sufficient representation of minority populations (e.g. race, gender, exposure level) we oversampled certain areas. Thus to account for this oversampling and to make the standard errors correctly reflect what we would see in a general population sample we utilized the Longitudinal Study Taylor Series Linearization.

Chapter 3: Results

As predicted the individual and network levels of social support were significantly associated with PTSD onset and trajectories in the aftermath of the WTCD. However, contrary to the hypotheses, preliminary analyses did not find a robust pattern of association between community level social support and the PTSD trajectories. Thus community level social supports were not included in further analyses. Given the breadth of these analyses, this paper will not present the significance of the demographic variables held constant throughout the analyses (gender, age, race, and household income). An exception will be if such a result is a topic in the Discussion section. Hence, the Results and Discussion sections, will present specifically the role of social support variables on PTSD onset and trajectories. Please see the tables for further information regarding the demographic variables.

Twelve tables are presented in this dissertation. Tables 1 – 6 illustrate initial analyses that serve as background to the hypotheses described in the Method section. For example, Tables 1 and 2 illustrate how the individual and network level covariates (described in the Method section) are distributed across the sample. Tables 3 – 5 present unadjusted models of the association and significance between the individual and network level covariates and probable PTSD at any point in the study (Table 3), the likelihood of presenting either the chronic, delayed, or resilient/recovery trajectory of PTSD as compared to being resistant (Table 4), and the likelihood of presenting either the chronic, delayed or resistant trajectory of PTSD as compared to recovering after temporary dysfunction (Table 5). Lastly, Table 6 is an unadjusted model of the association between the community level covariates and the likelihood of

presenting either the chronic, delayed, or resilient/recovery trajectory as compared to being resistant to PTSD.

Tables 7 – 12 directly address the hypotheses outlined and will be synthesized fully in the Discussion section. In summary, Tables 7 – 8 are adjusted models of the association between individual level covariates and PTSD trajectories. Similarly, Tables 9 – 10 are adjusted models of the association between network level variables and PTSD trajectories. Tables 11 – 12 illustrate models that incorporate both individual and network level covariates (the same variables see in Tables 7-10) and how they jointly are associated with PTSD trajectories, when resistance and resilience/recovery are the referents. The individual and network level covariates included in each of these models are outlined in the Method section.

As described in the Method section the study sample was representative of the general population. Table 1 shows how the covariates were distributed across the sample and denotes which variables are not distributed across the sample as would be expected in the general population. The latter variables are significantly associated with whether an individual presents with probable PTSD following a PTE; the magnitude of their effect and how they are associated (e.g. within age, which age groups are significantly associated) is determined in subsequent Tables. Significance was determined by a p-value less than 0.05. A number of demographics were significantly associated with whether the respondent has PTSD, specifically gender, race, and household income. Covariates within the individual-level social support domain meaningfully associated with whether the respondent has PTSD were perceived social support ($\chi^2 = 7.49$, $p = <0.01$), if the respondent considered getting help for WTCD related problems ($\chi^2 = 31.1$, $p = <0.01$), if the respondent has a parent and/or sibling with a diagnosed mental illness

(χ^2 = 11.03, p = <0.01), if the respondent reported fear of situations related to the WTCD (e.g. being in skyscrapers) (χ^2 = 18.89, p = <0.01), and exposure to a stressor prior to the WTCD (χ^2 = 8.36, p = <0.01). Similarly, covariates associated with the whether the respondent has PTSD within the network-level social support domain were social embeddedness (χ^2 = 4.02, p = 0.05), if the respondent received any assistance for WTCD problems (χ^2 = 8.23, p = <0.01), and participation in support groups in the six months following the WTCD (χ^2 = 6.14, p = 0.01). Exposure to at least one stressor after the WTCD was also significantly associated with whether an individual presents with probable PTSD after the WTCD or is resistant (χ^2 = 36.44, p = <0.01).

Table 2, similar to Table 1, specifies individual and network level covariates associated with whether the respondent presents one of the four PTSD trajectories. Again, significance was determined by a p-value of less than 0.05. The same demographic covariates were significant in determining trajectories as they were for PTSD incidence (Table 1). Additionally, there was great overlap in the individual level variables significantly associated with the PTSD trajectories. They included: the respondent's perceived social support (χ^2 = 5.00, p = <0.01), if the respondent considered getting help for WTCD related problems (χ^2 = 5.83, p = <0.01), if the respondent has a parent and/or sibling with a diagnosed mental illness (χ^2 = 7.33, p = <0.01), if the respondent had a regular source of medical care (χ^2 = 3.72, p = 0.01), if the respondent reported fear of situations related to the WTCD (e.g. being in skyscrapers) (χ^2 = 16.91, p = <0.01), and exposure to a stressor prior to the WTCD (χ^2 = 3.35, p = 0.02). Exposure to a stressor after the WTCD is also consistently significant (χ^2 = 24.11, p = <0.01). However, with the network-level social support domain, how many people are in the respondent's household was an additional significant covariate in determining PTSD trajectory (χ^2 = 4.62, p = <0.01).

Tables 3-5 provide further information about the individual and network level covariates associated with PTSD onset and trajectories. Showing the results of bivariate analyses, these tables present the (unadjusted) odds ratios describing the association between the covariates and probable PTSD at any point in the study (Table 3), the likelihood of presenting chronic, delayed, or resilient/recovery as compared to being resistant to PTSD (Table 4), and the likelihood of presenting chronic, delayed or resistant as compared to recovering after temporary dysfunction (Table 5). The odds ratios present the magnitude of association between each covariate and the specified outcome (e.g. probable PTSD or the identified PTSD trajectory). As such the further the odds ratio is from 1 (+/-) the greater the effect of association. For each of these tables, significance was determined using a 95% confidence interval, indicating a p-value less than 0.05.

A number of individual-level social support covariates were significantly associated with one's risk of presenting with probable PTSD at any point in the study (Table 3). They include if the respondent considered getting help for WTCD related problems (OR = 6.49, 95% CI = 3.36, 12.53)), low and medium as compared to high perceived social support (OR = 2.34, 95% CI = 1.44, 3.82 and OR = 2.09 95% CI 1.31, 3.35, respectively), a family history of mental illness (OR = 2.2, 95% CI = 1.38, 3.5), an above median fear of experiences related to the WTCD (OR = 2.48, 95% CI = 1.65, 3.75), and pre-WTCD stressors (OR = 2.12, 95% CI = 1.27, 3.52). Of the network-level covariates, below median social embeddedness (OR = 1.5, 95% CI = 1.01, 2.23), having received any type of assistance for WTCD related problems in the six months following the disaster (OR = 3.26, 95% CI = 1.45, 7.31), and having participated in support groups following

the WTCD (OR = 2.01, 95% CI = 1.61, 3.48) were vulnerabilities for presenting probable PTSD at any point in the study.

Table 4 estimates the unadjusted odds ratios between each covariate and the chronic, delayed, and resilient/recovery trajectories as compared to the resistant trajectory. As stated above, significance was determined by a p-value of less then 0.05. As predicted individual level covariates were more often significantly associated with chronic PTSD than being resistant. These included low and medium as compared to high perceived social support (OR = 4.35, 95% CI = 2.25, 8.43) and OR = 2.83, 95% CI = 1.49, 5.39 respectively), having considered getting help for WTCD related problems (OR = 11.98, 95% CI = 3.23, 44.4), an immediate family history of mental illness (OR = 4.25, 95% CI = 2.29, 7.89), above median fear (OR = 6.05, 95% CI = 3.38, 10.8), and having experienced a stressor prior to the WTCD (OR = 2.22, 95% CI = 1.21, 4.07). In contrast to the hypotheses, individual level covariates, such as having considered getting help for WTCD related problems (OR = 6.83, 95% CI = 1.86, 24.98), an immediate family history of mental illness (OR = 1.9, 95% CI = 1.12, 3.2), no access to a regular source of health care (OR = 2.26, 95% CI = 1.01, 5.07), and having above median fear (OR= 2.69, 95% CI = 1.8, 4.03), were also determinants of resilience/recovery versus being resistant. Additionally, network level, and not individual level, covariates [below median social embeddedness (OR = 2.18, 95% CI = 1.34, 3.55), having received no assistance related to the WTCD (OR = 5.73, 95% CI = 1.56, 21.01), having not attended church (OR = 1.77, 95% CI = 1.1, 2.85), and having not participated in support groups related to the WTCD (OR = 2.47, 95% CI = 1.07, 5.68)] were determinants of delayed onset when compared to being resistant. Exposure to stressors after the WTCD were incrementally associated with chronic, delayed, and least resilient/recovery as compared to

being resistant (OR = 13.28, 95% CI = 6.96, 25.34; OR = 3.09, 95% CI 1.78, 5.34; and OR =1.96, 95% CI = 1.3, 2.97 respectively).

Table 5 presents the association between the covariates and chronic and delayed onset PTSD as compared to resilient/recovery (resistant versus resilient/recovery is the opposite of what is presented in Table 4 and therefore will not be presented here). Low perceived social support (OR = 2.8, 95% CI = 1.36, 5.75), an immediate family history of mental illness (OR = 0.45, 95% CI = 0.23, 0.87), no access to a regular source of health care (OR = .27, 95% CI = 0.1, 0.68), and an above median degree of fear of WTCD related experiences (OR = 2.24, 95% CI = 1.19, 4.22) were individual-level covariates significantly associated with having chronic PTSD versus recovering after mild dysfunction. Of the network-level variables, those significantly associated with chronic PTSD versus recovering after mild dysfunction were below median social embeddedness (OR = 2.59, 95% CI = 1.45, 4.63) and living alone (OR = 1.82, 95% CI = 1.03, 3.21). Consistent with the current literature, exposure to at least one stressor after the WTCD was found to be indicative of chronic PTSD (OR = 6.77, 95% CI = 3.35, 13.67). Delayed onset was significantly correlated with below median social embeddedness (OR = 2.03, 95% CI = 1.17, 3.51). Additionally, medium as compared to high level perceived social support (OR = 0.36, 95% CI. = 0.18, 0.73) and below median level fear of WTCD related events appear to mitigate risk of delayed PTSD (OR = 0.49, 95% CI = 0.28, 0.85).

Table 6 presents the community level covariates associated with chronic, delayed onset, and resilience/resistant trajectories as compared to being resistant when not adjusting for confounders. Three variables were examined: social cohesion, informal social cohesion, and collective efficacy. There were no statistically significant association with the PTSD trajectories.

The absence of meaningful association between community level variables and the PTSD trajectories be addressed in greater depth in the Discussion section.

Tables 7 and 8 present the estimated adjusted odds ratios for the association between the individual-level covariates and PTSD trajectories. In contrast to tables 1-5, the adjusted models displayed in tables 7 and 8 illustrate how the covariates (demographics, individual-level social support variables, and exposure to stressors post the WTCD) are related to each other. As previously stated, significance was determined by a p-value less than 0.05. Individual-level covariates significantly associated with chronic PTSD versus being resistant were having considered getting help for WTCD related problems (OR = 11.42, 95% CI = 3.21, 40.6), having an immediate family history of mental illness (OR = 4.86, 95% CI = 2.02, 11.69), having above median fear of experiences related to the WTCD (OR = 6.06, 95% CI = 2.3, 15.96), and low or medium versus high perceived social support (OR = 3.32, 95% CI 1.41, 7.8, and OR = 2.43, 1.03, 5.76, respectively) (Table 7). Of these only having considered getting help (OR = 6.89, 95% CI = 2.08, 22.8) and above median fear (OR = 2.09, 95% CI = 1.27, 3.42) were significantly associated with resilience/recovery when compared with resistance. A regular source of medical care was the only individual-level covariate correlated with delayed onset (OR = 5.0, 95% CI = 1.58, 15.83).

The subsequent analysis, which treats resilience/recovery as the referent, examined the role of individual-level covariates in determining chronicity or recovery among those with PTSD at any point in the study (Table 8). A history of family illness (OR = 3.03, 95% CI 1.26, 7.3) and above median fear of WTCD related experiences were significant vulnerabilities for chronic PTSD versus recovery (OR = 2.9, 95% CI = 1.1, 7.69). Individual's with above median fear of

WTCD related experiences and medium as compared to high perceived social support were significantly less likely to present with delayed onset PTSD than they to present immediate mild dysfunction followed by recovery (OR = 0.49, 95% CI = 0.24, 0.98 and OR = 0.27, 95% CI = 0.1, 0.67, respectively).

Similar to Tables 7 and 8, Tables 9 and 10 look at how the network-level covariates are associated with the PTSD trajectories when adjusting for all included variables. Table 9, which holds resistant constant, shows that living alone (OR = 2.1, 95% CI = 1.05, 4.23) and having attended support groups related to the WTCD in the six months following September 11, 2011 were significantly associated with chronic PTSD versus resistance (OR = 3.33, 95% CI = 1.12, 9.85). That both are positively associated with chronic PTSD, suggests that not only does isolated living make one vulnerable to PTSD, but that those who attend support groups are also more likely to be experiencing symptomatology. Significant determinants of delayed onset PTSD were below median social embeddedness (OR = 1.87, 95% CI = 1.02, 3.4) and having attended support groups related to the WTCD in the six months following the event (OR = 3.01, 95% CI = 1.28, 7.1). Exposure to at least one stressor following the WTCD was also positively associated with delayed onset PTSD (OR = 22.99, 95% CI 10.18, 51.9) and immediate dysfunction followed by recovery (OR = 2.33, 95% CI 1.46, 3.72).

Among those with PTSD, no network-level covariates were significantly associated with chronic PTSD versus recovery (Table 10) and only one, having participated in church groups following the WTCD, was meaningfully associated with delayed onset PTSD (OR = 2.12, 95% CI 1.08, 4.14). Again, exposure to at least one stressor after the WTCD was notably correlated with delayed onset PTSD (OR = 2.02, 95% CI 1.07, 3.8). On the contrary, exposure to at least

one post-WTCD stressor was suggestive of resistance and not of temporary dysfunction followed by recovery (OR = 0.43, 95% CI = 0.27, 0.69).

Table 11, which builds on Tables 7-10, shows the adjusted odds ratios for the relationship between individual and network level social support variables and PTSD trajectories keeping resistant as the referent trajectory. Significance was set at a p-value less than 0.05. As predicted, primarily individual-level covariates were significantly associated with developing chronic PTSD versus being resistant. These included having considered getting help related to the WTCD (OR = 11.18, 95% CI = 3.04, 41.11), having a parent and/or sibling with a diagnosed mental illness (OR = 0.23, 95% CI = 0.1, 0.57), above median fear of WTCD related experiences (OR = 6.48, 95% CI = 2.44, 17.17), and having low rather than high perceived social support (OR = 3.28, 95% CI = 1.42, 7.59). Similarly, some individual-level covariates were meaningfully correlated with resilience/recovery versus resistance, namely having considered getting help for WTCD related problems (OR = 6.51, 95% CI = 2.0, 21.23) and above median fear of WTCD related experiences (OR = 2.08, 95% CI = 1.27, 3.42). In contrast, but consistent with the hypotheses, individual [having a regular source of medical care (OR = 5.9, 95% CI = 2.01, 17.35) and exposure to at least one stressor prior to the WTCD (OR = 2.3, 95% CI = 1.07, 4.8)] and network level [below median social embeddedness (OR = 2.3, 95% CI = 1.21, 4.37), participation in support groups (OR = 0.35, 95% CI = 0.14, 0.87), and participation in church after the WTCD (OR = 0.51, 95% Ci = 0.27, 0.97)] covariates were significantly associated with delayed onset PTSD when resistance was the referent. Medium as compared to high level perceived social support was notably protective against delayed onset PTSD (OR = 0.38, 95% CI = 0.15, 0.98). Exposure to at least one stressor after the WTCD was significantly associated with

delayed onset PTSD and resilience/recovery when compared to being resistant (OR = 4.11, 95% CI = 2.29, 7.36, and OR = 2.65, 95% CI = 1.57, 4.47, respectively).

Taking a different approach, Table 12 treats resilience/recovery as the referent in examining the relationship between individual and network level social support variables and PTSD trajectories while controlling for all variables in the model. As a result, this table presents the covariates that are meaningfully indicative of either chronicity or recovery among those individuals who present PTSD at any point in the study. A key difference exist in the demographic characteristics associated with chronic and delayed onset PTSD when examining individuals with PTSD at any point versus comparing individuals who presented with or were resistant to PTSD. Among those with PTSD at any point, females were less likely than men to present with the chronic or delayed onset trajectories (OR = 0.38, 95% CI = 0.17, 0.83, OR = 0.32, 95% CI = 0.16, 0.65, respectively). As predicted, individual-level variables, specifically having a parent and/or sibling with a mental illness (OR = 2.8, 95% CI = 1.16, 6.78) and above median fear of WTCD related experiences (OR = 3.11, 95% CI = 1.17, 8.26), were significantly associated of chronic PTSD versus presenting with mild dysfunction with subsequent recovery. Consistent with Tables 8 and 11, medium as compared to high perceived social support was protective against delayed onset PTSD (OR = 0.24, 95% CI = 0.09, 0.66) and attendance of church groups in the six months following the WTCD (OR = 2.62, 95% CI 1.29, 5.3) was significantly correlated with delayed onset PTSD as compared with the resilience/recovery trajectory.

The Discussion section will elaborate on the results described above, in particular three themes will be discussed. First, Tables 3, 4, 11, and 12 will serve primarily to illustrate the

individual and network level covariates associated with PTSD onset and trajectories. Second, Tables 11 and 12 will be used to discuss the individual and network level covariates that are associated with chronicity vs. recovery. Lastly, Tables 11 and 12 contribute to a broader dialogue on the determinants of the delayed onset trajectory and how they do not fit the same pattern of association as the other PTSD trajectories.

Chapter 4: Discussion

Unlike other psychological disorders, PTSD, by definition, cannot be diagnosed unless there is a preceding identifiable stressor that meets the criteria outlined by the Diagnostic Statistical Manual-IV-TR (American Psychiatric Association, 2000). Furthermore, demographics and context at the time of the trauma, such as gender, race, social support networks, type of trauma, and type of exposure to the trauma (e.g. direct or indirect), are well documented to have an impact on one's risk for PTSD in the aftermath of a PTE. Less frequently studied are the underlying behavioral trends and personality characteristics that pre-exist the PTE and which may be as critical to understanding who is most vulnerable to PTSD as they are to understanding the onset of other pathology, such as depression and anxiety.

Using data from a four wave random-sample longitudinal study of NYC residents following the WTCD, these analyses address three main themes. First, the role of individual and network level social support variables in determining PTSD onset and the chronic, resilient/recovery, and resistant trajectories. Second, variables associated with an increased risk of PTSD chronicity among those that had probable PTSD at some point in the study. Third, the etiology of delayed onset PTSD and the individual and network level variables associated with this trajectory. The following discussion is an exploration into these findings.

Broadening the definition of social support

Social support, defined by Hobfoll (1988) as "those social interactions or relationships that provide individuals with actual assistance or that embed individuals within a social system

believed to provide love, caring, or sense of attachment to a valued social group or dyad" (p 121), is promoted by media, practitioners, and the general public as a key protective factor against PTSD following population-level traumas. In this definition, Hobfoll emphasizes two dominant forms of social support, actual and perceived, that are frequently measured in disaster-related studies. And yet social support is just one of many constructs that may impact an individual's risk of developing PTSD in the context of extraordinary stress (Norris, Friedman, Watson, Byrne, Diaz, & Kaniasty, 2002). Type of exposure to the PTE, history of past traumas, secondary stressors (e.g. job loss), and sociodemographics, to name a few, are also closely linked to PTSD onset (Brewin, Andrews & Valentine, 2000; Galea, Ahern, Tracy, et al., 2008; Ozer, Best, Lipsey, & Weiss, 2003). Moreover, limiting social support to subjective and objective measures of one's support system is simplistic and negates other subjective characteristics that potentially influence an individual's perception of his/her social network, the benefit of seeking out resources, and the availability of one's network to be used as a resource.

Moving away from the conventional definition of social support as "helping behavior that did happen" – actual – and "what might happen" – perceived – this analysis is founded on two levels of social support – individual and network – each comprised of a handful of unique variables (Norris & Kanaisty, 1996, p 498; Barrera, 1986). In particular, this study meaningfully expands the definition of individual level social support to augment perceived social support with variables that influence perceived social support, shape help seeking behavior, and therefore may enhance or deter the provision of support by one's network. Network level is expanded to include professional resources made available to the NYC population in the

context of the WTCD, such as medical care, support groups, and church communities, which are critical in the post-disaster context as individual networks may be significantly disrupted. Given the intrinsic desire for relationships among humans and the developmental and experiential processes that shape how an individual comes to value, perceive, and use relationships, these additional constructs permit a more full examination of the factors that may contribute to the utilization and availability of social supports in the post-disaster context (Berkman, Glass, Brissette & Seeman, 2000; Sarason, Sarason, & Shearin, 1986, Siegel, 1999; Stern 2010; van der Kolk, 2007).

Levels of social support associated with PTSD onset and trajectories

Peer reviewed empirical articles present contradictory findings regarding the effect of social support on mental health during times of high distress. As discussed previously, high levels of perceived and actual social support have been found to be protective against PTSD (Borja, Callahan, & Rambo, 2009; Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lispey, & Weiss, 2003). Specifically, there is a strong relationship between low perceived social support and chronic PTSD (Ozer, Best, Lipsey, & Weiss, 2003). And yet, other studies have found social support to be both neutral or harmful to mental health, in particular, if the help offered is contradictory to what the recipient needs or desires (Andrews, Brewin, & Rose, 2003; Borja, Callahan, & Long, 2006; Cambell, Aherns, Self, Wasco, & Barnes, 2001; Cordova et al 2001; Lepore &Revenson, 2007; Lincoln, Chatters, & Taylor, 2005; Mitchell & Black, 1995; Wu, Yin, Xu, Zhao, 2011). The conflicting findings on the role of social support in the post disaster context mirror the challenge in creating bridges of support between two or more individuals who may

be under considerable distress. Barriers to beneficial support include on one hand, attunement between the giver and receiver, and on the other hand, the recipient perceiving assistance (professional and interpersonal) as desirable and potentially useful. To this, Borja, Callahan, and Rambo (2009) suggest that it is the quality of the social support, such as attunement between what is given and what is wanted and flexibility of the receiver to adjust to the support available, versus the quantity that is linked to one's psychological well-being after trauma.

This study identified social embeddedness and/or perceived social support as associated with meeting criteria for PTSD in unadjusted models. For example, individuals who met criteria for probable PTSD at any point in the study were likely to have low social embeddedness and low or medium perceived social support. However, once adjusted for the individual and network covariates and sociodemographics, social embeddedness and perceived social support were no longer indicative of PTSD onset; this is at odds with much of the current rhetoric that frames social support as protective (Norris & Kaniasty, 1996; Schwarzer & knoll, 2007; Uchino, 2004). In their stead, the primary determinants of PTSD onset that are consistent with the literature are race, below $20,000 household income, and exposure to at least one stressor since the WTCD (Brewin, Andrews & Valentine, 2000; Galea, Ahern, Tracy, et al., 2008; Norris & Kanaisty, 1996; Ozer, Best, Lipsey, & Weiss, 2003). Additional predictors are having considered getting help for WTCD related problems and having an above median fear of WTCD related experiences.

That these findings are partially at odds with conventional wisdom on the role of social support is curious and worthy of exploration. A critical difference between this study and much

of the current empirical literature on social support is the broader definition applied to social support. And yet, the results do not present a scattering of significant variables; for example some individual and some network level covariates, associated with chronic PTSD. Rather there is a very clear trend that the variables within the individual level social support domain are indicative of chronic PTSD when compared to being resistant. Related to the finding that an elevated level of fear is associated with chronic PTSD, Borja, Callahan, and Rambo (2009) found personality, in particular neuroticism, and not perceived social support to be significantly correlated with PTSD.

Individual-level variables were also consistently the dominant predictors of two PTSD trajectories, chronic and resilience/recovery, when compared to being resistant. Of note, the individual-level variables associated with resilience/recovery were the same as those seen for PTSD onset. These two, plus a family history of mental illness and low perceived social support, were jointly predictive of chronic PTSD. Interestingly, in our mutually adjusted models network-level covariates were not significantly associated with PTSD onset at any point in the study or with the resilience/recovery and chronic trajectories when compared to being resistant. These findings are consistent with Turner et al.'s (1983) argument that subjective experiences of social support in the post disaster context are more strongly correlated with psychological wellbeing than actual supports.

There are several possible explanations for the predominance of individual-level as opposed to network level covariates in determining PTSD onset as well as the chronic and resilient/recovery trajectories. First, as proposed in this study, the utilization of network level social support is founded on subjective variables, such as those defined in this study by

individual level social support. For example, individuals who do not deem social support as useful may become isolative and rejecting of help versus actively seeking resources during periods of distress. Alternatively, individuals who lack the ability to adapt to new norms and unfamiliar resources may find available supports further distressing and undesirable. Lastly, in the context of population distress, it is unlikely that *perfect* support is available. Hence, if the individual does not find comfort in a *good enough* resource, he/she will likely experience all imperfect supports as unhelpful and harmful (Winnicott, 1949). Each of these examples highlight the developmental experiences that inform how individuals may react in stressful situations (Stern, 2010). Moreover, they are consistent with van der Kolk's (2007) argument that an individual's evolved perception of social support will form the foundation for how he/she evaluates and uses supports at a network and community level.

The predominance of individual level social support is also consistent with the notion that the post-disaster context is ripe with complexities and challenges to the social support that under normal conditions one might evaluate and experience positively. Janoff-Bulman argues that the individual's, network's, and larger community's "basic assumptions or views of the world" such as "benevolence of the world," "meaningfulness of the world," and "self-worth" "[are] tested and jeopardized" by population-level traumas (Janoff-Bulman, 1999; Shaffer, p 27). As a result, the individual's ability to adapt to the post-disaster context is critical to his/her health (Bromberg, 1999; Howell, 2005; Stern, 2010; Winnicott, 1949). Despite the emphasis on the individual, Janoff-Bulman (1999) notes the importance of positively experienced actual supports in "[reenacting] the process of building positive assumptions in early childhood" (p 313). Janoff-Bulman (1999) postulates, that these later relationships mimic the strong and

responsive developmental relationships that originally were instrumental in the individual's construction of positive assumptions about the world and self. This is in line with the notion that early relationships are templates for the quality and role that future relationships may take on in one's life (Berkman, 2000, Fonagy, 1996; Sarason et al., 1986)

Resilience/recovery and chronic PTSD along one continuum

There is a wealth of data addressing the characteristics and experiences that make one prone to developing PTSD in the aftermath of a PTE. On the other hand there is a dearth of empirical data assessing what variables promote recovery, or put differently, why do some individuals recover while others suffer chronic dysfunction. This analysis assessed the association between social support variables and chronic PTSD as compared to the resilient/recovery trajectory. Consistent with the literature to date, Hispanic and low SES were strong predictors of chronic PTSD (Adams & Boscarino, 2009; Brewin, Andrews, & Valentine, 2000; Bromet & Dew, 1995; Norris et al, 2002; Rubonis & Brickman, 1991). Interestingly, while women were more prone to presenting PTSD than men, of those who presented PTSD men were at greater risk of suffering chronic PTSD. While this nuance is new to the literature it is not surprising. Men and minorities are less likely to seek psychological assistance than women and whites (Doherty & Doherty, 2010; Nam, Chu, Lee, Lee, Kim, & Lee, 2010). Cultural gender roles and stigma are frequent explanations of these differences in help seeking behavior (Rogler & Cortes, 1993; Smith, Tran, & Thompson, 2008). Moreover, Shields and Price (2005) argue that men, minorities, and people of low SES typically report lower perceived social support than women, whites, and individuals with sufficient or excessive incomes. Given the patterns of

seeking help it is critical that response efforts identify minorities and men who may not otherwise present themselves for treatment.

Specific to the social support hypotheses presented in this paper, individual level covariates were, again, significantly associated with an individual's recovery (or lack thereof). Aside from those individual covariates associated with presenting PTSD versus being resistant, having a genetic susceptibility to mental illness was an additional vulnerability for chronic PTSD versus recovery (Keane & Wolfe, 1990; Meewisse, Olff, Kleber, Kitchiner, & Gersons, 2011; Yehuda, Byant, Marmar, & Zohar, 2005). Additionally, having a parent and/or sibling with a diagnosed mental illness is likely to mean the individual has experience coping with mental illness, even if indirectly. As a result, these experiences may have a direct impact on how the individual chooses to address his/her own presenting symptoms (e.g. proactively seek out help or deny the onset of symptoms).

Exposure to at least one stressor after the WTCD was another variable significantly associated with chronic PTSD when compared to those individuals who recovered from PTSD. Interestingly this variable is also a risk factor for PTSD onset followed by recovery and delayed onset when compared to those who are resistant. These findings, while from different analyses within this dissertation, together are consistent with the literature arguing that additional stressors increase one's vulnerability to PTSD (Bonanno, Galea, Bucciarelli, & Vlahov, 2007). Further, multiple stressors and/or traumas may accumulate over time and override otherwise sufficient coping mechanisms.

Understanding the delayed onset trajectory

Unlike the resilience/recovery and chronic PTSD trajectories, which fall along a shared continuum – both marked by the presentation of PTSD in the immediate aftermath of the PTE – delayed onset PTSD has its own life course. In fact, there is considerable debate over the prevalence of delayed onset PTSD (Andrews, Brewin, Philpott, & Stewart, 2007). Andrews and his colleagues (2007) suggested that the different definitions for delayed onset PTSD resulted in conflicting data on its prevalence. For example, some studies define delayed onset narrowly, meaning the individual does not present any symptoms in the 6 months following exposure to a PTE. Others allow for symptomology in the immediate aftermath of a traumatic event, barring full diagnosis until 6 months post. Given these definitions, the finding that the narrower definition results in a significantly lower prevalence of delayed onset PTSD makes sense (Andrews et al., 2007).

Delayed onset is a documented phenomenon in different study samples – e.g. western, nonwestern, civilian, military – however, this discussion focuses specifically on delayed onset PTSD among a western civilian sample (Smid, Mooren, van der Mast, Gersons, Kleber, 2009). Unlike those who display immediate dysfunction or who remain healthy, individuals along the delayed onset trajectory are likely to be *at risk* in the period following the PTE. In a meta-analysis of delayed PTSD, Smid et al (2009) suggest that individuals who developed delayed PTSD are likely to present "prodromal symptoms" which subsequently "increase allostatic load" – a sustained neural or neuroendocrine response due to chronic stress – and, which in turn, will increase one's risk of developing PTSD (McKwen, 2000; Smid et al, 2009, p 1578).

There are two theories explaining delayed onset PTSD. On one hand, a trauma interacts with other pre-existing life stressors (e.g. marital problems, job loss) and overtime this

interaction leads to PTSD, where the symptoms revolve around the initial trauma (Adams & Boscarino, 2009; Freedy, Kilpatrick, & Resnick, 1993; Galea et al, 2002). On the other hand, individuals experience additional stressors (e.g. death of a friend, displacement) after the initial trauma, which trigger the initial trauma leading to PTSD onset months after the initial exposure (Adams & Boscarino, 2009). In both scenarios, it is the cumulative effect of a trauma plus at least one stressor that leads to dysfunction. Consistent with the literature, this study found exposure to at least one stressor – prior to or after the WTCD – was strongly associated with delayed onset.

Contrary to the defined link between individual level covariates and the two trajectories associated with immediate onset PTSD (resilience/recovery and chronic) the variables indicative of delayed onset PTSD (as compared with being resistant) did not appear to follow the same pattern. Delayed onset is the only trajectory of PTSD that was significantly associated with network level covariates. Of note, below median social embeddedness was a risk factor for delayed onset. This is consistent with Buckley, Blanchard, Hickling (1996) who found that survivors of automobile accidents with low social support networks were more likely to develop delayed onset PTSD than be resistant.

Additionally, while the individual level covariates associated with resilience/recovery and chronic PTSD overlapped, those associated with delayed onset are unique to this trajectory. One such finding is the negative association between medium perceived social support and delayed onset PTSD when compared to being resistant. That medium level perceived social support is protective against delayed onset PTSD as compared to high perceived social support is counter intuitive. However, it is plausible that those individuals with high perceived social

support were less likely to seek professional help than those with medium perceived social support.

This study demonstrates the complexity of thinking about delayed onset as analogous to other trajectories of PTSD. First, the interaction between an external stressor – either preceding or in the aftermath of the identified trauma – and the identified trauma is likely what results in the individual's ultimate failure to cope and subsequent presentation of PTSD. Second, the covariates are associated with delayed onset do not conform to the clear pattern associated with resilience/recovery and chronic PTSD. One alternate explanation is that individuals who later develop delayed PTSD are in a state of limbo in the months following the identified trauma. During this period, mild symptoms may be expressed or symptoms may be suppressed or denied. Regardless, the individual, without sufficient coping mechanisms or appropriate resources, may become more vulnerable to smaller stressors that under normal conditions he/she would be able to tolerate.

Revisiting the community

The various ways that a community can offer its residents social support was not explored in these analyses due to the lack of association between community variables and the PTSD trajectories in the preliminary analysis. Of note, a limitation of this analysis may have resulted in the null results. The New York Social Environment Study, from which the community level variables came, was conducted in 2005 and thus may not measure accurately the community variables in the immediate aftermath of the WTCD. Thus, given the existing

literature noting the role that community can play in population health, it would be shortsighted to rule out the role of the community due to these findings.

In lieu of empirical data to help examine the role of community, presented here is a brief case study of how the community – emergency services, local institutions, and residents – came together to provide social support to those in need immediately after the planes hit the towers (Rudenstine & Galea, 2011).

New York City official agencies and residents worked to help those directly affected by the attack on the WTC. For many New Yorkers on September 11, 2001, helping consisted of walking together on the streets away from the disaster zone (Purnick, 2001). For emergency response providers, however, helping in the immediate aftermath of the disaster meant quickly traveling towards the WTC site and contributing to the rescue effort. Despite communication problems, and the growing infrastructural risks, individual responders entered the WTC towers to assist civilians trapped inside.

Large numbers of New Yorkers and residents of the surrounding area went to lower Manhattan hoping to help in any way possible. "People waited for hours to give blood, they delivered food to hospitals, they offered help if they had any to give" (Purnick, 2001). Grace Spence was quoted by Mirta Ojito of The New York Times as saying, "I'm here to do whatever…I can hold hands, listen to stories, sweep streets, whatever" (Ojito, 2001). By the evening of September 12, 2001 the New York Blood Center announced it had a sufficient supply of blood and would postpone collecting further donations (Ojito, 2001). Skilled volunteers, such as psychologists, engineers, medical professionals, and construction workers were bused into

lower Manhattan to assist the first responders. However, many of these professionals were not needed due to the large number of volunteers already at the site.

Companies, such as NY Waterway, designated all 24 of their boats to serve as "floating ambulances from piers in Lower Manhattan and others to go to Hoboken, New Jersey, Hunts Point in Queens, and the Brooklyn Army terminal" (Kennedy, 2001). As NYC transit shut down, thousands of civilians were left to walk home or were stranded by waterways from getting home. In response, the Circle Line tour company and NY Waterway created a ferry service to New Jersey, Queens, and Brooklyn (Kennedy, 2001). Private citizens who owned boats shuttled people around town. Waterways became a critical way of getting those stranded home safely and those injured to hospitals in neighboring communities that were less burdened than those in Manhattan.

Americans from across the United States and much of the world worked to support and aid those affected by the tragedy. Mirta Ojito of The New York Times wrote of a young couple who drove to Manhattan from Ithaca, NY to offer professional services to children, "I'm willing to assist children in any way, to counsel, to reassure them, to play games with them, to let them know they are loved and cared for" (Ojito, 2001). Generous acts of altruism were abundant in the days and weeks following September 11.

Information gathering was also essential at this stage. As people sought out ways they could be helpful, many were trying everything possible to learn if their loved ones, who may have been in the WTC, were safe. Not long after the first plane hit the North tower the cell phone system was overwhelmed by the abundance of calls being made on cell phones. The internet became a medium for communicating and satisfying the need for connection and

information (Harmon, 2001). Bill Shunn, a writer and computer programmer in Queens, NY created a website to allow individuals in NY to enter their names in order to alert people that they were safe (Shunn, 2009). Others sat glued to the TV or radio desperate for information about those responsible or affected by the attack and the progress of the rescue efforts. Caryn James of the New York Times wrote on September 12, 2001, "The images were terrifying to watch, yet the coverage was strangely reassuring simply because it existed with such immediacy, even when detailed information was scarce…On a day of death, television was a lifeline to what was happening" (James, 2001).

In the moments after the towers fell, the community of lower Manhattan was affected structurally, institutionally, and emotionally. Consequently the forms of support described above were brought from communities with available resources to a lower Manhattan and served critical roles in helping suffering individuals in the immediate aftermath. The affect that these resources had on health is unknown. Two possible outcomes are for some of the individuals who received assistance their risk of PTSD was decreased due to early intervention. Second, that a proportion of those who developed PTSD continued to receive assistance.

While community level variables of social support were not statistically significant in this study, there is evidence that the community is in fact an important variable in promoting health in the aftermath of population level events (Black & Lobo 2008; Lepore & Revenson, 2006; Norris et al., 2008). Thus, it is critical that we alter our conception of community to be able to document the characteristics of community that are empirically associated with community resilience (Norris et al., 2009). For example, "sense of community," "place attachment," and "citizen participation" are three dimensions of social capital that may be associated with

community resilience. Future work should utilize a broader framework for community level variables in order to examine their relationship to PTSD onset and trajectories. This work is central to our effectively using communities as agents of population health.

Limitations

Studying personality, behavioral patterns, and the objective receipt of resources is challenging in large-scale, telephone-based population studies that are dependent on accurate self-report. Collecting subjective measures of social support, such as if an individual has someone he/she can borrow money from or call for emotional support, is believed to be more reliable as they are based on a participant's own beliefs versus on how they report on external events (Norris & Kaniasty, 1996). And yet, given the evidence that individual characteristics are predictive of how an individual will adapt to new situations, perceive of and use available resources, and cope with considerable stress it is critical that the field find better ways to assess the joint impact of individual patterns of behavior, subjective social support, and objective resources on mental health in the context of stress.

Moreover, there is debate on the reliability of self-report measures of mental health. For example, Shedler, Mayman, & Manis (1993) argue that measures of self-report mental health frequently result in three types of respondents: (i) individuals who are healthy, (ii) individuals who accurately report distress, and (iii) individuals who report health, but who are distressed. The contradiction in self-report health and actual health was revealed through clinical interviews. Shedler and his colleagues suggest that "illusory mental health" is the

product of individuals "disavowing much of their emotional life" and thus denying symptoms of dysfunction (p 1117).

Specific to this dissertation, variables in the existing dataset were assigned to represent constructs. While the results of the analyses presented here suggest that there are differences in how individual and network level covariates are associated with PTSD, further exploration with well-thought out instruments is necessary.

The post disaster context is riddled with potential acute changes to available resources at the individual, network and community levels (Bolin & Bolton 1986; Brown & Perkins, 1992; Drabek & Key 1984; Erikson, 1976, Norris & Kanaisty, 1996; Norris & Uhl, 1993; Riad and Norris, 1996; Solomon, 1986). Norris and Kaniasty (1996) developed the social support deterioration deterrence model to help explain the affect of population level distress on social support (actual and perceived) and in turn, how social support can mediate distress. Norris and Kaniasty propose via their model that population stress may result in insufficient resources at the community and network levels to address the vast and ranging needs. In addition, unlike the aftermath of an individual trauma, the post-disaster context at a population level has the potential to leave all members of a network in distress, emotionally and physically exhausted, and with a tendency to withdraw (Black & Lobo, 2008; Walsh, 2007). Consequently, among those who are suffering there may be a pattern towards self-preservation versus having the ability and willingness to provide support to others. This is a critical element of the post disaster context, but also means that an individual's assessment of his/her network may not be an accurate portrayal of what is actually available to the individual.

Despite these limitations, this study presents compelling evidence that there are underlying individual characteristics and behavioral tendencies that may determine how one makes use of available resources – both interpersonal relationships and professional services.

Understanding the clinical implications of social support on PTSD

This dissertation is an attempt to bring together substantively overlapping, but disciplinarily siloed discussions related to how social support, of all kinds, may contribute to mental health functioning in the aftermath of a population-level disaster. There are two themes worth revisiting as they inform the current literature on the role of social support on PTSD onset and trajectories.

As reviewed in this paper, social support, defined most frequently as one's actual network and/or as one's perception of his network, is believed to be protective of mental health functioning. While this study corroborates this idea in unadjusted models, objective and subjective measures of having a social network appear secondary to other individual level variables in adjusted models. To clarify, these findings do not mean that social support networks in and of themselves are insignificant. Instead it is argued that individual level variables – such as if one considers seeking help during periods of distress – will effect how one chooses to use his available network. This finding can inform population response efforts in the post disaster context. Rather than assessing one's social supports via questions about perceived and actual networks, it is equally critical to assess an individual's likelihood to seek help if needed and the degree to which the trauma is affecting the individual's functioning (e.g. excessive fear leading the individual to avoid particular scenarios). As a result responders to

population level disasters need to identify those individuals less likely to seek help and attempt to link them with appropriate resources.

Similarly, thinking about demographic characteristics will help responders/clinicians identify which individuals might be at greater risk of PTSD onset and chronicity. For example, women are often noted to be more vulnerable to PTSD than men, however, as this data suggests, of those with PTSD, men are more likely to suffer chronic PTSD. Efforts to ensure men are connected with appropriate resources may counter their tendency to isolate and deny the need for services.

The second central theme pertains to how the delayed onset trajectory of PTSD differs in etiology from those trajectories where there is an immediate presentation of PTSD (resilience and chronic). Among this population of people, low levels of perceived and actual social support and the experience of additional stressors are strong predictors of delayed dysfunction. Consequently, population responders and clinicians can use these variables to identify individuals at higher risk of developing delayed PTSD. In addition, despite evidence that a percent of individuals are vulnerable to PTSD in the aftermath of a disaster, but may not decompensate fully until at least six months post the identified trauma, public awareness and resources decline overtime. Sustainability of professional resources and sensitivity to emotional distress of friends and colleagues may help this group of individuals stabilize.

A new formulation of social support. The failure of inquiry into the life course of PTSD and the individual dynamics of the exchange of resources (interpersonal and professional) consequently may lead to misguided recommendations geared uniformly towards social support as

protective against dysfunction or assumptions regarding who would most benefit from services. There is reasonable difficulty in measuring individual characteristics and behaviors in population level studies. For example, there are practical constraints of the length of a questionnaire and reliability of measures. There is also tension between the accuracy of self-report measures versus clinical interviews, and the feasibility of the latter in population-level studies. And yet there are clinical implications, some of which are noted above, at a population and individual level of continuing to simplify social support as quantifiable construct versus as also a product of individual tendencies towards seeking help and beliefs on help-seeking.

Findings from this dissertation lead me to recommend that we move away from thinking of social support as subjective or objective accounts of one's network and instead consider social support as a fluid process that is constructed in each instance on the interaction of individual and network level covariates. Thus, the foundation of social support is the individual recipient and giver. Specifically their personalities, their contexts and functioning at the time of resource exchange, their attitudes about needing or giving help, and their pre-existing expectations of the usefulness of assistance. Subsequently the actual exchange of support will depend on the availability of actual resources, the in-the-moment openness to accepting assistance of the recipient, and the current functioning of the recipient and giver. Accepting that the giving and taking of social support relies on a multifaceted process helps to explain how social support can just as easily go awry as it can be successful.

This formulation of social support can inform the public health response in the aftermath of a large scale PTE. Recognizing that social support can in fact be constraining if it

does not match the needs of the recipient reinforces the need to consider the individual when making recommendations for recovery or maintenance of health. Thus by keeping the individual in mind in addition to his/her context, responders and/or clinicians can best match one of a number of circumscribed recommendations with the needs of the recipient. Moreover, since a population-wide disaster has the potential to disrupt the normal functioning of networks and community resources, there is a population responsibility to seek out (via in person visits, internet messages, phone calls, and television etc.) those individuals who tend to isolate in the context of distress in order to help deter further dysfunction.

There are additional implications for clinicians engaged in working with individuals. Successful individual treatment for those suffering from symptoms of PTSD is as much about the current illness as it is about preconceived notions of what it means to have a mental illness and to receive treatment. Furthermore, as with social support (interpersonal and professional) attunement between the therapist and patient is central to the patient feeling secure in and benefiting from the treatment. Thus misattunment may, among other things, result in the client emotionally retreating from and/or physically ceasing to attend out of feeling neglected, abuse, or misunderstood by the therapist.

While a catalyst of health, social resources – interpersonal and professional – are only a sliver of the puzzle when we think of mental health functioning following potentially traumatic events. Our challenge, thus, moving forward is to determine how best to integrate the dynamics of social support into our research and practice in order to continue to enhance our understanding of what forms of social support promote health in the post disaster context for which individuals

Table 1. Demographic and social support characteristics of respondents with probable PTSD at any point in the study (2001-2005)*

			PTSD		No PTSD			
Variable		**Total N**	**N**	**Row %**	**N**	**Row %**	**Chi-Square**	**P-Value**
Gender	Male	707	90	34.63	617	47.18	6.29	0.01
	Female	865	179	65.37	686	52.82		
Race	Black	204	42	20.68	162	16.1	7.2	<0.01
	Hispanic	222	70	35.94	152	18.24		
	Other	130	20	7.03	110	9.95		
	White	993	131	36.34	862	55.72		
Age	Under 25	127	13	8.92	114	14.68	1.15	0.33
	25-34	308	51	23.57	257	24.3		
	35-44	333	56	20.76	277	20.17		
	45-54	337	75	25.3	262	18.09		
	55-64	231	41	13.41	190	12.07		
	65+	222	30	8.04	192	10.68		
Household Income	<20k	200	62	27.48	138	12.02	7	<0.01
	20-40	284	66	27.47	218	22.15		
	40-75	361	54	23.67	307	28.2		
	75+	476	60	21.39	416	37.63		
Individual-level variables								
Perceived Social Support	Low	346	83	29.87	263	19.34	7.49	<0.01
	Medium	360	78	32.41	282	23.48		
	High	845	105	37.72	740	57.18		
Considered Getting Help for Problems Related to WTCD	No	1369	168	82.77	1201	96.89	31.1	<0.01
	Yes	95	45	17.23	50	3.11		

Table 1. Demographic and social support characteristics of respondents with probable PTSD at any point in the study (2001-2005)* (*continued*)

Parents and/or Sibling Diagnosed with a Mental Illness	No	1320	191	75.99	1129	87.43	11.03	<0.01
	Yes	252	78	24.01	174	12.57		
Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	No	148	31	13.78	117	11.23	0.52	0.47
	Yes	1424	238	86.22	1186	88.77		
Median Fear	Below Median	881	88	37.4	793	59.75	18.89	<0.01
	Above Median	691	181	62.6	510	40.25		
Stressor Before WTCD	No	431	44	16.52	387	29.54	8.36	<0.01
	Yes	1141	225	83.48	916	70.46		
Network-level variables								
Social Embeddedness Scale	Below Median	759	154	56.14	605	46.06	4.02	0.05
	Above Median	813	115	43.86	698	53.94		
Number of People in Household	Only 1 Person	395	73	13.99	322	10.19	2.98	0.08
	2+ People	1173	194	86.01	979	89.81		
Receive Any Assistance Related to WTCD	No	1466	236	87.8	1230	95.91	8.23	<0.01
	Yes	106	33	12.2	73	4.09		
Did You Participate in Church After the WTCD	No	821	136	50.25	685	48.8	0.08	0.77
	Yes	751	133	49.75	618	51.2		
Did You Participate in Support Groups After the WTCD	No	1434	224	67.49	1210	93.35	6.14	0.01
	Yes	138	45	12.51	93	6.65		
Any stressor after WTCD	No	525	35	10.7	490	36.68	36.44	<0.01
	Yes	1047	234	89.3	813	63.32		

*Statistical significance was set at p-values less than 0.05

Table 2. Demographic and social support characteristics of respondents with four trajectories of PTSD*

Variable			PTSD Trajectories								
			Resistant		Resilient/Recovery		Delayed Onset		Chronic		
		Total N	N	Row %	N	Row %	N	Row %	N	Row %	Chi-Square	P-Value
Gender	Male	533	305	62.82	91	13.19	69	13.77	68	10.21		
	Female	701	305	48.28	178	24.19	93	13.32	125	14.21	6.38	<0.01
Race	Black	154	71	48.22	32	20.46	28	18.70	23	12.62		
	Hispanic	161	50	40.09	34	18.80	26	16.58	51	24.53		
	Other	93	51	62.80	15	14.95	14	14.09	13	8.16		
	White	805	429	60.05	184	19.98	91	11.07	101	8.89	2.66	<0.01
Age	Under 25	88	48	58.85	16	15.63	11	10.13	13	15.39		
	25-34	203	95	53.44	56	22.79	26	13.48	26	10.29		
	35-44	261	122	48.62	61	20.79	34	15.94	44	14.65		
	45-54	281	125	55.38	67	19.87	34	12.06	55	12.69		
	55-64	195	102	56.03	36	18.23	26	14.21	31	11.53		
	65+	194	114	62.33	29	14.54	29	13.79	22	9.33	0.58	0.89
Household Income	<20k	154	56	41.28	25	16.22	20	9.45	53	33.05		
	20-40	223	94	44.25	44	18.47	34	17.06	51	20.22		
	40-75	289	147	54.90	68	19.67	38	15.77	36	9.65		
	75+	372	205	61.89	95	20.89	43	12.17	29	5.05	4.17	<0.01
Individual level variables												
Perceived Social Support	Low	269	106	42.42	54	19.09	42	17.18	67	21.30		
	Medium	290	128	52.05	71	23.77	29	7.16	62	17.02		
	High	658	367	60.79	142	17.57	88	14.62	61	7.02	5	<0.01
Considered Getting Help for Problems Related to WTCD	No	1075	595	58.91	215	17.07	149	14.10	116	9.92		
	Yes	75	8	18.20	24	36.01	8	9.06	35	36.73	5.83	<0.01

Table 2. Demographic and social support characteristics of respondents with four trajectories of PTSD* (*continued)*

Parents and/or Sibling Diagnosed w/ a Mental Illness	No	1036	546	57.71	217	18.85	140	13.32	133	10.13		
	Yes	198	64	36.02	52	22.30	22	14.80	60	26.88	7.33	<0.01
Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	No	98	47	61.61	15	10.25	11	6.48	25	21.65		
	Yes	1136	563	53.97	254	20.31	151	14.29	168	11.44	3.72	0.01
Median Fear	Below Median	608	366	66.55	111	13.93	86	14.56	45	4.96		
	Above Median	626	244	43.42	158	24.47	76	12.53	148	19.58	16.91	<0.01
Stressor Before WTCD	No	332	214	64.81	55	17.31	30	9.81	33	8.07		
	Yes	902	396	50.97	214	20.07	132	14.90	160	14.06	3.35	0.02
Network level variables												
Social Embeddedness	Below Median	595	256	47.72	115	17.58	99	17.30	125	17.41		
	Above Median	639	354	60.99	154	20.88	63	10.14	68	7.99	7.33	<0.01
Number of People in Household	Only 1 Person	319	135	42.77	69	19.62	46	16.54	69	21.07		
	2+ People	912	475	56.24	198	19.26	115	13.14	124	11.36	4.62	<0.01
Receive Any Assistance Related to WTCD	No	1159	589	56.44	248	18.83	153	12.96	169	11.78		
	Yes	75	21	19.17	21	29.49	9	25.21	24	26.14	5.78	<0.01
Did You Participate in Church After the WTCD	No	632	314	58.05	136	18.14	78	10.41	104	13.40		
	Yes	602	296	51.66	133	20.41	84	16.38	89	11.55	2.12	0.1

Table 2. Demographic and social support characteristics of respondents with four trajectories of PTSD* (*continued*)

Did You Participate in Support Groups After the WTCD	No	1123	572	56.36	240	18.93	148	12.87	163	11.84		
	Yes	111	38	36.65	29	23.67	14	20.65	30	19.04	2.63	0.05
Any stressor after WTCD	No	525	353	70.94	98	17.51	50	9.07	24	2.48		
	Yes	709	257	42.67	171	20.67	112	16.83	169	19.84	24.11	<0.01

*Statistical significance was set at p-values less than 0.05

Table 3. Bivariate associations between demographic and social support variables at the individual and network level and PTSD ever in the study*

			PTSD vs No PTSD		
Variable		**Total N**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	865	1.69	1.12	2.54
	Male	707	Ref		
Race	Black	204	1.97	1.17	3.32
	Hispanic	222	3.02	1.83	4.99
	Other	130	1.08	0.55	2.14
	White	993	Ref		
Age	Under 25	127	0.81	0.31	2.12
	25-34	308	1.29	0.65	2.57
	35-44	333	1.37	0.7	2.68
	45-54	337	1.86	0.98	3.53
	55-64	231	1.47	0.74	2.93
	65+	222	Ref		
Household Income	<20k	200	4.02	2.15	7.51
	20-40	284	2.18	1.27	3.75
	40-75	361	1.48	0.82	2.65
	75+	476	Ref		
Individual level variables					
Perceived Social Support	Low	346	2.34	1.44	3.82
	Medium	360	2.09	1.31	3.35
	High	845	Ref		
Considered Getting Help for Problems Related to WTCD	Yes	95	6.49	3.36	12.53
	No	1369	Ref		
Parents and/or Sibling Diagnosed w/ a Mental Illness	Yes	1320	2.2	1.38	3.5
	No	252	Ref		

Table 3. Bivariate associations between demographic and social support variables at the individual and network level and PTSD ever in the study* (*continued*)

Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	Yes	1424	0.79	0.42	1.49
	No	148	Ref		
Median Fear	Above Median	691	2.48	1.65	3.75
	Below Median	881	Ref		
Stressor Before WTCD	Yes	1141	2.12	1.27	3.52
	No	431	Ref		
Network level variables					
Social Embeddedness Scale	Below Median	759	1.5	1.01	2.23
	Above Median	813	Ref		
Number of People in Household	Only 1 Person	395	1.43	0.95	2.16
	2+ People	1173	Ref		
Receive Any Assistance Related to WTCD	Yes	106	3.26	1.45	7.31
	No	1466	Ref		
Did You Participate in Church After the WTCD	No	821	1.06	0.72	1.57
	Yes	751	Ref		
Did You Participate in Support Groups After the WTCD	Yes	138	2.01	1.16	3.48
	No	1434	Ref		
Any stressor after WTCD	Yes	1047	4.83	2.9	8.06
	No	525	Ref		

*Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 4. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resistant trajectory*

Variable		Total N	Chronic vs. Resistant OR	Chronic vs. Resistant L 95% CI	Chronic vs. Resistant U 95% CI	Delayed vs. Resistant OR	Delayed vs. Resistant L 95% CI	Delayed vs. Resistant U 95% CI	Resilience & Recovery vs. Resistant OR	Resilience & Recovery vs. Resistant L 95% CI	Resilience & Recovery vs. Resistant U 95% CI
Gender	Female	701	1.81	1.07	3.06	1.26	0.78	2.03	2.39	1.58	3.6
	Male	533	Ref			Ref			Ref		
Race	Black	154	1.77	0.84	3.72	2.1	1.13	3.92	1.28	0.71	2.28
	Hispanic	161	4.13	2.09	8.16	2.24	1.04	4.82	1.41	0.71	2.8
	Other	93	0.88	0.36	2.12	1.22	0.53	2.78	0.72	0.31	1.64
	White	805	Ref			Ref			Ref		
Age	Under 25	88	1.75	0.6	5.05	0.78	0.28	2.2	1.14	0.47	2.74
	25-34	203	1.29	0.51	3.24	1.14	0.49	2.65	1.83	0.89	3.74
	35-44	261	2.01	0.9	4.49	1.48	0.73	3.02	1.83	0.93	3.63
	45-54	281	1.53	0.69	3.38	0.98	0.48	2.02	1.54	0.8	2.97
	55-64	195	1.37	0.6	3.14	1.15	0.5	2.61	1.39	0.68	2.84
	65+	194	Ref			Ref			Ref		
Household Income	<20k	154	9.81	4.14	23.24	1.16	0.48	2.83	1.16	0.54	2.49
	20-40	223	5.6	2.51	12.49	1.96	1	3.84	1.24	0.69	2.2
	40-75	289	2.15	0.84	5.54	1.46	0.78	2.74	1.06	0.64	1.77
	75+	372	Ref			Ref			Ref		
Individual level variables											
Perceived Social Support	Low	269	4.35	2.25	8.43	1.68	0.89	3.19	1.56	0.92	2.63
	Medium	290	2.83	1.49	5.39	0.57	0.3	1.09	1.58	0.98	2.54
	High	658	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	No	75	11.98	3.23	44.4	2.08	0.39	11.02	6.83	1.86	24.98
	Yes	1075	Ref			Ref			Ref		

Table 4. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resistant trajectory* (*continued*)

Parents and/or Sibling Diagnosed w/ a Mental Illness	No	198	4.25	2.29	7.89	1.78	0.89	3.55	1.9	1.12	3.2
	Yes	1036	Ref			Ref			Ref		
Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	No	1136	0.6	0.28	1.29	2.52	0.94	6.71	2.26	1.01	5.07
	Yes	98	Ref			Ref			Ref		
Median Fear	Above Median	626	6.05	3.38	10.8	1.32	0.81	2.14	2.69	1.8	4.03
	Below Median	608	Ref			Ref			Ref		
Stressor Before WTCD	Yes	902	2.22	1.21	4.07	1.93	0.99	3.76	1.47	0.9	2.42
	No	332	Ref			Ref			Ref		
Network level variables											
Social Embeddedness Scale	Below Median	595	2.78	1.65	4.69	2.18	1.34	3.55	1.08	0.72	1.61
	Above Median	639	Ref			Ref			Ref		
Number of People in Household	Only 1 Person	319	2.44	1.49	3.98	1.65	0.98	2.8	1.34	0.86	2.1
	2+ People	912	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	No	75	6.54	2.37	18.01	5.73	1.56	21.01	4.61	1.49	14.25
	Yes	1159	Ref			Ref			Ref		
Did You Participate in Church After the WTCD	No	602	0.97	0.59	1.6	1.77	1.1	2.85	1.26	0.85	1.88
	Yes	632	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	No	111	2.47	1.16	5.27	2.47	1.07	5.68	1.92	0.98	3.79
	Yes	1123	Ref			Ref			Ref		

Table 4. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resistant trajectory* (*continued*)

Any stressor after WTCD	No	709	13.28	6.96	25.34	3.09	1.78	5.34	1.96	1.3	2.97
	Yes	525	Ref			Ref			Ref		

*Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 5. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resilient/recovery trajectory*

			Chronic vs Resilient/Recovery			Delayed vs Resilient/Recovery			Resistant vs Resilient/Recovery		
Variable		**Total N**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	865	0.76	0.42	1.37	0.53	0.3	0.92	0.42	0.28	0.63
	Male	707	Ref			Ref			Ref		
Race	Black	204	1.39	0.61	3.15	1.65	0.61	3.37	0.78	0.44	1.4
	Hispanic	222	2.93	1.36	6.34	1.59	0.68	3.71	0.71	0.36	1.41
	Other	130	1.23	0.42	3.57	1.7	0.61	4.74	1.4	0.61	3.21
	White	993	Ref			Ref			Ref		
Age	Under 25	127	1.53	0.45	5.28	0.68	0.2	2.31	0.88	0.36	2.11
	25-34	308	0.7	0.25	2.01	0.62	0.23	1.66	0.55	0.27	1.12
	35-44	333	1.1	0.43	2.82	0.81	0.34	1.92	0.55	0.28	1.08
	45-54	337	0.99	0.4	2.5	0.64	0.27	1.51	0.65	0.34	1.25
	55-64	231	0.99	0.37	2.62	0.82	0.31	2.17	0.72	0.35	1.46
	65+	222	Ref			Ref			Ref		
Household Income	<20k	200	8.43	3.18	22.33	1	0.37	2.71	0.86	0.4	1.84
	20-40	284	4.53	1.89	10.82	1.58	0.75	3.37	0.81	0.45	1.44
	40-75	361	2.03	0.75	5.48	1.38	0.68	2.77	0.94	0.56	1.57
	75+	476	Ref			Ref			Ref		
Individual level variables											
Perceived Social Support	Low	346	2.8	1.36	5.75	1.08	0.54	2.18	0.64	0.38	1.09
	Medium	360	1.79	0.89	3.61	0.36	0.18	0.73	0.63	0.39	1.02
	High	945	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	No	95	1.76	0.77	3.99	0.3	0.08	1.14	0.15	0.04	0.54
	Yes	1369	Ref			Ref			Ref		
Parents and/or Sibling Diagnosed w/ a Mental Illness	No	1320	0.45	0.23	0.87	1.06	0.51	2.22	1.9	1.12	3.2
	Yes	252	Ref			Ref			Ref		

Table 5. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resilient/recovery trajectory* (*continued)*

Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	No	1424	0.27	0.1	0.68	1.11	0.36	3.41	0.44	0.2	0.99
	Yes	148	Ref				Ref		Ref		
Median Fear	Above Median	691	2.24	1.19	4.22	0.49	0.28	0.85	0.37	0.25	0.58
	Below Median	881	Ref			Ref			Ref		
Stressor Before WTCD	Yes	1141	1.5	0.73	3.08	1.31	0.61	2.82	0.68	0.41	1.11
	No	431	Red			Ref			Ref		
Network level variables											
Social Embeddedness Scale	Below Median	759	2.59	1.45	4.63	2.03	1.17	3.51	0.93	0.62	1.39
	Above Median	813	Ref			Ref			Ref		
Number of People in Household	Only 1 Person	395	1.82	1.03	3.21	1.24	0.68	2.25	0.75	0.48	1.17
	2+ People	1173	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	No	1466	0.71	0.21	2.41	0.8	0.18	3.52	4.61	1.49	14.24
	Yes	106	Ref			Ref			Ref		
Did You Participate in Church After the WTCD	No	821	1.31	0.74	2.29	0.72	0.42	1.23	1.26	0.85	1.88
	Yes	751	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	No	1434	0.78	0.36	1.69	0.78	0.33	1.82	1.92	0.98	3.79
	Yes	138	Ref			Ref			Ref		

Table 5. Bivariate associations between demographic and social support variables at the individual and network level and three trajectories of PTSD as compared to the resilient/recovery trajectory* (*continued*)

Any stressor after WTCD	Yes	1047	6.77	3.35	13.67	1.57	0.85	2.9	0.51	0.34	0.77
	No	525	Ref			Ref			Ref		

*Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 6. Bivariate associations between community level social support covariates and three trajectories of PTSD as compared to the resistant trajectory*

		Chronic VS Resistant			Delayed VS Resistant			Resilient & Recovery VS Resistant		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Social Cohesion	First Quartile	1.52	0.53	4.39	0.5	0.12	2.06	1.15	0.38	3.51
	Second Quartile	1.03	0.32	3.36	0.44	0.17	1.15	1.02	0.45	2.33
	Third Quartile	0.99	0.41	2.39	0.42	0.18	0.99	1.09	0.5	2.36
	Fourth Quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Social Cohesion	Below Median	1.26	0.58	2.76	0.69	0.29	1.62	1.03	0.51	2.08
	Above Median	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Informal Social Control	First Quartile	1.82	0.58	5.7	1.2	0.38	3.81	2.36	0.63	8.88
	Second Quartile	1.2	0.43	3.36	0.49	0.2	1.23	3.66	1.43	9.37
	Third Quartile	1.41	0.45	4.4	0.58	0.22	1.52	3.05	1.15	8.06
	Fourth Quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Informal Social Control	Below Median	1.19	0.56	2.57	0.97	0.45	2.11	1.55	0.8	3.02
	Above Median	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Collective Efficacy Full Scale	First Quartile	1.75	0.6	5.07	0.88	0.25	3.04	2.02	0.69	5.97
	Second Quartile	0.89	0.31	2.62	0.38	0.15	0.99	1.22	0.52	2.86
	Third Quartile	0.6	0.23	1.55	0.65	0.27	1.59	1.61	0.69	3.78
	Fourth Quartile	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Collective Efficacy Full Scale	Below Median	1.48	0.7	3.15	0.67	0.3	1.51	1.15	0.59	2.25
	Above Median	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

*Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 7. Multivariate associations between demographic and individual level social support variables and three PTSD trajectories as compared to the resistant trajectory[1,2]

		Chronic vs Resistant			Delayed vs Resistant			Resilient & Recovery vs Resistant		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	1,21	0.58	2.51	1.13	0.62	2.05	3.17	1.88	5.35
	Male	Ref			Ref			Ref		
Race	Black	1.01	0.25	4.08	2.27	1.01	5.13	0.54	0.25	1.17
	Hispanic	3.51	1.25	9.81	3.54	1.44	8.7	1.2	0.54	2.69
	Other	0.81	0.21	3.08	2.38	0.8	7.09	0.57	0.2	1.65
	White	Ref			Ref			Ref		
Age	Under 25	1.54	0.36	6.61	0.35	0.09	1.26	1.48	0.47	4.64
	25-34	1.79	0.48	6.73	0.51	0.19	1.41	2.58	1.08	6.16
	35-44	3.55	1.04	12.15	0.9	0.36	2.25	1.8	0.76	4.28
	45-54	1.65	0.45	6.07	0.35	0.12	1.0	1.39	0.6	3.21
	55-64	2.24	0.54	9.27	0.58	0.22	1.56	1.17	0.47	2.92
	65+	Ref			Ref			Ref		
Household Income	Less than 20K	7.97	2.15	29.46	1.28	0.43	3.81	1.1	0.42	2.89
	20-40K	4.13	1.23	13.87	1.43	0.64	3.2	1.09	0.55	2.16
	40-75K	1.91	0.57	6.37	1	0.48	2.07	0.77	0.41	1.42
	More thank 75k	Ref			Ref			Ref		
Perceived Social Support	Low	3.32	1.41	7.8	1.7	0.78	3.72	1.78	0.88	3.58
	Medium	2.43	1.03	5.76	0.46	0.19	1.09	1.74	0.97	3.12
	High	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	Yes	11.42	3.21	40.6	2.07	0.55	7.76	6.89	2.08	22.8
	No	Ref			Ref			Ref		

Table 7. Multivariate associations between demographic and individual level social support variables and three PTSD trajectories as compared to the resistant trajectory[1,2] (*continued*)

Parents and/or Sibling Diagnosed w/ a Mental Illness	Yes	4.86	2.02	11.69	1.97	0.86	4.56	1.6	0.83	3.1
	No	Ref			Ref			Ref		
Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	Yes	1.41	0.49	4.08	5.0	1.58	15.83	2.12	0.74	6.09
	No	Ref			Ref			Ref		
Median Fear	Above Median	6.06	2.3	15.96	1.02	0.55	1.88	2.09	1.27	3.42
	Below Median	Ref			Ref			Ref		
Stressor Before WTCD	Yes	1.94	0.72	5.19	1.99	0.93	4.25	1.4	0.76	2.58
	No	Ref			Ref			Ref		
Any stressor after WTCD	Yes	19.29	7.73	48.18	4.76	2.66	8.5	2.62	1.56	4.39
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table
[2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 8. Multivariate associations between demographic and individual level social support variables and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2]

		Chronic vs Resilient/Recovery			Delayed vs Resilient/Recovery			Resistant vs Resilient/Recovery		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	0.38	0.18	0.81	0.36	0.18	0.71	0.32	0.19	0.53
	Male	Ref			Ref			Ref		
Race	Black	1.85	0.48	7.1	4.17	1.61	10.81	1.84	0.86	3.93
	Hispanic	2.91	1.02	8.33	2.94	1.07	8.11	0.83	0.37	1.86
	Other	1.41	0.32	6.24	4.15	1.11	15.45	1.74	0.61	5.0
	White	Ref			Ref			Ref		
Age	Under 25	1.04	0.23	4.73	0.23	0.05	1.07	0.67	0.22	2.11
	25-34	0.69	0.17	2.87	0.2	0.06	0.65	0.39	0.16	0.92
	35-44	1.97	0.53	7.32	0.5	0.17	1.52	0.56	0.23	1.32
	45-54	1.19	0.3	4.65	0.25	0.07	0.86	0.72	0.31	1.67
	55-64	1.92	0.47	7.89	0.5	0.16	1.65	0.86	0.34	2.14
	65+	Ref			Ref			Ref		
Household Income	Less than 20K	7.25	1.99	26.4	1.17	0.35	3.86	0.91	0.35	2.39
	20-40K	3.79	1.19	12.08	1.31	0.51	3.34	0.92	0.46	1.81
	40-75K	2.49	0.78	7.95	1.31	0.57	2.98	1.31	0.71	2.42
	More thank 75k	Ref			Ref			Ref		
Perceived Social Support	Low	1.87	0.73	4.75	0.96	0.39	2.33	0.56	0.28	1.13
	Medium	1.4	0.59	3.3	0.27	0.1	0.67	0.58	0.32	1.03
	High	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	Yes	1.66	0.56	4.87	0.3	0.08	1.14	0.15	0.04	0.48
	No	Ref			Ref			Ref		
Parents and/or Sibling Diagnosed w/ a Mental Illness	No	3.03	1.26	7.3	1.23	0.51	3.0	0.62	0.32	1.21
	Yes	Ref			Ref			Ref		

Table 8. Multivariate associations between demographic and individual level social support variables and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2] (*continued*)

Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	Yes	0.66	0.19	2.36	2.36	0.62	9.0	0.47	0.16	1.36
	No	Ref			Ref			Ref		
Median Fear	Above Median	2.9	1.1	7.69	0.49	0.24	0.98	0.48	0.29	0.78
	Below Median	Ref			Ref			Ref		
Stressor Before WTCD	Yes	1.39	0.49	3.91	1.42	0.59	3.4	0.72	0.39	1.32
	No	Ref			Ref			Ref		
Any stressor after WTCD	Yes	7.38	2.83	19.24	1.82	0.93	3.57	0.38	0.23	0.64
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table
[2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 9. Multivariate associations between demographic and network level social support variables and three PTSD trajectories as compared to the resistant trajectory[1,2]

		Chronic vs Resistant			Delayed vs Resistant			Resilient/Recovery vs Resistant		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	2.22	1.13	4.36	1.26	0.69	2.29	3.54	2.12	5.91
	Male	Ref			Ref			Ref		
Race	Black	1.01	0.37	2.78	2.14	0.99	4.63	0.73	0.36	1.49
	Hispanic	3.02	1.19	7.7	3.37	1.38	8.21	1.29	0.6	2.76
	Other	0.59	0.2	1.79	1.74	0.66	4.55	0.52	0.2	1.36
	White	Ref			Ref			Ref		
Age	Under 25	3.74	0.88	15.84	0.5	0.13	1.99	1.42	0.51	3.91
	25-34	2.81	0.75	10.53	0.72	0.26	2.01	2	0.89	4.47
	35-44	5.68	1.72	18.77	1.11	0.44	2.76	2.22	0.98	5.0
	45-54	3.23	0.94	11.09	0.55	0.2	1.54	1.55	0.72	3.34
	55-64	3.68	1.04	13.07	0.84	0.31	2.27	1.36	0.6	3.08
	65+	Ref			Ref			Ref		
Household Income	Less than 20K	9.0	3.01	26.92	0.76	0.26	2.04	1.42	0.51	3.91
	20-40K	3.42	1.21	9.72	1.01	0.45	2.26	0.93	0.49	1.76
	40-75K	1.6	0.63	4.03	1.03	0.52	2.07	0.85	0.48	1.52
	More thank 75k	Ref			Ref			Ref		
Social Embeddedness Scale	Below Median	1.88	0.95	3.72	1.87	1.02	3.4	1.09	0.65	1.82
	Above Median	Ref			Ref			Ref		
Number of People in Household	Only 1 Person	2.1	1.05	4.23	1.66	0.86	3.2	1.69	0.94	3.03
	2+ People	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	No	0.42	0.1	1.74	0.58	0.2	1.75	0.34	0.11	1.03
	Yes	Ref			Ref			Ref		

Table 9. Multivariate associations between demographic and network level social support variables and three PTSD trajectories as compared to the resistant trajectory[1,2] (*continued*)

Did You Participate in Church After the WTCD	No	1.18	0.61	2.26	0.54	0.29	1.01	1.15	0.72	1.83
	Yes	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	No	3.32	1.12	9.85	3.01	1.28	7.1	2.03	0.88	4.67
	Yes	Ref			Ref			Ref		
Any stressor after WTCD	Yes	22.99	10.18	51.9	4.7	2.67	8.29	2.33	1.46	3.72
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table
[2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 10. Multivariate associations between demographic and network level social support variables and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2]

		Chronic vs Resilient/Recovery			Delayed vs Resilient/Recovery			Resistant vs Resilient/Recovery		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	0.63	0.3	1.3	0.36	0.18	0.7	0.28	0.17	0.47
	Male	Ref			Ref			Ref		
Race	Black	1.37	0.48	3.93	2.92	1.2	7.08	1.36	0.67	2.76
	Hispanic	2.34	0.88	6.25	2.61	1.03	6.63	0.78	0.36	1.66
	Other	1.14	0.3	4.34	3.35	1.03	10.86	1.93	0.74	5.03
	White	Ref			Ref			Ref		
Age	Under 25	2.64	0.59	11.84	0.35	0.08	1.56	0.71	0.26	1.95
	25-34	1.41	0.35	5.63	0.36	0.12	1.11	0.5	0.22	1.12
	35-44	2.56	0.72	9.13	0.5	0.17	1.43	0.45	0.2	1.02
	45-54	2.08	0.57	7.65	0.35	0.11	1.11	0.64	0.3	1.38
	55-64	2.71	0.74	9.96	0.62	0.21	1.8	0.74	0.33	1.66
	65+	Ref			Ref			Ref		
Household Income	Less than 20K	8.53	2.72	26.81	0.72	0.22	2.3	0.95	0.37	2.43
	20-40K	3.68	1.27	10.67	1.09	0.45	2.62	1.07	0.57	2.03
	40-75K	1.87	0.72	4.85	1.21	0.56	2.61	1.17	0.66	2.09
	More thank 75k	Ref			Ref			Ref		
Social Embeddedness Scale	Below Median	1.73	0.85	3.52	1.71	0.89	3.3	0.92	0.55	1.53
	Above Median	Ref			Ref			Ref		
Number of People in Household	Only 1 Person	1.24	0.6	2.59	0.98	0.47	2.07	0.59	0.33	1.06
	2+ Person	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	No	1.21	0.26	5.61	1.7	0.47	6.08	2.9	0.97	8.71
	Yes	Ref			Ref			Ref		

Table 10. Multivariate associations between demographic and network level social support variables and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2] (*continued*)

Did You Participate in Church After the WTCD	Yes	0.97	0.49	1.93	2.12	1.08	4.14	1.15	0.72	1.83
	No	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	No	0.61	0.2	1.82	0.67	0.28	1.63	2.03	0.88	4.67
	Yes	Ref			Ref			Ref		
Any stressor after WTCD	Yes	9.88	4.14	23.54	2.02	1.07	3.8	0.43	0.27	0.69
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table
[2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 11. Multivariate associations between demographic and social support variables at the individual and network levels and three PTSD trajectories as compared to the resistant trajectory[1,2]

		Chronic vs Resistant			Delayed vs Resistant			Resilient/Recovery vs Resistant		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	1.3	0.6	2.81	1.1	0.59	2.07	3.45	2.01	5.91
	Male	Ref			Ref			Ref		
Race	Black	1.06	0.26	4.34	2.14	0.92	4.98	0.55	0.25	1.2
	Hispanic	3.77	1.38	10.35	3.43	1.41	8.32	1.25	0.57	2.77
	Other	0.78	0.2	3.09	2.64	0.92	7.55	0.57	0.2	1.63
	White	Ref			Ref			Ref		
Age	Under 25	2.07	0.39	10.94	0.54	0.14	2.11	1.56	0.48	5.07
	25-34	2.39	0.54	10.57	0.71	0.24	2.09	2.61	1.07	6.37
	35-44	3.56	0.92	13.8	0.92	0.35	2.43	1.73	0.7	4.28
	45-54	1.85	0.43	7.79	0.39	0.13	1.14	1.27	0.58	3.25
	55-64	2.36	0.52	10.72	0.57	0.21	1.57	1.14	0.46	2.86
	65+	Ref			Ref			Ref		
Household Income	Less than 20K	5.87	1.59	21.64	1.03	0.35	3.02	0.96	0.37	2.53
	20-40K	2.98	0.86	10.39	1.05	0.46	2.39	0.96	0.48	1.92
	40-75K	1.53	0.48	4.86	0.85	0.41	1.76	0.72	0.38	1.36
	More thank 75k	Ref			Ref			Ref		
Individual level variables										
Perceived Social Support	Low	3.28	1.42	7.59	1.54	0.68	3.46	1.7	0.85	3.42
	Medium	2.02	0.81	5.02	0.38	0.15	0.98	1.58	0.87	2.86
	High	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	Yes	11.18	3.04	41.11	2.35	0.64	8.66	6.51	2.0	21.23
	No	Ref			Ref			Ref		
Parents and/or Sibling Diagnosed w/ a Mental Illness	No	0.23	0.1	0.57	0.57	0.23	1.4	0.66	0.33	1.28
	Yes	Ref			Ref			Ref		

Table 11. Multivariate associations between demographic and social support variables at the individual and network levels and three PTSD trajectories as compared to the resistant trajectory[1,2] (*continued)*

Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	Yes	1.52	0.52	4.44	5.9	2.01	17.35	2.35	0.8	6.91
	No	Ref			Ref			Ref		
Median Fear	Above Median	6.48	2.44	17.17	1.11	0.6	2.06	2.08	1.27	3.42
	Below Median	Ref			Ref			Ref		
Stressor Before WTCD	Yes	1.84	0.68	4.98	2.27	1.07	4.8	1.48	0.8	2.74
	No	Ref			Ref			Ref		
Network level variables										
Social Embeddedness Scale	Below Median	1.81	0.77	4.27	2.3	1.21	4.37	1.15	0.66	2.02
	Above Median	Ref			Ref					
Number of People in Household	Only 1 person	1.81	0.75	4.35	1.74	0.89	3.42	1.74	0.93	3.24
	2+ People	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	No	0.42	0.09	2.07	0.41	0.15	1.15	0.59	0.19	1.84
	Yes				Ref			Ref		
Did You Participate in Church After the WTCD	No	0.91	0.41	2.0	0.51	0.27	0.97	1.34	0.81	2.22
	Yes	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	No	0.32	0.08	1.38	0.35	0.14	0.87	0.74	0.27	2.05
	Yes	Ref			Ref			Ref		
Any stressor after WTCD	Yes	18.48	7.39	46.21	4.11	2.29	7.36	2.65	1.57	4.47
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table

[2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

Table 12. Multivariate associations between demographic and social support variables at the individual and network levels and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2]

		Chronic vs Resilient/Recovery			Delayed vs Resilient/Recovery			Resistant vs Resilient/Recovery		
Variable		**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**	**OR**	**L 95% CI**	**U 95% CI**
Gender	Female	0.38	0.17	0.83	0.32	0.16	0.65	0.29	0.17	0.5
	Male	Ref			Ref			Ref		
Race	Black	1.91	0.49	7.41	3.87	1.45	10.39	1.81	0.84	3.92
	Hispanic	3.01	1.09	8.37	2.74	1.02	7.32	0.8	0.36	1.77
	Other	1.38	0.31	6.2	4.66	1.26	17.23	1.76	0.61	5.08
	White	Ref			Ref			Ref		
Age	Under 25	1.33	0.25	7.16	0.35	0.07	1.66	0.64	0.2	2.08
	25-34	0.91	0.19	4.33	0.27	0.08	0.92	0.38	0.16	0.93
	35-44	2.05	0.5	8.36	0.53	0.17	1.67	0.58	0.23	1.42
	45-54	1.35	0.31	5.99	0.28	0.08	0.97	0.73	0.31	1.73
	55-64	2.06	0.46	9.19	0.5	0.16	1.54	0.88	0.35	2.19
	65+	Ref			Ref			Red		
Household Income	Less than 20K	6.09	1.68	22.06	1.07	0.32	3.52	1.04	0.4	2.73
	20-40K	3.12	0.95	10.29	1.1	0.42	2.85	1.05	0.52	2.1
	40-75K	2.12	0.69	6.49	1.18	0.51	2.72	1.38	0.73	2.61
	More thank 75k	Ref			Ref			Ref		
Individual level variables										
Perceived Social Support	Low	1.93	0.76	4.9	0.9	0.36	2.24	0.59	0.29	1.18
	Medium	1.28	0.53	3.13	0.24	0.09	0.66	0.64	0.35	1.15
	High	Ref			Ref			Ref		
Considered Getting Help for Problems Related to WTCD	Yes	1.72	0.56	5.26	0.36	0.1	1.26	0.15	0.05	0.5
	No	Ref			Ref			Ref		
Parents and/or Sibling Diagnosed w/ a Mental Illness	Yes	2.8	1.16	6.78	1.15	0.45	2.91	0.66	0.33	1.28
	No	Ref			Ref			Ref		

Table 12. Multivariate associations between demographic and social support variables at the individual and network levels and three PTSD trajectories as compared to the resilient/recovery trajectory[1,2] (*continued*)

Do You Have a Regular Doctor or a Usual Source of Health Care That You Can Go To For Your Routine Medical Care?	Yes	0.65	0.18	2.32	2.51	0.69	9.16	0.43	0.14	1.25
	No	Ref			Ref			Ref		
Median Fear	Above Median	3.11	1.17	8.26	0.53	0.27	1.08	0.48	0.29	0.79
	Below Median	Ref			Ref			Ref		
Stressor Before WTCD	Yes	1.24	0.43	3.58	1.53	0.64	3.68	0.68	0.36	1.25
	No	Ref			Ref			Ref		
Network level variables										
Social Embeddedness Scale	Below Median	1.58	0.68	3.63	2	0.97	4.13	0.87	0.5	1.53
	Above Median	Ref			Ref			Ref		
Number of People in Household	Only 1 Person	1.4	0.42	2.59	1	0.45	2.24	0.7	0.31	1.07
	2+ People	Ref			Ref			Ref		
Receive Any Assistance Related to WTCD	Yes	1.39	0.22	8.63	1.44	0.39	5.28	0.59	0.19	1.84
	No	Ref			Ref			Ref		
Did You Participate in Church After the WTCD	Yes	1.48	0.67	3.24	2.62	1.29	5.3	1.34	0.81	2.22
	No	Ref			Ref			Ref		
Did You Participate in Support Groups After the WTCD	Yes	2.3	0.57	9.31	2.1	0.7	6.31	0.74	0.27	3.05
	No	Ref			Ref			Ref		
Any stressor after WTCD	Yes	6.98	2.66	18.35	1.55	0.79	3.06	0.38	0.22	0.64
	No	Ref			Ref			Ref		

[1]All odds ratios are adjusted for all variables in the table; [2]Significance was determined using a 95% confidence interval, indicating p-value less than 0.05

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