Research paper

Trajectories of traumatic stress symptoms during conflict: A latent class growth analysis

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ABSTRACT

Background: The ways in which traumatic stress symptoms unfold under situations of ongoing threat and trauma exposure are poorly understood. The current study aims to identify traumatic stress symptom trajectories during conflict, as well as potential risk factors.

Methods: Experience sampling methods were used to study traumatic stress symptoms during the 2014 Israel-Gaza conflict in 100 Israeli civilians exposed to rocket fire. Summary reports of traumatic symptoms were made twice-daily for 30 days via mobile phone.

Results: Latent class growth analysis revealed four distinct classes (low, reducing, moderate, and high) characterised by their trajectory of traumatic stress symptoms during the conflict. Female gender, not being in a relationship, and higher prior trauma exposure were identified as potential risk factors.

Limitations: Data were not collected in the early phase of the conflict, the sample was relatively small, and only traumatic stress symptoms were investigated as outcomes.

Conclusions: This study identified heterogeneous traumatic stress symptom trajectories among civilians during a conflict, with different subgroups showing distinct response patterns over time, associated with various risk factors. Investigating responses to ongoing trauma, and identifying predictors of different stress symptom trajectories has clinical implications for the targeted delivery of interventions. Further exploration of heterogeneous trajectories could potentially elucidate mechanisms that drive resilience and recovery, including in situations of ongoing exposure such as during conflict.

1. Introduction

An increasing body of research indicates that following trauma exposure, subgroups in the population show different posttraumatic stress symptom (PTS) trajectories, including resilience, reducing symptoms, persistently high, and delayed onset of symptoms, among others (Andersen et al., 2014; Bonanno and Mancini, 2012; Bryant et al., 2015; Galatzer-Levy et al., 2013; Norris et al., 2009). These studies mostly focused on the posttraumatic period, yet situations of ongoing trauma exposure, such as armed conflict, community violence, and domestic abuse, affect many people globally. Research indicates that such individuals are at higher risk of psychopathology, including PTS, depression, and anxiety, among others (Golding, 1999; Johnson and Thompson, 2008). Yet, the various ways in which traumatic stress symptoms in particular develop during the peritraumatic phase while traumatic stress exposure is ongoing are still poorly understood.

There are different theories about how people react to ongoing trauma. Studies generally show that most people cope relatively well with traumatic stressors, even during an exposure period (Bonanno, 2004, 2005), reporting low levels of PTS. Among those who experience PTS, the stress-habituation model (Jaycox et al., 1998; Meichenbaum and Novaco, 1985) suggests that the impact of the traumatic stressor reduces over time as people adapt to stress exposure. In contrast, stress accumulation and dose-response models posit that the more stress people are exposed to, the worse their symptoms (Brewin et al., 2000; Buydens-Branchey et al., 1990; Kaysen et al., 2009; Rossman, 2001; Steel et al., 2009). This may result from attrition of various coping resources, which progressively reduce individuals' abilities to withstand stress (Hobfoll et al., 2009). It is likely that these different models apply to different subgroups of people; identifying those most vulnerable to the effects of ongoing or cumulative stress could help us to support the people most at risk of suffering worsening or chronically high levels of distress at an early stage.

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Developments in data analysis techniques have led to advances in the field of traumatic stress. Studies which rely on analyses of sample means or aggregated assessments give an inadequate picture of the variety of patterns of distress within populations, particularly over time (Galatzer-Levy et al., 2013; Ursano et al., 1999). In recent years, there has been a growing trend away from variable-centered approaches, towards person-centered approaches in which heterogeneity within populations are examined using latent growth mixture modelling techniques such as latent growth class analysis (LCGA), and growth mixture modelling (GMM) (Bonanno and Diminich, 2013; Bonanno et al., 2006; Norris et al., 2009). These models empirically identify distinct clusters of people in the larger population with similar symptom trajectories (Galatzer-Levy, 2014). Previous latent growth modelling studies conducted with a wide range of populations such as combat veterans, police officers, survivors of natural disasters, and people exposed to terror attacks, have consistently found that the predominant trajectory following traumatic exposure is usually characterised by no or low symptoms over time (Andersen et al., 2014; Bonanno, 2004; Bonanno et al., 2012; Fan et al., 2015; Galatzer-Levy et al., 2011, 2013; Lowe et al., 2014). Various other trajectories have also been observed, including chronic (persistently high), recovery (initially high followed by a reduction), worsening (initial symptomatology that increases over time), and delayed onset (initially low followed by an increase), among others.

Most studies focus on comparing individuals who develop PTSD with those who do not. However, it may also be important to differentiate between subgroups of individuals who do not have clinical significant levels of PTS, but have different response patterns from each other (Bonanno, 2004; Norris et al., 2009). Bonanno (2004) argues that studies often group resilient and recovering individuals into the same category, making the incorrect assumption that these two groups utilise the same coping processes, while Norris et al. (2009) note that most studies have been unable to differentiate 'resistant' individuals who show almost no symptoms, including during exposure, from 'resilient' individuals who may show some early symptoms and then quickly recover, as assessments mostly start in the posttraumatic stage. Assessing heterogeneous traumatic symptoms trajectories may provide an insight as to whether there are differences in the peritraumatic or early stage, and whether they impact on outcomes.

Risk factors for symptomatic posttraumatic stress trajectories include female gender (Fan et al., 2015; Johannesson et al., 2015), higher peritraumatic exposure (Johannesson et al., 2015; Lowe and Rhodes, 2013; Pietrzak et al., 2013), lower education levels (Johannesson et al., 2015; Pietrzak et al., 2013), not being married (Rosellini et al., 2014), and socioeconomic disadvantage (Lowe et al., 2014). It is likely that the same risk factors are relevant for peritraumatic stress symptom trajectories. This needs further investigation in peritraumatic contexts to understand if this is indeed the case, and for which trajectories.

Most studies of peritraumatic reactions utilise retrospective assessment and summary reports, asking participants to indicate the extent to which they experienced symptoms during a traumatic event. Research, however, indicates that memories of traumatic events may be fragmented and changeable over time (Foa et al., 1995; Southwick et al., 1997; Zoellner et al., 2001), and that retrospective assessments of states and symptoms are unreliable (Schwarz, 2012). Even studies assessing peritraumatic reactions in real time have mostly used cross-sectional assessments, which give only a snapshot indication of the level of symptoms, without identifying the trajectory of the individual's symptoms.

Innovative methods for measuring responses to trauma can be used to improve understanding of the impact of ongoing trauma. Ambulatory assessment methods such as experience sampling methodology (ESM), proximal intensive assessments (PIA), and ecological momentary assessments (EMA) entail multiple real-time assessments that ask participants about their states, symptoms and behaviors in the moment, or in the hours preceding each assessment (Bolger and Laurenceau, 2013; Carlson et al., 2016; Csikszentmihalyi et al., 2013). These methods enable the exploration of reactivity over time while minimizing ecological and retrospective biases (Bolger et al., 2003; Trull and Ebner-Priemer, 2013).

The current study investigates how traumatic stress symptoms unfold in real time, in different ways, among different groups of people; something that has only recently begun to be investigated, and never before in a group with current ongoing exposure. The study addresses knowledge gaps by using intensive longitudinal assessment methods to collect data, and latent growth mixture modelling to analyse these data, in order to identify traumatic stress trajectories among Israeli civilians during the Israel-Gaza War in July-August 2014. We hypothesized that we would identify heterogeneous trajectories of traumatic stress symptoms. Based on previous research we expected that the majority of participants would belong to a low symptoms class. We also expected to observe an increasing symptoms class (stress accumulation), and a decreasing symptoms class (habituation). We did not expect to find a delayed trajectory, as we investigated the early period after exposure started. Our second hypothesis was that the risk factors for belonging in the highest symptoms trajectory would include being female, higher levels of prior and current exposure, lower income, being single, and lower education.

2. Method

The current study forms part of a larger prospective study conducted during and after the 2014 Israel-Gaza conflict (8 July–26 August 2014) (Gelkopf et al., in press). During the 50-day conflict, more than 4500 rockets and mortars were fired from Gaza towards Israeli communities, and Israel conducted air and ground military operations in Gaza. Israel has an effective missile defence system, and many people have bomb shelters or reinforced rooms that provide protection. When rockets were fired, warning sirens were sounded in the specific area under threat in Israel, and residents had a time window of 15–90 s to safely seek shelter, based on their distance from Gaza, and as determined by the Home Front Command. The closer participants were to the border, the shorter the time window to find shelter before they were at risk of being hit by a rocket. Although in most cases the rockets were either intercepted or missed their target, there were some Israeli civilian deaths and injuries.

Participants entered the study between days 8–29 and completed an entry questionnaire. Thereafter, for the next 30 days, participants were sent ESM questionnaires to their smartphones, morning and evening, that referred to experiences, symptoms and reactions that had taken place since the previous questionnaire. Participants were remunerated for their participation. The design and procedure was approved by the University of Haifa Ethics Committee.

2.1. Participants

We recruited a community sample of participants who lived in southern and central Israel within 90 s of a potential rocket hit, through advertisements posted on social networking, community and organizational websites, as well as local community and higher education noticeboards. Potential participants contacted the research team and study explanation and informed consent were carried out via the telephone. For the current study, 100 participants provided data between days 15–45 of the conflict, and 96 participants completed the 30-day protocol. No significant differences in demographic measures were found between those who completed the protocol and those who dropped out.

2.2. Measures

2.2.1. Baseline

Demographics were queried, namely gender, age, in a relationship vs single, years of education, and financial status which was operationalised by asking how the participants rated their financial status in relation to those around them (see Table 1).

Trauma history was assessed via the Trauma History Screen, a brief measure in which participants report their exposure to different types of