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Traumatic Events and Physical Health in a New Zealand Community Sample

Ross A. Flett<sup>1</sup>, Nikolaos Kazantzis<sup>2</sup>, Nigel R. Long<sup>1</sup>,  
Carol MacDonald<sup>3</sup>, & Michelle Millar<sup>4</sup>

**MS# 01-99-128-R3**

**Word Count: 6215**

This research was supported by a grant from the New Zealand Accident Rehabilitation and Insurance Corporation (ACC). The authors thank Denny Meyer for assistance with statistical analysis.

Correspondence concerning this article should be addressed to Nikolaos Kazantzis, Ph.D., School of Psychology, Massey University at Albany, Private Bag 102904, NSMC, Auckland, New Zealand, telephone: (64) 94439799, fax: (64) 94439732, e-mail: N.Kazantzis@massey.ac.nz, web: <http://www.massey.ac.nz/~nkazantz/>

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<sup>1</sup> School of Psychology, Massey University, Palmerston North, New Zealand

<sup>2</sup> School of Psychology and Waitemata District Health Cognitive Therapy Center, Massey University at Albany, Auckland, New Zealand

<sup>3</sup> Open Polytechnic of New Zealand, Lower Hutt, New Zealand

<sup>4</sup> Wellington School of Medicine, Wellington South, New Zealand

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first submitted 8/ 6/ 1999: Journal of Traumatic Stress

### Abstract

Traumatic event exposure and physical health were examined in a community-residing sample of 1,500 New Zealand adults. Half (51%) reported past traumatic event exposure, 9% reported recent (past 12 months) trauma exposure, and 40% reported no exposure. After adjusting for gender, ethnic, and age differences, those experiencing crime and accident trauma exhibited significantly deteriorated physical health, as measured by current physical symptoms, chronic medical conditions, and chronic limitations in daily functioning. Further research is required to assess the influence of traumatic events on the physical health among adults from other countries, and to evaluate the factors that may mediate or moderate this relationship for different subgroups of the New Zealand population. Limitations of the present study are outlined.

Keywords: TRAUMATIC STRESS, HEALTH, ETHNICITY, NEW ZEALAND

**Word Count: 125**

### Traumatic Events and Physical Health in a New Zealand Community Sample

There has been a steady increase in recent research directed towards the examination of the mental and physical health effects of traumatic events (e.g., Eisen et al., 1998; Golding, 1994; Laws, 1993; Spiro, Schnurr, & Aldwin, 1997; Taft, Stern, King, & King, 1999; Ullman & Segal, 1996). There is now substantial empirical evidence demonstrating the adverse mental health effects of a wide variety of stressful events, including but not limited to, burn injuries (Fauerbach, Lawrence, Haythornthwaite, & Richter, 1997), military combat (Stretch, Knudson, & Durand, 1998; Sutker & Allain, 1996), motor vehicle accidents (Sprang, 1997), natural disasters (Green, Grace, & Gleser, 1985; Heitzman, 1998; McFarlane & Papay, 1992), nuclear disasters (Tarabrina, Lazebnaya, & Zelenova, 1994), domestic assault (Watson et al., 1997), and sexual assault (Flett, MacDonald, & Long, 1996; Pribor & Dinwiddie, 1992; Resnick, Kilpatrick, & Lipovsky, 1991). With few exceptions (e.g., Escobar, Canino, Rubio-Stipec, Bravo, 1992; Litz, Keane, Fisher, Marx, & Monaco, 1992), this research has concentrated on evaluating trauma impact on mental health rather than physical health.

Despite the limited existing data demonstrating effects of exposure to traumatic events on physical health, several avenues of research suggest that such a relationship exists. In particular, research has raised the possibility that specific health effects may result from exposure to different types of trauma. Adolescent victims of rape, for example, frequently report sleep difficulties and somatic complaints (Choquet, Darves-Bornoz, Ledoux, Manfredi, & Hassler, 1997). In addition, one study concluded that the traumatic stress following intense exposure to bushfire led to the development of a range of musculoskeletal and neurological symptoms among firefighters (McFarlane,

Atchison, Rafalowicz, & Papay, 1994). Other research has demonstrated that specific traumatic events, such as combat-related trauma (Marshall, Jorm, Grayson, & O'Toole, 1998), criminal victimization (Kilpatrick & Resnick, 1993), and sexual and physical abuse (Choquet et al., 1997; Leserman, Li, Drossman, & Hu, 1998) are often associated with increased physical and mental health service utilization. In addition, a number of researchers have highlighted a relationship between traumatic event exposure and poor health practices leading to physical health problems (see reviews in Eisen et al., 1998; Newberry, 1998).

Findings from studies examining the impact of traumatic stress outside the United States have been limited by a concentrated focus on specific sub-samples of the population. For example, long-term trauma effects have been studied among war veterans from Australia (Cunningham & Cunningham, 1997; Grayson, Dobson, & Marshall, 1998), Canada (Beal, 1995), Israel (Skodol, Schwartz, Dohrenwend, & Levay, 1996), New Zealand (e.g., Kazantzis, Flett, Long, MacDonald, & Millar, 2000), Sri Lanka (Somasundaram, 1996), and Turkey (Sungur, Surmeli, & Ozcubukcuoglu, 1995). Trauma effects have been studied among those exposed to a variety of terrorist activities, such as transport hijacking in France and Israel (Amir, Kaplan, & Kotler, 1996; Cremniter et al., 1997; Shalev, 1993), and other research has shown that those operating as firefighters in Australia (McFarlane et al., 1994; Spurrell & McFarlane, 1993) and accident rescue teams in Denmark (Andersen, Christensen, & Petersen, 1991) exhibit marked posttraumatic stress following exposure to large bushfires and accidents during work. The effects of exposure to traumatic events have also been studied among refugees from Tibet (Servan-Schreiber, Lin, & Birmaher, 1998), Somalia (Roodenrijs, Scherpenzeel, & de Jong, 1998), Bosnia, Herzegovina, and Croatia (Marusic, Kozaric-Kovacic, Folnegovic-Smalc, & Ljubin, 1995). Nonetheless, comparatively little is

known about the potential impact of exposure to traumatic events on physical health among general samples of community-residing individuals (see Stein, Walker, Hazen, & Forde, 1997, for exception).

The purpose of the present study was to evaluate the influence of several types of traumatic events on health perceptions and physical health problems among a large New Zealand community sample. The present study employed widely used indicators of physical health: perceived health, chronic limitations in daily functioning, chronic symptoms, and current physical symptoms in the investigation of several hypotheses.

On the basis of evidence suggesting that traumatic event exposure may affect physical health through development of posttraumatic stress symptomatology (Breslau, 1998), inferior health practices (Laws, 1993), or combined behavioral, psychological, and neurobiological pathology (Friedman & Schnurr, 1995), it was hypothesized that all types of traumatic events would be associated with poorer physical health in the present study. Given that health differences between ethnic groups have been associated with variations in the quality of social networks (Aday, 1994), socioeconomic status (Norris, 1992), and access to health services (Golding, Baezconde, & Lourdes, 1990), the effects of ethnicity were adjusted in examining the impact of traumatic events. Since women and older adults are often more likely to exhibit increased symptomatology following traumatic event exposure (e.g., Norris, 1992; Breslau et al., 1998; Stein et al., 1997), the effects of gender and age were also adjusted in examining effects.

## Method

### Sample

The study was carried out across both New Zealand islands, and included both rural and urban populations. A structured interview was carried out using the data from

a 1995-1996 study of the non-institutionalized New Zealand population (Flett, Millar, Long, & MacDonald, 1998).

A three-stage cluster sampling methodology was employed to select the participants. The first stage involved the random selection of 150 census enumeration districts from both New Zealand islands. In order to reliably investigate particular subgroups of the New Zealand population, such as Maori ancestry (indigenous people) and rural residing individuals, it was necessary to ensure that the final sample included an adequate proportion of these groups. Thus, the sampling design allowed for the deliberate oversampling of Maori ancestry and rural residing individuals. While this stratification does not reflect a household probability sampling methodology, it is similar to that used in prior surveys (e.g., Hornblow, Bushnell, Wells, Joyce, & Oakley-Browne, 1990).

The second stage of the sampling strategy involved the random selection of a sample of dwellings from each of the enumeration districts. Households were contacted by trained National Research Bureau (NRB) staff on behalf of the Massey University research team, and up to three visits were made to each dwelling before substitution (in the event of non-contact). In total, 150 enumeration districts were sampled and 10 interviews conducted in each<sup>5</sup>.

The third stage of the sampling strategy involved selecting an eligible participant from each household. If there was more than one eligible individual in a given household (i.e., greater than 18 years of age), then individuals were listed in descending order of age onto a sampling grid. The individual selected for an interview was the individual with the next birthday. Using this sampling strategy, 2,590 households were

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<sup>5</sup> Geographic distribution of enumeration districts ( $N = 150$ ) were as follows: Northland ( $n = 16$ ); Auckland ( $n = 23$ ); Waikato ( $n = 19$ ); Bay of Plenty ( $n = 28$ ); Gisborne ( $n = 16$ ); Hawkes Bay ( $n = 7$ );

successfully contacted. Of this total, 1,090 refused to be interviewed yielding a sample of 1500, and a response rate of 58%.

This strategy yielded a sample of 1500 community residing New Zealand adults, 536 men and 961 women (mean age = 45.39,  $SD = 16.89$ ). Forty-five percent of the sample were “younger adults” (aged 18-39 years), 31% were “middle-aged adults” (40-59 years), and 24% were “older adults” (aged 60-90 years). Thirty percent were Maori, 46% were employed and 61% were married. The characteristics of the sample were somewhat similar to national estimates: gender (48% male, 52% female), age (50% young, 38% middle aged, 12% older), ethnicity (15% Maori), marital status (48% married), and employment status (6% unemployed), as reported in the latest census reports (Statistics New Zealand, 1997, 1998).

### Measures

Traumatic event measures. Given the evidence demonstrating that a high percentage of community samples experience multiple traumatic events, it was important for the interview to incorporate a broad definition and assessment of trauma. The present study used a modified version of the Traumatic Stress Schedule (TSS; Norris, 1990) to collect past (greater than 12 months) and recent (less than 12 months) exposure to traumatic events. Since the TTS is restricted to a general assessment of traumatic events, three items were modified to distinguish between child and adult sexual assault, familial physical assault and other physical assault, and serious motor vehicle accident and other serious accidents. The definition for disaster was also expanded from the context of Hurricane Hugo to include exposure to general experiences of natural disasters (i.e., including fire, flood, or earthquake). The resultant measure assessed past and recent incidence of 12 different traumatic events: combat,



child sexual assault, adult sexual assault, domestic assault, other physical assault, robbery or holdup, motor vehicle accident, other accident resulting in injury, disaster experience, and being forced to leave home or take other precautions because of natural disaster.

Physical health measures. Four measures of physical health were used.

Perceived general health status was assessed with one question following a lead-in to the health section of the interview. The interviewer first said: “These questions are questions about your general physical health.” The respondent was then asked “Overall, would you say your health is excellent (1), good (2), not so good (3), or poor (4)?” a question demonstrating utility with New Zealand adults in the 1992 National Health Survey (Statistics New Zealand and Ministry of Health, 1993). Perceived general health status ratings have also been made on four point scales in previous research with samples of New Zealand Vietnam War veterans, United Nations peacekeepers, and general military personnel (Alpass, Long, MacDonald, & Chamberlain, 1996; MacDonald, Chamberlain, & Long, 1996). Similar ratings of overall health are one of the most commonly used measures of health and show consistency with physician health assessment (LaRue, Bank, Jarvik, & Hetland, 1979), number of physician visits (Ware, 1986), and are also predictive of mortality (Idler & Kasl, 1991).

Chronic limitations in physical functioning (i.e., inability to carry out daily activities) were assessed with 12 items similar to those used to assess chronic limitations in prior research (e.g., Long, Chamberlain, & Vincent, 1992; MacDonald et al., 1996). The interviewer first said: “Here are a list of activities of daily living that people sometimes have trouble with”. The respondent was then asked, “Do you have trouble doing any of these things because of your health?” The list included bathing,

dressing, getting out of bed, walking, toileting, meal preparation, shopping, light housework, heavy housework, managing money, using the telephone, and eating. This measure provides a total number of chronic limitations in physical functioning (Ware, 1986) and is similar to other measures of chronic limitations in physical functioning used in previous studies of trauma effects on physical health (Ullman & Siegel, 1996). The coefficient alpha for the present study was .82.

Chronic symptoms were also assessed. Respondents were asked whether they had experienced any of a list of 17 chronic medical problems for a duration of six months or more using a modified version of the Checklist of Serious Medical Conditions (Belloc, Breslow, & Hochstim, 1971). The checklist involved asking a number of questions regarding chronic health conditions. For example, the interviewer first said: "We would like you to think about the long-term problems you may have. Long-term health problems are more severe health problems that you have had for six months or more, or something that is likely to last for at least six months." The respondent was then asked, for example, "Please answer 'yes' or 'no' to indicate if a doctor, nurse, or other health care worker has told you whether you have asthma." Additional questions were asked about several chronic medical conditions (e.g., diabetes, epilepsy, high blood pressure or hypertension, arthritis or rheumatism, heart trouble, cancer) using the same question format. From their responses, respondents were categorized along a physical health continuum ranging from minimum state defined by a number of serious chronic medical conditions, to an optimal state defined by no complaints. This general approach to the measurement of health in a population has been reviewed in detail (see Breslow, 1989). The coefficient alpha for the present study was .78.

Finally, respondents were asked to complete the Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982). The PILL is a measure of current physical symptoms that has strong criterion-related validity with health-related work absences and more physician and health care center visits. Despite this, previous studies have demonstrated that a number of list items on the full 54-item version of the PILL are highly correlated and do not contribute independently to the physical symptom total (see MacDonald et al., 1996). Highly correlated items were combined to form the 28-item version for use in the present study. For example, the original items “acne and pimples on face” and “acne and pimples other than face” were combined as a single item “acne or pimples”. The resultant measure assessed a similar range of physical health problems as the full version, including relatively broad categories such as “eye problems,” “numbness or tingling in any part of body,” as well as specific categories such as “cold hands or feet even in hot weather” and “twitching of eyelid”. In this way, respondents were asked to indicate the experience of 28 physical symptoms and complaints over the past month, using a 5-point scale ranging from 1 (not at all) to 5 (extremely) to provide a total index of the severity of current physical health symptoms. The coefficient alpha for the present study was .86.

### Procedure

Participants were given a detailed information sheet that described the nature of the study, their rights as participants and the responsibilities of the researchers. Participants were informed that their responses would be kept anonymous and confidential, that they could skip or omit any of the interview questions, and they could discontinue participation in the study at any time. Given that the survey involved sensitive issues about experiences of traumatic events, participants were interviewed in their homes by trained NRB staff (professional interviewers who had extensive experience with population interviews and surveys). After pilot testing, all interviewers spent seven hours practicing for this project, with the help of a one-hour structured interview designed specifically for this study<sup>6</sup>. Data collection was conducted over a three-month period in 1995.

### Data analysis

The sample was first classified into separate trauma categories on the basis of prior research examining the trauma using the TTS (i.e., Norris, 1992). This classification yielded three trauma categories: crime (sexual assault, theft by force, domestic assault, and other physical assault), hazard (natural disaster and disaster precaution), and accident (motor vehicle accident, other accident, tragic death). A multivariate analysis of covariance (MANCOVA) procedure was performed on the four dependant variables: self-rated health, chronic limitations in physical functioning, chronic symptoms, and current physical symptoms. The trauma factors entered into the analysis were crime, accident, and hazard. The analysis was run to test for the main effects of trauma using a custom design that was not full factorial. Covariates included

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<sup>6</sup> A copy of the interview and administration procedure is available from the senior author.

in the model were gender (male, female), ethnicity (Europeans, Maori), and age (younger, middle-aged, older)<sup>7</sup>.

This analysis determined whether there were mean differences in physical health as a function of exposure to the different trauma while also controlling for the influence of the age, gender, and ethnicity of the sample. Results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory after a log transformation of all response variables. No post-stratification weighting methods were used as the purpose was to determine which effects were significant for the sample rather than to estimate the size of the effects. In these circumstances, it is not necessary to have an accurate representation of all population groups in the sample and the use of a post-stratification weighting procedure is not appropriate.

## Results

### Prevalence of traumatic events

Half of the sample (51%,  $n = 769$ ) reported that they had experienced a traumatic event in the past, 40% ( $n = 601$ ) reported no event, and 9% ( $n = 130$ ) reported recent experience of trauma. The overall prevalence for past and recent prevalence of different trauma was as follows, accidents (31%, 4%), crime (26%, 2%), and hazards (11%, 1%), respectively.

Women reported exposure to more past crime than men,  $\chi^2(1, N = 1497) = 10.53, p < .001$ , and more past accidents,  $\chi^2(1, N = 1497) = 3.94, p < .05$ . Europeans reported exposure to more crime in the past than Maori,  $\chi^2(1, N = 1497) = 3.94, p < .05$ ,

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<sup>7</sup> We also ran an analysis of variance collapsing across exposure type (i.e., some trauma exposure vs. none) to examine age, gender, and ethnicity interactions, but this analysis did not produce any two-way interactions that achieved significance.

and more past experience of accidents,  $\chi^2(1, N = 1497) = 11.81, p < .001$ . Middle-aged adults reported exposure to more crime in the past than younger and older adults,  $\chi^2(2, N = 1492) = 87.39, p < .001$ , and more past experience of natural hazards,  $\chi^2(2, N = 1492) = 10.64, p < .01$ , but younger adults reported more exposure to accidents in the past,  $\chi^2(2, N = 1492) = 10.93, p < .01$ . As can be seen from Table 1, only a small proportion of the sample reported recent experience of the different trauma. Maori reported more exposure to recent crime  $\chi^2(1, N = 390) = 5.30, p < .05$ , and recent accidents,  $\chi^2(1, N = 497) = 4.58, p < .05$ . No differences were found as to prevalence or traumatic events as a function of the other demographic variables (current paid employment, current marital status).

#### Relationship Between Traumatic Events and Physical Health

Data were analyzed using MANCOVA to examine the hypothesized main effects for different trauma. A composite dependent variable was computed within the analysis based on self-rated health, chronic limitations in physical functioning, chronic symptoms, and current physical health scores. Correlations among dependent measures are shown in Table 2.

Table 3 shows the mean and standard deviations of health measures for crime, hazard, and accident for the three levels of trauma exposure. As only a small proportion of the sample had experienced recent trauma, trauma exposure variables were collapsed to form dichotomous variables (i.e., exposure, no exposure) in the analysis of trauma impact. With the use of Pillai's Trace Statistic, the combined dependent variables were significantly affected by crime trauma,  $F(4, 1360) = 16.34, p < .001$ , accident trauma,  $F$

(4, 1360) = 6.42,  $p < .001$ , but not hazard trauma (see Table 4)<sup>8</sup>. The analysis suggests that when gender, ethnicity, and age were statistically controlled, exposure to hazard trauma was not related to poorer physical health. Subsequent univariate analysis revealed that exposure to crime was associated with poorer health as measured by current physical symptoms, and exposure to accidents was associated with deterioration in health as measured by chronic limitations in physical functioning, current physical symptoms, and total chronic symptoms (Table 4). In other words, those exposed to accidents exhibited an increase in both chronic and current health symptomatology.

Table 5 shows the untransformed mean and standard deviations of health measures for age, gender, and ethnic subgroups of the sample. With the use of Pillai's Trace Statistic, the combined dependent variables were significantly related to the covariates gender, ethnicity, and age. Univariate analyses showed that gender and ethnicity subgroups exhibited more physical health complaints, but age subgroups exhibited deterioration on all physical health measures. The analysis only produced a significant two-way interaction effect for ethnicity and age  $F(4, 1360) = 4.74, p < .01$ <sup>9</sup>. Examination of the estimated marginal means showed that physical symptoms were more pronounced for older Maori ( $M = 4.11$ ) compared to their European counterparts ( $M = 3.57$ ).

### Discussion

The results of the present study demonstrated that 51% of the sample reported past exposure to a traumatic event. Women reported more exposure to crime and accident trauma than men. Europeans reported more exposure to crime and accidents

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<sup>8</sup> Previous tests of the interactions between trauma type main effects failed to reach significance, suggesting that the effects of each trauma were independent of each other.

<sup>9</sup> Other analyses of two-way interactions between covariates were insignificant and consequently excluded from the MANCOVA model.

than their Maori counterparts, but Maori reported more recent exposure to these events. Younger adults reported more experience of accidents, but middle-aged adults reported more exposure to crime and hazards. It is difficult to assert that the prevalence estimates for traumatic events obtained in the present study are high or low since it depends on which type of trauma is examined. New Zealand is generally considered to be a low-stress country with relatively small involvement with international military operations or United Nations peacekeeping activities. While the overall rate of exposure for this sample is less than the prevalence for exposure recorded in the United States (Kilpatrick, Saunders, Veronen, Best, & Von, 1987; Norris, 1992; Resnick et al., 1991; Vrana & Lauterbach, 1994), much lower rates than those obtained in the present sample have also been recorded in the United States (Breslau, Davis, Andreski, & Peterson, 1991).

Given that the instrument used to gather prevalence data in the present study was similar to that used in previous studies (i.e., Norris, 1992) and respondents were assured anonymity prior to participation, there is no reason to suggest that individuals were not responding truthfully. It seems that the main difference between United States and New Zealand respondents lies in the proportion of individuals exposed to natural disasters (hazards), which are comparatively rare in New Zealand. However, it is also possible that there are differences in the openness with which participants from the two countries report trauma and with their subjective impressions of the defined events on the TTS (Norris, 1990).

Regarding traumatic event exposure and influence on health, the results showed that exposure to crime and accident events was associated with an increased prevalence of physical illness (as measured by the composite health variable), a finding consistent with prior research (Ullman & Siegel, 1996). The finding that accidents were associated



with poorer physical health corroborates prior research documenting physical health symptoms among survivors of motor vehicle accidents (Blanchard et al., 1997; Buckley, Blanchard, & Hickling, 1998). These main effects for crime and accident exposure, and the lack of significant interaction between the different traumatic event types suggests that the effects of each event are independent of each other, and support the predicted findings. The present study demonstrated these effects when gender, ethnicity, and age were statistically controlled. There was an ethnicity by age interaction where older Maori reported more chronic health and current physical health symptoms, a pattern consistent with the findings of research on older adult health in New Zealand (Hirini et al., 1999).

After the adjustment for ethnicity, the observed traumatic event impact on health is notable given the significant differences in observed frequency of exposure and the efforts taken to ensure adequate proportion of Maori sampled in the present study. Prior research has demonstrated that trauma effects are substantially different across ethnic subgroups, such as differences between European-ancestry and Hispanic groups in the United States (Ullman & Siegel, 1996), and research demonstrating that African-American groups may be more vulnerable to mental illness following exposure to traumatic events (e.g., Dunn, Paolo, Ryan, Dunn, & Van Fleet, 1994; Zatzick, Marmar, Weiss, & Metzler, 1994). However, the lack of culturally sensitive assessment of traumatic events and their potential effects raises caution about the conclusions that may be drawn about the associations between traumatic events and health in the present study (see reviews in Frueh, Brady, & de Arellano, 1998; Keane, Kaloupek, & Weathers, 1996). Further research is needed to investigate whether Maori-ancestry individuals are at greater risk of physical illness following exposure to traumatic events.

The data reported in this study were not obtained through a random sampling procedure of all members of the New Zealand population, nor are they strictly representative of the general population. In contrast to previous studies, traumatic event incidence was low in the present sample. Nonetheless, the findings obtained in the present study suggest that the incidence of traumatic events in New Zealand is lower than the United States, and traumatic event exposure is associated with similar influence on physical health. However, replication of these findings is required before the relationship between trauma and physical health can be taken as conclusive.

As with prior surveys of traumatic events in the community, the present study was limited by the use of self-report measures to evaluate physical health. The retrospective nature of the study also precludes any ability to evaluate the causal effects of traumatic stress on physical health. Ideally, future research would use a prospective research design and physician assessment to evaluate physical health prior, immediately after, and at regular intervals following traumatic event exposure.

Despite these limitations, the present study examined a heterogeneous sample drawn from 14 geographically distinct areas across both New Zealand islands. The present study examined the influence of a broad range of traumatic events and was able to demonstrate that those adults exposed to crime and accident events exhibit more physical health symptoms. These features make this study one of the few studies to demonstrate a relationship between the influence of different traumatic events on physical health in a general population sample. The finding that the prevalence of traumatic events was significantly greater among ethnic and demographic subgroups is particularly noteworthy. Further research is required to assess the influence of traumatic events on the physical health among adults from other countries, and to evaluate the

factors that may mediate or moderate this relationship for different subgroups of the New Zealand population.

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