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Development of an inventory for measuring war-related events in refugees

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Abstract

Knowledge about the range of war-related events experienced by refugees is lacking. This initial report of the New Mexico Refugee Project (NMRP) details the development of the Comprehensive Trauma Inventory (CTI), the first empirically developed instrument that measures war-related events in community-dwelling refugees. Both expert and participant methods using quantitative and qualitative approaches were used to broaden knowledge about the range of war-related experiences in refugees. The CTI-164, developed by expert rational methods, was administered to 36 Kurdish and 31 Vietnamese refugees along with an in-depth interview (IDI) and five other quantitative instruments measuring symptoms, impairment, and social support. Focus groups (FGs) were also conducted. Text and descriptive analyses, *t* tests, and correlations were used to analyze data. Refugees reported an average of 150 war-related events on the CTI-164, more than in other studies. IDIs and FGs revealed 123 war-related events and event types that were not on the CTI-164 or other measures currently used. Refugees reported multiple chronic symptoms and significant impairment in daily functioning. The CTI-164 was modestly correlated with symptoms and impairment. The definable number and type of war-related events endured by refugees is greater than in previously published research. Expert rational methods are not adequate to develop an instrument to define war-related events and measure their association with health outcomes. Participatory and qualitative methods reveal events and event types that have not been previously defined. The CTI warrants further testing after revision to incorporate items and event types determined by qualitative methods.

Accurate measurement about events, trauma, and health outcomes in refugees is lacking [1]. Two conceptual issues are particulary important regarding measurement of events and trauma. First, it is important to define the full range of war-related experience to document human rights abuses, to validate refugees' experiences, and to provide a standard for research measurement. Second, establishing a standard method to differentiate between "event" and "trauma" is crucial to enhance prediction of adverse health outcomes and to ensure the integrity of refugee trauma research. Logical extensions of these conceptual ideas reveal important methodologic issues. Validity of an instrument that purports to assess events and traumatic experiences will be improved by using theory to define the constructs of interest and by using sound psychometric development principles that combine the use of qualitative and quantitative methods with a representative sample of a relevant population [1].

No empirically developed instruments that measure the range of war-related and potential traumatic events in community-dwelling refugees are available [1]. Two instruments of war trauma have been developed in refugees, 1 using expert rational methods in clinical samples of Southeast Asians [2], and 1 using expert rational methods in a community sample of Cambodians [3]. Two instruments measuring resettlement and postmigration stress have been developed in refugees, 1 using expert rational methods in asylum-seekers [4,5], and 1 using expert rational methods

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in a community sample of Cambodians [3]. Instruments developed in refugees that measure pre-war or other non-war events are not available.

The New Mexico Refugee Project (NMRP) was established to improve measurement of refugee torture, trauma, and health status. The Comprehensive Trauma Inventory (CTI) is a community-based, empirically derived instrument being developed to measure a broad range of war-related events in refugees. This report details the development of the CTI. Specifically, we described the use of both quantitative and qualitative methods in phase I of the 2-phase NMRP to improve knowledge about the range and type of war-related experiences in refugees.

1. Method

1.1. Theoretical considerations

First, we considered the kind of events to be measured. While there is a theoretical distinction between life events, stress events, and traumatic experiences, a central goal of the NMRP was to identify a broader range of war-related experiences in refugees than currently exists. While refugees also experience non-war-related events, which are also likely to affect health outcomes [6], the CTI is being developed to specifically measure a broad range of war-related events in refugees. Later work will distinguish the relative traumatic nature of these events.

Our second consideration was about how to best develop a measure of war-related events, given funding and logistical restrictions. The most valid instruments will be derived by using multiple methods from multiple sources, including experts and participants [1]. Events differ from war to war through history, and other life events occur during war, such that distinguishing "war events" from other events may be difficult. Thus, we decided to use both experts and refugee participants combining qualitative and quantitative methods to collect data from two ethnic groups from different historical contexts at 2 US sites.

1.2. Study design

Phase I of the NMRP was a cross-sectional survey using both expert rational and participatory methods and both qualitative and quantitative methods to detect all possible war-related "traumatic" events and types. The CTI-164 (described below in "instruments") was the quantitative instrument developed for phase I by expert rational methods, and in-depth interviews and focus group (FGs) were the qualitative instruments developed for phase I using participatory methods. We also used other existing quantitative instruments about symptoms, impairment, and social support to provide descriptive data about the population and to assess predictive validity of CTI-164 events to health outcomes. The final process of phase I consisted of synthesizing and triangulating data from the qualitative interviews with quantitative data to revise the CTI-164 for phase II, where it would undergo validity and reliability testing.

1.3. Populations and sampling

The phase I sample was drawn from communities of Kurdish and Vietnamese refugees in Colorado Springs, CO and Albuquerque, NM, respectively. Kurds were primarily from northern Iraq, and had resettled in Colorado after 1990. Vietnamese were resettled in Albuquerque since 1975 in 3 waves. There has been more immigration and secondary migration in the Vietnamese than in the Kurds. Refugee advisors and snowball sampling techniques were used to conduct purposive sampling to produce groups of people who had experienced "torture," "non-torture war-related trauma," and "no war-related trauma." Expert option and preliminary power analyses determined that a sample of 72 was ideal, stratifying by trauma type, ethnicity, and gender, to produce adequate data for analyses. Pre-study meetings with refugee consultants indicated that it might be difficult to find female Vietnamese who had been tortured and Kurds who had no war-related trauma.

Experts chosen to develop the CTI-164 included the core NMRP study team (M.H., V.E., T.W., B.K.) and two study consultants (J.J., J.W.) who have years of clinical and research experience with refugees.

1.4. Instruments

1.4.1. The Trauma Experiences Questionnaire (TEQ)

Developed by our research team and adapted partly from criteria published by Thompson et al [7], the TEQ was used to screen people into 1 of the 3 entry-criteria categories ("torture," "non-torture war-related trauma," "no war-related trauma"). The United Nations Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment [8] definition of torture was operationalized into a checklist for screening participants for torture.

1.4.2. The In-Depth Interview (IDI)

Investigators and consultant's expert in qualitative research developed the IDI to collect data about the range, type, and importance of war events; the range, type, and importance of symptoms; and the perceived relationship of events to symptoms; as well as information about potential moderators of the effects of war events such as shame and guilt, and information about resiliency. Questions to elicit war-related experiences stressed our interest in "traumatic" events. Interviewers for IDIs were Kurdish and Vietnamese refugees selected for their respected standing in the community (1 of each gender by ethnicity). IDI training consisted of 40 hours of didactic and interactive education, which included role-playing, 2 taped interviews, and 5 field interviews for each interviewer, all of which were reviewed by the principal investigator. Standardization was enhanced

by having each interviewer use a training manual, follow the IDI format, and train in specific interviewing techniques, and by having the primary investigator review interviews and data with each interviewer at specific data collection intervals.

1.4.3. Focus groups (FG)

Investigators and consultant's expert in qualitative research methods developed the FG format and questions to collect data about trauma, torture, symptoms, and impairment. FGs were conducted by 2 of the authors (M.H., J.J.).

1.4.4. The Comprehensive Trauma Inventory-164 (CTI-164)

This version of the CTI was developed by expert rational methods specifically for phase I of the NMRP. Published war-related events experienced by refugees were identified from a comprehensive review of the literature. The core research team then conducted brainstorming sessions to determine other possible events that might occur in war for soldiers or civilians. Events identified from these processes were combined, sorted by type of events, and condensed where items were considered to be very similar to others, which produced 164 items. We decided to place these items into 4 trauma type categories, consistent with other refugee trauma research: (1) physical trauma, (2) psychological trauma, (3) sexual trauma, and (4) combat trauma. During data analyses, a fifth "total" score was derived by summing scores from all 4 CTI categories. Consistent with the current standard in the field, the Harvard Trauma Questionnaire (HTQ) [2], each CTI-164 could be answered by checking any and all boxes that related to the way that event was or was not experienced: (1) did not happen, (2) experienced, (3) witnesses, or (4) heard about. During data analyses, the ways events could be experienced were condensed into 2 categories: (1) "me" (experienced) and (2) "all" (experienced + witnesses + heard about). Thus, 10 CTI-164 event categories were derived for data analyses (e.g., physical "me", physical "all", etc.), and summative scores were created for each category for each participant. The CTI-164 was administered after the IDI section on recall of trauma events was conducted. Recognition memory is more comprehensive than recall memory [9], which is why both methods were used to meet the study goal of developing an instrument to include the broadest possible range of war-related events.

1.4.5. The New Mexico Refugee Symptom Checklist (NMRSCL)

The NMRSCL is in development as part of the NMRP and will be the topic of another report. The phase I version of the NMRSCL was also developed by using expert rational methods similar to that used to develop the CTI-164. Thirty participants were asked to complete this quantitative NMRSCL and 37 participants were asked open-ended questions about symptoms in the context of the IDI. The NMRSCL has 67 symptom items organized into 15 composite scales with spaces for write-in symptoms for each scale, and is scored 0 = no and 1 = yes by instructing participants to check an item if that symptom has been "bothersome and persistent" during the past year. The NMRSCL is being developed into symptom scale health outcome measures for refugees.

1.4.6. The Sheehan Disability Inventory (SDI)

The SDI has three 10-point Likert scales that measure impairment due to the disruption of daily activities in the three areas of work, social, and home/family life. There is also a 5-point global disability rating scale. The SDI has been used extensively in research, has adequate internal reliability, and is sensitive to change with treatment [10]. The SDI was used in phase I as a health outcome measure of impairement.

1.4.7. The Medical Outcomes Study Short Form 36 (SF-36)

The SF-36 was developed and validated in the Health Insurance Experiment and Medical Outcomes Study, and is a self-report questionnaire measuring level of functioning and impairment in eight domains on a scale from 0 (poor) to 100 (excellent) [11,12]. The SF-36 is brief, psychometrically well tested, and appropriate for administration to persons over the age of 14, and may be self- or interviewer-administered. International studies have demonstrated the feasibility of achieving valid translations, highlighted the importance of standardized translation with attention to cultural issues, and pointed to the potential usefulness of the SF-36 in international comparisons [13]. The SF-36 was used in phase I as a health outcome measure of impairment.

1.4.8. Post-migratory Social Support Inventory (PMSSI)

The PMSSI, developed by our research team, is a 7-item self-rated questionnaire that assesses the number of relatives and friends that are in the participant's country of origin, in the United States, and in the same city as the participant.

1.5. Data collection

The CTI-164 and the existing instruments about symptoms, impairment and social support were administered during the same session as the IDI and in the same order for each participant. All IDIs were audiotaped and conducted in the language requested by the participant by ethnic and gender-matched interviewers after verbal and signed informed consent. The study was approved by the University of New Mexico's Human Research Review Committee. Assurances of confidentiality are highly important for ethical and scientific reasons in refugees [9] and were given carefully and fully before proceeding. Breaks were allowed at the participant's request since the IDI and other data collection averaged 4.5 hours per person. Data accuracy was assessed 2 ways. First, participants were asked to inform the interviewer if they did not want to talk about an issue. The interviewer would cease recording,

discuss the issue, and determine how to proceed while being audiotaped. Second, at the end of the interview with the recorder off, each participant was asked, "Was there anything that came to mind during the interview that you did not talk about?" and "Did you answer these questions truthfully?" Each participant was told that this was only for assessment of data integrity. In the event that there was disclosure of information off tape or disclosure that not all information had been relayed, the interviewer would make field notes about this fact, but not about the specific information discussed. FGs were conducted with the aid of a translator, and answers were typed into a computer file by the interviewers.

1.6. Instrument and data translation and transcription

Translation is complex and must be adapted for specific purposes [14]. All questionnaires in the NMRP were translated into Kurdish and Vietnamese using standard, back and forth blinded techniques and consensus approaches [15-17]. Each interviewer translated the interviews he or she conducted back into English using a standard approach, consulting with other interviewers if there were questions about words or phrases. Once in English, IDIs were typed into a computer file.

1.7. IDI and FG data synthesis and reduction

A code book was developed by the research coordinator (V.E.) with investigator input in order to extract data from the IDIs, which was conducted by using colored markers to "tag" war-related "traumatic" events on a hard copy of each IDI. Themes of potential trauma types were also evaluated from IDI and FG data in a similar fashion. Events and type themes were reviewed by core team members and reduced by deleting items that were duplicates literally or in meaning, and then by combining items that had similar meanings.

1.8. Data analyses

In addition to IDI and FG coding, synthesis and reduction, quantitative data (CTI-164, TEQ, NMRSCL, SDI, SF-36, PMSSI) were entered in ACCESS and transferred into SPSS for analyses. Analyses of events, themes, and relationships between the CTI-164 and outcomes measures were conducted using descriptive statistics, correlations, and *t* tests to describe and test properties of the CTI-164.

2. Results

2.1. Sample

Table 1 shows the demographics and TEQ category of the sample. It was difficult to find women of either ethnic group who were tortured or Kurds of either gender who had no war-related trauma. Thus, oversampling in other categories was used to obtain the desired sample size: 9 Kurdish males were recruited in TEQ categories 1 and 2, and 15 Kurdish females were recruited in TEQ category 2. There were no refusals to participate; however, recruitment was aided by "word of mouth", so those not willing to participate may never have been formally contacted. Sixty-eight subjects were recruited and 1 withdrew. The final phase I sample (N = 67) was 54% Kurdish (n = 36), 46% Vietnamese (n = 31), 54% male (n = 36), and 46% female (n = 31). About 72% of Kurds and 39% of Vietnamese had some college education, with Vietnamese females having the lowest average education level. Vietnamese participants were significantly older than Kurdish participants (55.7 [8.8] years *v* 36.9 [9.2] years; $t[64] = 8.36$; $P < .01$).

Table 1
Study entry trauma category, education, and age of participants

	Vietnamese (n = 31)		Kurdish (n = 36)		Total (N = 67)
	Male (n = 18)	Female (n = 13)	Male (n = 18)	Female (n = 18)	
Trauma category*					
1. Torture	6	1	9	2	18
2. War-related trauma	6	6	9	15	36
3. No war-related trauma	6	6	0	1	13
Total	18	13	18	18	67
Education level					
0-8 yr	0	5	0	2	7
9-12 yr	8	5	4	5	22
College/technical school	9	3	14	11	37
Total	17*	13	18	18	66†
Age category (yr)					
20-44	0	0	2	9	11
45-65	12	11	16	8	47
65-90	5	2	0	1	8
Total	17†	13	18	18	66†

* Self-report on the Trauma Experiences Questionnaire (TEQ).
† One value missing.

Table 2
Average number of reported CTI-164 events by ethnicity and gender

Events (total in sample)	"Me"/"All" ratio	Vietnamese mean events (n = 31)			Kurdish mean events (n = 35)			Gender mean events (n = 66)		Total sample mean events (N = 66)
		Male	Female	Total	Male	Female	Total	Male	Female	
Total all (n = 9889)	0.17	64.3	22.2	**46.6**	255.4	227.9	**241.3****	157.1	141.6	149.8
Total me (n = 1711)		28.2	13.2	21.9	37.1	22.3	29.5	32.5**	18.5	25.9
Physical all (n = 2801)	0.12	24.6	7.5	17.5	73.5	56.1	64.6	48.4	35.7	42.4
Physical me (n = 335)		9.0	2.6	6.3	6.5	1.6	4.0	7.8	2.0	5.1
Psychological all (n = 4707)	0.21	27.8	11.1	20.8	120.9	111.5	116.1	73.0	69.4	71.3
Psychological me (n = 986)		13.8	8.0	**11.4**	21.1	15.3	**18.1****	17.3	12.2	14.9
Sex all (n = 610)	0.01	2.4	0.2	1.5	15.0	17.2	16.1	8.5	10.1	9.2
Sex me (n = 8)		0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1
Combat all (n = 1771)	0.22	9.5	3.4	6.9	45.9	43.1	44.5	27.2	26.4	26.8
Combat me (n = 382)		5.3	2.5	**4.1**	9.4	5.3	**7.3****	7.3	4.1	5.8

If asterisk is in a "total" column, comparison is between ethnic groups and compared values are in bold; if asterisk is in a "gender" column, comparison is between gender groups and compared are in bold.

*$P < .05$.

**$P < .01$.

2.2. IDI events

Project time constraints allowed for 40 (12 Vietnamese females, 10 Vietnamese males, 8 Kurdish females, and 10 Kurdish males) IDIs to be coded by events and type in time for instrument revision for phase II. The total number of war-related events coded from these interviews was 612, an average of 15.3 events spontaneously recalled per participant as "traumatic". One hundred twenty-three of the 612 recalled traumatic events were not on the CTI-164.

2.3. IDI and FG themes

The IDI and the FG text data were evaluated for trauma type themes. Investigators, staff, and field consultants met to discuss identified type themes and their relevance to war experiences and perceived outcomes as expressed by participants and as seen in the extant literature. Prominent themes identified were psychological violence, physical injury, detention and intentional violence, sexual violence, witnessing various forms of violence, hearing about various forms of violence, deprivation of basic needs or being discriminated against, betrayal, domestic discord, displacement, separation and isolation from family and friends, and problems during fleeing and migration.

2.4. CTI-164 events and types

The CTI data of 1 participant was incomplete and discarded from analyses. Table 2 shows CTI-164 data by ethnicity and gender and Table 3 shows intercorrelations among the CTI-164 subscales. The 66 participants said they endured a total ("all" = experienced + witnessed + heard about) of 9889 events and personally experienced ("me" = experienced) 1711 events, an average of 150 "all" and 26 "me" events per person (16% of all possible "me" events on the CTI-164). Of all events, 28% were

Table 3
Intercorrelations among CTI-164 subscales

	CTI-164 correlation matrix									
	Total all	Total me	Physical all	Physical me	Psychological all	Psychological me	Sex all	Sex me	Combat all	Combat me
Total all	1									
Total me	.52*	1								
Physical all	.95*	.54*	1							
Physical me	.21	.83*	.32*	1						
Psychological all	.99*	.52*	.91*	.20	1					
Psychological me	.58*	.95*	.56*	.66*	.61*	1				
Sex all	.84*	.23	.79*	−.04	.79*	.31†	1			
Sex me	.15	.49*	.23	.46*	.15	.47	.07	1		
Combat all	.94*	.48*	.82*	.12	.93*	.54	.74	.05	1	
Combat me	.53*	.78*	.49*	.45*	.52*	.71	.32	.19	.62	1

* $P < .01$ (2-tailed).

† $P < .05$ (2-tailed).

physical, 48% were psychological, 6% were sexual, and 18% were combat. Of the personally experienced ("me") events, 20% were physical, 58% were psychological, 0.5% were sexual, and 22% were combat-related. Twenty-nine CTI-164 items were not endorsed by any of the 66 refugees, and 34 additional items were reported by less than 5% of the participants. Thirty items were reported to have been experienced, witnessed, or heard about by greater than 30% of the participants. Thus, 71 of the 164 CTI items were reported by 5% to less than 30% of the participants.

Total "all" events were strongly correlated with seven of the nine other CTI categories (r = 0.52 to 0.99; all P < .001), with the exceptions being physical "me" events (r = 0.21; P = .10) and sexual "me" events (r = 0.15; P = .22). These two event types were least reported and had the least variability. Total "me" events were strongly correlated with eight of the other nine CTI categories (r = 0.48 to 0.95; all P < .001), with the exception being sexual "all" events (r = 0.23; P = .07). As shown in Table 3, correlations between "all" events and the physical "all" (r = .95), psychological "all" (r = .99), sexual "all" (r = .84), and combat "all" (r = .94) events were very high. The personally experienced "me" events were not as highly correlated with "all" events, and "me" events also discriminate on health outcomes better than the "all" categories (shown below). Comparing the ratio of "me"/"all" events in each type category, the sexual category was different and lower from all others (1% v > 12%), which may indicate underreporting of personally experienced sexual events.

Kurds reported a higher average number of "all" events than did Vietnamese (241.3 v 46.6; t[65] = 7.3; P < .01), but the average number of "me" events were similar between ethnic groups (29.5 v 21.9). Kurds were, however, significantly more likely than Vietnamese to experience psychological (t = 2.7[65]; P < .01) and combat (t = 2.5[65]; P < .01) "me" events. Males across ethnic group were more likely than females to have experienced "me" events (mean, 32.5 v 18.4; t = 2.50, P = .02); however, "all" events were not significantly different by gender.

2.5. CTI-164 events related to TEQ category

Table 4 shows that participants who met entry criteria for torture on the TEQ personally experienced significantly more CTI-164 events compared to those who met entry criteria for non-torture war-related trauma. Being tortured did not predict more personally experienced sexual events or "all" events compared with the non-torture war-related trauma group. The torture group reported significantly more CTI-164 events in nine of the 10 CTI categories compared to the no war-related trauma group. As might be expected, being tortured was most significantly associated with personally experienced physical events.

2.6. Health outcomes and their correlation with the CTI-164

2.6.1. Symptoms: NMRSCL

On the average, refugees experienced 10 symptoms as persistent and bothersome during the past year. The average number [SD] of symptoms were similar between Kurds and Vietnamese (10.3 [8.7] v 9.8 [7.0]; t[28] = 0.14; P = .89) and between males and females (9.8 [6.6] v 10.5 [9.8]; t[28] = 0.26; P = .80). There were no differences by ethnicity or gender on mean number of symptoms in each category, with the exception of the expected gender difference in gynecologic symptoms.

Table 5 shows that there were significant associations between psychological "me" events on the CTI and 6 symptom categories, and between sexual "all" events on the CTI and 2 symptom categories. Combat "me" and psychological "all" events on the CTI each correlated with one symptom category. The total number of personally experienced events ("total me") reported on the CTI modestly correlated with the number of total symptoms reported on the NMRSCL (r = 0.34; P = .07). By chance alone there would be 7.5 significant correlations between the NMRSCL subscales and the CTI-164 (there were nine).

2.6.2. Impairment: SDI

The Vietnamese tended to be more impaired at work (4.0 v 2.9; P = .14) and in their family life (3.2 v 2.1; P = .16) compared with Kurds. Regardless of ethnic group,

Table 4
Mean number of CTI-164 events by entry trauma (TEQ) category

		Total all	Total me	Physical all	Physical me	Psychological all	Psychological me	Sex all	Sex me	War all	War me
1. Torture (n = 17)	Mean	**227.2**†	**47.2**†,*	**67.9**†	**12.9***	**106.4**†	**23.8**†,*	**13.6**	**0.41**†	**39.2**†	**10.1**†,*
	(SD)	187.7	25.5	58.5	10.8	85.4	13.6	17.3	0.80	32.6	5.3
2. Non-torture war-related (n = 36)	Mean	**144.5**	**22.8**	**38.7**	**3.1**	**70.3**	**14.5**	**8.8**	**0.03**	**26.8**	**5.2**
	(SD)	103.6	12.5	26.2	4.1	50.8	7.7	9.9	0.17	23.7	4.2
3. No war-related (n = 13)	Mean	**63.3**	**6.7**	**19.4**	**0.31**	**28.4**	**4.7**	**4.7**	**0.00**	**10.9**	**1.7**
	(SD)	113.4	12.3	24.1	0.86	61.8	8.5	9.8	0.00	23.3	3.9
Total (N = 66)	Mean	149.8	25.9	42.4	5.1	71.3	14.9	9.2	0.12	26.8	5.8
	(SD)	141.1	21.7	40.0	7.8	67.7	11.5	12.4	0.45	27.5	5.3

* P < .05 comparing groups 1 and 2.
† P < .05 comparing groups 1 and 3.

Table 5
Correlations of health outcomes with CTI-164 event types

	CTI-164 event categories									
	Total all	Total me	Physical all	Physical me	Psychological all	Psychological me	Sex all	Sex me	Combat all	Combat me
Symptoms										
NMRSCL (n = 30)										
General	.25	.21	.16	.04	.29	.30	.30	−.12	.20	.16
Skin	−.01	.19	−.08	.11	−.00	.15	−.02	.21	.07	.26
Senses	−.08	−.27	−.04	−.18	−.13	−.29	.15	−.16	−.09	−.21
Cardiovascular	.10	.28	.15	.15	.03	.23	.29	.27	.03	.40*
Respiratory	−.05	.15	−.06	.12	−.04	.15	.05	.04	−.06	.12
Gastrointestinal	−.10	−.04	−.11	−.02	−.06	.03	.01	−.03	−.20	−.19
Genitourinary	.07	.33	.07	.32	.09	.36*	.04	.20	.02	.08
Gynecologic	.04	−.05	−.07	−.14	.09	−.01	.03	−.11	.04	.02
Sexual	−.07	.27	−.11	.23	−.03	.27	−.10	−.07	−.06	.19
Musculoskeletal	.28	.23	.24	.06	.27	.26	.38*	−.02	.20	.25
Neurologic	.30	.36	.15	.16	.36*	.44*	.35	.16	.25	.26
Anxiety/fears	.21	.33	.05	.17	.30	.42*	.22	.10	.16	.17
Depression	.27	.28	.13	.09	.32	.41*	.29	.05	.24	.09
Cognition	.10	.28	−.02	.15	.16	.37*	.17	.18	.05	.07
Other body	.19	−.01	.14	−.08	.24	.10	.25	−.08	.08	−.14
Total symptoms	.25	.34	.13	.14	.29	.43*	.39[a]	.08	.16	.21
Impairment										
SDI (n = 66)										
Work	−.12	.26*	−.10	.33[†]	−.12	.17	−.12	.05	−.13	.21
Social	.07	.23	.04	.24*	.08	.19	.06	−.04	.07	.17
Family	−.14	.08	−.12	.24	−.14	.04	−.11	−.08	.16	−.12
SF−36 (n = 66)										
Physical function	−.22	.05	−.18	.33[†]	−.23	−.08	−.14	−.16	−.26*	−.14
Role physical	.02	.06	.07	.17	−.01	.03	.10	−.16	−.02	−.04
Bodily pain	.00	.17	−.02	.17	−.00	.16	.04	−.13	.03	.11
General health	−.13	.21	−.11	.26[a]	−.14	.13	−.05	.03	−.11	.19
Vitality	−.01	.12	−.06	.08	.00	.12	.12	.07	−.04	.09
Social function	.07	−.05	.04	−.05	.06	−.08	.12	−.19	.10	.06
Role emotional	.09	.13	.06	.12	.11	.13	.07	−.01	.08	.08
Mental health	.18	.09	.12	−.03	.20	.13	.16	.20	.19	.10
Social support PMSSI (n = 66)										
Living in country of origin	.55[†]	.33[†]	.54[†]	.08	.53[†]	.38[†]	.41[†]	.02	.55[†]	.40[†]
Living in US	.01	.07	.02	.03	.03	.09	−.12	−.11	−.01	.05
Living in same US city	.11	.09	.08	.04	.14	.07	−.01	−.10	.13	16

Positive correlations mean that greater trauma = 1) more symptoms on NMRSCL, 2) more impairment on SDI, 3) more impairment SF-36. TEQ scored categorically, so negative correlation is strength of association between CTI-164 events and torture (= "1" on the TEQ). On the PMSSI, social support was defined as either relatives or friends living.

* $P < .05$ (2-tailed).

† $P < .01$ (2-tailed).

males were more impaired in their work (4.2 *v* 2.4; $P = .02$) and tended to be more impaired in their social life (3.5 *v* 2.4; $P = .11$) than females. Impairment at work was significantly associated with all experienced ("total me") events ($r = 0.26$; $P = .03$) and with physical "me" events ($r = 0.33$; $P < .01$). Social impairment was significantly associated with physical "me" events ($r = 0.24$; $P = .05$). By chance alone there would be 1.5 significant associations between the SDI scales and the CTI-164 categories (there were three).

2.6.3. Impairment: SF-36

The average scaled scores on the SF-36 for our refugee sample were compared to normative data from a community survey in the United Kingdom, as shown in Table 6 [13]. Our refugee sample had worse functioning on all eight SF-36 scales than the UK community sample, although vitality scale scores may not differ significantly. Within our sample, Vietnamese participants were significantly more impaired than Kurds on physical functioning (65 *v* 85; $t = 3.4$[36]; $P < .01$) and general health (47 *v* 60; $t = 2.2$[49]; $P = .03$). SF-36 scaled scores were not significantly different by gender.

Table 5 shows that physical "me" events on the CTI were associated with impaired physical functioning ($r = 0.33$; $P = .007$) and impaired general health ($r = 0.26$; $P = .04$) and combat "all" events were associated with

Table 6
SF-36 scores comparing NMRP refugees with a UK community sample

	Vietnamese			Kurdish			Total NMRP sample	UK community sample
	Male	Female	Total	Male	Female	Total		
Physical function	60.9	72.3	**65.4**	86.7	82.5	**84.6**†	76.2	92.5
Role physical	54.2	63.6	57.8	60.9	68.1	64.7	61.5	91.4
Bodily pain	62.0	73.5	66.6	67.4	70.7	69.1	67.9	86.3
General health	45.4	48.1	**46.5**	56.9	62.2	**59.6***	53.7	78.8
Vitality	58.1	60.9	59.1	63.3	61.6	59.7	60.5	64.0
Social function	74.3	72.9	73.8	62.5	75.7	69.1	71.2	91.3
Role emotional	63.0	61.1	62.2	62.7	55.6	59.0	60.5	85.6
Mental health	57.6	64.4	60.1	56.9	53.3	55.1	57.4	75.4

On the SF-36, lower scores indicate more impairment. If asterisk is in "total" column, significance is between ethnic groups and comparison values are in bold.
* Correlation is significant at .05 level (2-tailed).
† Correlation is significant at .01 level (2-tailed).

better physical functioning ($r = 0.26$; $P = .04$). There were no significant associations between the SF-36 scores and total "me" or total "all" events on the CTI-164. By chance alone there would be 4 significant associations between the SF-36 and the CTI-164 (there were three).

2.6.4. Social support: PMSSI

There were no significant associations between the number of family members and friends living in the United States or in the same US city and the 10 trauma categories. However, the number of living relatives and friends in the country of origin was associated with 8 of 10 CTI-164 trauma categories ($r = 0.33$ to 0.55; all $P < .01$) but not with physical "me" events and sexual "me" events.

3. Discussion

This study improves knowledge about the range, breadth, and depth of war-related events experienced by refugees. By collecting and synthesizing data from multiple sources using multiple methods, we have identified a greater number of war-related events and of event types than has been previously described. The CTI-164 was developed by expert rational methods and identified an average of 150 total events and 26 personally experienced events, which is more than in other published literature. For example, studies using the Harvard Trauma Questionnaire report between 3 and 19 events [18-21]. The IDIs identified an average of 15 recalled "traumatic" events, and identified 123 new events that were not on the CTI-164 and that have not, to our knowledge, been reported in the literature on refugee trauma. Furthermore, the IDIs and FGs identified types of events that have not been included in measures that are currently being used.

That the CTI-164 did not capture all the relevant war-related events in these 2 refugee groups, and that it was only modestly associated with the health outcomes measured in this study, is an important and somewhat expected finding, as the CTI-164 was intended to be the first iteration of a developing CTI. There was some variability in the number and type of events between Kurdish and Vietnamese people and between males and females, suggesting that the CTI-164 may have some validity as an indicator of differential events between these groups. However, the CTI-164 was only modest in predicting health outcomes, in spite of the fact that the participants reported significant numbers of bothersome symptoms and impairment severity. Furthermore, the four trauma on the CTI-164 ("physical", "psychological", "sexual", and "combat"), also chosen by expert rational methods, and consistent with standards in the field, were not good predictors of health outcomes. Instruments that are developed solely by expert rational approaches are not likely to be adequate in representing the true universe of the phenomenon being measured. As we have discussed in a recent review, an instrument is more likely to be a valid representation of the experiences of refugees if it is developed in community populations using empirical approaches combining qualitative and quantitative methods [1]. Qualitative techniques, such as IDIs and FGs, help understand the range, depth, and meaning of possible responses in a population, and allow for development of culturally informed quantitative measures, designed to be linguistically and visually acceptable and understandable to various refugee groups, which must then be validated using iterative methods [22-25].

In addition to the design method limiting the validity of the CTI-164, as expected, another reason that the CTI-164 was only modestly associated with adverse health outcomes is that it was developed to measure only war-related experiences, which likely account for only a portion of the symptoms and impairment seen in refugees. For example, Steel et al used path analysis to determine that 20% of the variance in adverse health outcomes was accounted for by war trauma, where 14% of the variance was acccounted for by post-migration difficulties [6]. Studies using the Harvard Trauma Questionnaire have

demonstrated statistically significant yet modest associations between war trauma and health outcomes [6,18-20]. The War Trauma Scale (WTS), developed by Clarke and Sack, accounted for only 15% of the post-traumatic stress disorder (PTSD) score variance and 7% of depression score variance [3], while their Resettlement Stressor Scale (RSS) correlated with four mental health conditions when the mental health scores were pooled together, and accounted for only 12% of PTSD score variance but no depression score variance. Delineating the range of potentially traumatic experiences in refugees is a complex task. There are events that may precede and postdate experiences related to war, genocide, or oppression, and subjective experiences are highly variable [5,6,26-30]. Moreover, experiences of refugees vary between group and war context, and memory of past events is fallible. Eliciting information from refugees also has its challenges, for example, the desire of people with PTSD to not talk about their experiences, or the fact that shame may inhibit disclosure of particular events. Furthermore, the process of extracting qualitative information from interviews and generating discrete items is time-consuming and difficult. It is also difficult to determine what events and type of events influence health status, and are therefore "traumatic" [2,7,29,31-39]. The differential effects of non–war-related events on health outcomes in refugees is understudied [5,31] and likely important in the pathogenesis of PTSD in addition to war-related events [40-45]. Thus, we expect any version of the CTI, measuring only war-related events, to have limited validity in predicting health outcomes.

Our data made it clear that the CTI warranted revision by incorporating both qualitative and quantitative data from phase I of the NMRP. This was an expected finding and part of the 2-phase process of the NMRP. To revise the CTI, we used an iterative process of item inclusion and reduction by adding the newly identified 123 items, discarding the 29 items that were not endorsed, excluding items that were endorsed with very low frequency and that could be combined with other items, and combining items that were highly correlated and were conceptually similar. Each of the final items was placed into 1 of the 12 trauma type categories identified from qualitative data. "Hearing about" and "witnessing" events were made into separate categories and not just extra check boxes for other events. These are important and common events, and the previous format confused many participants and seemed to reduce reliability. The response format was designed to allow a participant to check whether or not each event had happened to them and, if it had happened, how much impact the event had in terms of fear or threat to their life or safety. Each item had possible responses of: 0 = "did not happen", 1 = "a little fear or threat", 2 = "moderate fear or threat", 3 = "a lot of fear or threat" and 4 = "extreme fear or threat". The instructions and format were intended to gather responses relevant to criterion A of the DSM-IV PTSD diagnosis. The final instrument (Appendix 1) has 104 items in 12 trauma type categories, each of which can be scored 0 to 4. This instrument is currently being tested for its reliability and validity in a large, community sample of refugees. Future work will be aimed at determining what items are most traumatic and at adapting the CTI for efficiency.

Primary limitations to this development work were that the sample was only from 2 refugee groups, there was a relatively low sample size and power to detect true associations between the CTI-164 and the health outcome measures, and the fact that the Vietnamese and Kurds were of different ages. The sample was purposive and likely not fully representative of all refugees, and it is unlikely that this work has identified all war-related experiences. Our sample was limited to 2 ethnic groups from 2 very different war contexts. However, in both cases, the war experiences continued for many years in many contexts, including combat, civilian harassment, imprisonment, torture, and random violence. Further, sampling was designed to measure events from both soldiers and civilians, both men and women, and in people who had been tortured, traumatized by war, and in those who denied war-related trauma. While the small sample size limited power to detect true associations between the CTI-164 and the health outcome measures, it was adequate for its qualitative purpose, and the primary goal of enhancing knowledge about the range and type of war-related experiences in refugees was met. Age may have an impact on measures of health and impairment, and the sample size in phase I does not allow for stratification by age. This was not problematic for the qualitative goal of phase I, but it does underpower the quantitative analyses in this report. For example, there were no differences between ethnic groups on NMRSCL symptoms, which is one measure we would expect to be affected by age. How age moderates the relationships between events, trauma, and health outcomes will be better evaluated in reports from phase II of the NMRP.

In conclusion, substantially improving measurement of war-related events in refugee populations is important and will lead to several important outcomes. Knowing the range of events will help document human rights abuses. Clarifying events that are traumatic and predictive of poor health will help clinicians better diagnose and care for patients; public health officials will be able to develop prevention models; and scientists will conduct more useful research. The CTI has promise for these purposes, and warrants further refinement and testing in large community samples.

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APPENDIX 1. COMPREHENSIVE TRAUMA INVENTORY-104

Instructions: The list of events below are things that happen to people *during war*. Please read each item carefully and check either "**NO**" if the event *did **not** happen to you* or circle one of the four items under "**Yes**" if it *did happen to you.*

If the event did happen to you, circle *one of the four numbers next to each item that reflects how frightening the event was for you in terms of it being a threat to your life or safety.*

	NO Did **NOT** happen to me	**YES** Did happen to me			
		Little fear or threat	Moderate fear or threat	A lot of fear or threat	Extreme fear or threat
		1	2	3	4
Psychological Injury					
1. Having your home, school or workplace searched or ransacked		1	2	3	4
2. Having your home (or important place like school or workplace) severely damaged or destroyed		1	2	3	4
3. Fleeing or hiding from soldiers or enemies		1	2	3	4
4. Having to lie to protect yourself or others (includes signing official statement to protect yourself or others)		1	2	3	4
5. Living in the middle of war, and being forced into dual loyalties to survive		1	2	3	4
6. Being threatened with harm or feeling like you are in serious danger		1	2	3	4
7. Being in an area of active war combat, but you were not actively participating and were not injured		1	2	3	4
8. Actively participating in combat either as a soldier or civilian fighter		1	2	3	4
9. Forced to join military		1	2	3	4
10. Being near death because of illness or injury		1	2	3	4
11. Your pregnancy (for men: your wife's) was threatened, or a young baby died because of war conditions		1	2	3	4
12. Death of a family member besides a young baby due to war		1	2	3	4
13. Death of friends due to war		1	2	3	4
14. Having to abandon injured, dead, or dying people		1	2	3	4
15. Death of your child		1	2	3	4
Physical Injury					
16. Directly exposed to chemical weapons		1	2	3	4
17. Being injured in active combat		1	2	3	4
18. Being shot or shelled with explosives		1	2	3	4
Detention and Intentional Abuse					
19. Forced to stand, kneel, or walk for a long time		1	2	3	4
20. Being forced to attend party activities or having ideas or beliefs forced on you ("brainwashing")		1	2	3	4
21. Being intimidated or "blackmailed"		1	2	3	4
22. Being humiliated in front of others (stripped naked, insulted, screamed at, beaten)		1	2	3	4
23. Being beaten in front of family or friends		1	2	3	4
24. Being handcuffed, tied up, or shackled		1	2	3	4
25. Being blindfolded		1	2	3	4
26. Being intentionally NOT told what was going to happen to you next or where you were going to be taken		1	2	3	4
27. Being taken and left in an unknown place		1	2	3	4
28. Being hit, slapped, beat, or kicked by a person or with an object		1	2	3	4

APPENDIX 1. (*continued*)

	NO Did **NOT** happen to me	**YES** Did happen to me			
		Little fear or threat 1	Moderate fear or threat 2	A lot of fear or threat 3	Extreme fear or threat 4
Detention and Intentional Abuse					
29. Having your ears, eyes, nose or mouth injured with objects		1	2	3	4
30. Having any part of your body subjected to burning, freezing or electrical shocks		1	2	3	4
31. Having your body injured by hanging, needles, or having hair or nails pulled		1	2	3	4
32. Being immersed in water or sprayed with high-powered water		1	2	3	4
33. Being cut or stabbed		1	2	3	4
34. Being nearly killed by hanging or suffocation, near-drowning, or other intentional injury (like being dragged)		1	2	3	4
35. Being abused with urine or feces		1	2	3	4
36. Being abused with bright lights, loud noises, or bad smells		1	2	3	4
37. Being placed in solitary (isolated) confinement or being deprived of sensations		1	2	3	4
38. Being deprived of adequate food or water		1	2	3	4
39. Being awakened repeatedly and being deprived of sleep		1	2	3	4
40. Having medical care withheld when you were very sick		1	2	3	4
41. Living in very poor conditions in prison (crowding, problems with sanitation or temperature)		1	2	3	4
42. Being forced to work hard or for a long time or under very bad conditions		1	2	3	4
43. Being interrogated, physically searched, stopped for identification and questioned		1	2	3	4
44. Being falsely accused of things you did not do or being arrested		1	2	3	4
45. Forced to make a confession about yourself or others		1	2	3	4
46. Being threatened with severe injury or execution		1	2	3	4
47. Being made to watch while others were tortured or executed, or hearing others being injured or tortured		1	2	3	4
48. Being confined in a village, town or house by soldiers or police		1	2	3	4
49. Being jailed for less than three months		1	2	3	4
50. Being in jail, prison, or a re-education camp for more than three months		1	2	3	4
Sexual Trauma or Abuse					
51. Any unwanted sexual experience		1	2	3	4
52. Having your private parts touched when you do not want that		1	2	3	4
53. Being threated to be sexually molested or raped (but it didn't actually happen)		1	2	3	4
54. Having your private parts harmed (cut, burned, cold or heat, electricity, etc...)		1	2	3	4
55. Having your private parts penetrated by objects or hands		1	2	3	4
56. Being "raped" (forced to have sexual intercourse [vaginal, anal, oral] against your will)		1	2	3	4

(*continued on next page*)

APPENDIX 1. (*continued*)

	NO Did **NOT** happen to me	**YES** Did happen to me			
		Little fear or threat 1	Moderate fear or threat 2	A lot of fear or threat 3	Extreme fear or threat 4
Witnessing Abuse, Injury, or Death					
57. Seeing your family or friends get seriously injured or ill because of war		1	2	3	4
58. Seeing other people get seriously injured or ill because of war		1	2	3	4
59. Seeing a family member or a friend being raped		1	2	3	4
60. Seeing another person being raped		1	2	3	4
61. Seeing your family or friends being killed		1	2	3	4
62. Seeing others being killed		1	2	3	4
63. Seeing someone being mutilated or blown-up		1	2	3	4
64. Watching other people die		1	2	3	4
65. Helping ill or wounded people (includes refugees)		1	2	3	4
66. Seeing dead bodies or parts of human remains		1	2	3	4
67. Digging up, burying, or handling dead bodies or parts of human remains		1	2	3	4
68. Seeing organized violence, mass demonstrations, or horrible events on television		1	2	3	4
69. Seeing injury or death of many people at once, or witnessing mass graves		1	2	3	4
70. Seeing injured or dead animals		1	2	3	4
Hearing About Injury and Death					
71. Heard about people being abused by harsh methods		1	2	3	4
72. Heard that children or other innocent people were injured or killed		1	2	3	4
73. Heard about mass killings and people being put in mass graves		1	2	3	4
Deprivation and Discrimination					
74. Having very little food, water, or clothing because of poverty or discrimination		1	2	3	4
75. Having to live in poor conditions (fleeing, in mountains, poor shelter and hygiene)		1	2	3	4
76. Having your home, business or important personal property confiscated		1	2	3	4
77. Being forced to stop work or schooling		1	2	3	4
78. Being monitored (repeatedly investigated, or watched and followed, or having to report to officials)		1	2	3	4
79. Being oppressed (can't gather publicly, meet friend, speak your opinion)		1	2	3	4
Betrayal					
80. Being lied to or being made to feel uncertain about family member's whereabouts		1	2	3	4
81. Being abandoned by your family while you were in prison		1	2	3	4
82. Feeling like you were abandoned by allies during the war		1	2	3	4
83. Feeling like you were deceived by your own leaders or high-ranking officials		1	2	3	4
84. Being disgraced		1	2	3	4
85. Having bombs or gunfire go off in "safe" areas (like evacuation areas)		1	2	3	4
86. Being forced to monitor and report on family or neighbors		1	2	3	4

APPENDIX 1. (*continued*)

	NO Did **NOT** happen to me	**YES** Did happen to me			
		Little fear or threat 1	Moderate fear or threat 2	A lot of fear or threat 3	Extreme fear or threat 4
87. You refused or escaped from imposed military duty		1	2	3	4
Domestic Discord and Violence					
88. Experiencing severe family conflict because of the war		1	2	3	4
89. Experiencing violence from a family member because of the war		1	2	3	4
Displacement					
90. Being moved to a government area or "new economic area"		1	2	3	4
91. Having to flee from your home or community because of danger		1	2	3	4
92. Having to flee from your home or community because there is no work or because of other discriminations		1	2	3	4
Separation and Isolation					
93. Raising your children by yourself		1	2	3	4
94. Your children were often alone because of war circumstances		1	2	3	4
95. Being taken away by enemies, and separated from your family		1	2	3	4
96. Having a spouse or a child be put in jail, prison, or camp		1	2	3	4
97. Being separated from your family because of war circumstances		1	2	3	4
98. NOT being able to take care of family members because of separation		1	2	3	4
99. NOT being able to see a family member who is dying, or can't witness burial		1	2	3	4
Difficulties During Migration					
100. Being beat up or poorly treated in a refugee camp		1	2	3	4
101. Thinking you would not ever be able to leave a refugee camp		1	2	3	4
102. You or family members were denied refugee or asylum status		1	2	3	4
103. Feeling afraid that you will be sent back to your country from a refuge camp		1	2	3	4
104. Separated from family members during fleeing or migration		1	2	3	4

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