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# Probable Posttraumatic Stress Disorder and Disability in Cambodia

## Associations With Perceived Justice, Desire for Revenge, and Attitudes Toward the Khmer Rouge Trials

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**B**ETWEEN 1975 AND 1979, Cambodia suffered genocide under the government of Democratic Kampuchea, known commonly as the Khmer Rouge (KR).<sup>1,2</sup> It is estimated that between 1 million and 2 million people (approximately 20% of the Cambodian population) died during that epoch, and millions of survivors were forced into slave labor under harsh conditions.<sup>2</sup>

Multiple studies suggest that the psychological effects of traumatic exposures during the KR regime have been profound, including a high prevalence of posttraumatic stress disorder (PTSD), somatic symptoms, and disability.<sup>3-6</sup> However, since most of the studies are based on samples of refugees drawn from refugee camps,<sup>3</sup> countries of refuge,<sup>5</sup> or treatment settings,<sup>6</sup> their applicability to the Cambodian populace as a whole is unknown.

Despite the massive scope of human rights violations under the KR, their leaders had never been held accountable.<sup>7</sup> However, a special tribunal sponsored jointly by the United Nations and the Kingdom of Cambodia (known formally as the "Extraordinary Chambers in the Courts of Cam-

**Context** Millions of Cambodians suffered profound trauma during the Khmer Rouge era (1975 to 1979). A joint United Nations–Cambodian tribunal (the "Khmer Rouge trials") was empanelled in 2006 to prosecute top Khmer Rouge leaders and began substantive hearings in March 2009.

**Objectives** To establish the prevalence of probable posttraumatic stress disorder (PTSD) among adult Cambodians and to assess correlates of PTSD symptoms and disability with perceived justice, desire for revenge, and knowledge of and attitudes toward the trials.

**Design, Setting, and Participants** A national probability sample of 1017 Cambodians was assembled using a multistage, stratified cluster design, including 813 adults older than 35 years who had been at least 3 years old during the Khmer Rouge era and 204 adults aged 18 to 35 years who had not been exposed to the Khmer Rouge era. Face-to-face interviews were conducted between December 2006 and August 2007.

**Main Outcome Measures** Prevalence of probable PTSD using the PTSD Checklist, Civilian version (cutoff score of 44), and mental and physical disability using the Medical Outcomes Study 12-item Short Form Health Survey.

**Results** The prevalence of current probable PTSD was 11.2% (95% confidence interval [CI], 8.6%-13.9%) overall and 7.9% (95% CI, 3.8%-12.0%) among the younger group and 14.2% (95% CI, 11.0%-17.3%) in the older group. Probable PTSD was significantly associated with mental disability (40.2% vs 7.9%; adjusted odds ratio [AOR], 7.80; 95% CI, 3.90-15.60) and physical disability (39.6% vs 20.1%; AOR, 2.60; 95% CI, 1.26-5.39). Although Cambodians were hopeful that the trials would promote justice, 87.2% (n=681) of those older than 35 years believed that the trials would create painful memories for them. In multivariate analysis, respondents with high levels of perceived justice for violations during the Khmer Rouge era were less likely to have probable PTSD than those with low levels (7.4% vs 12.7%; AOR, 0.54; 95% CI, 0.34-0.86). Respondents with high levels of desire for revenge were more likely to have probable PTSD than those with low levels (12.0% vs 7.2%), but the difference was not statistically significant in the multivariate analysis (AOR, 1.76; 95% CI, 0.99-3.11).

**Conclusions** Probable PTSD is common and associated with disability in Cambodia. Although Cambodians had positive attitudes toward the trials, most were concerned that the trials would bring back painful memories. Now that the trials have begun, longitudinal research is needed to determine the impact of the trials on Cambodians' mental health.

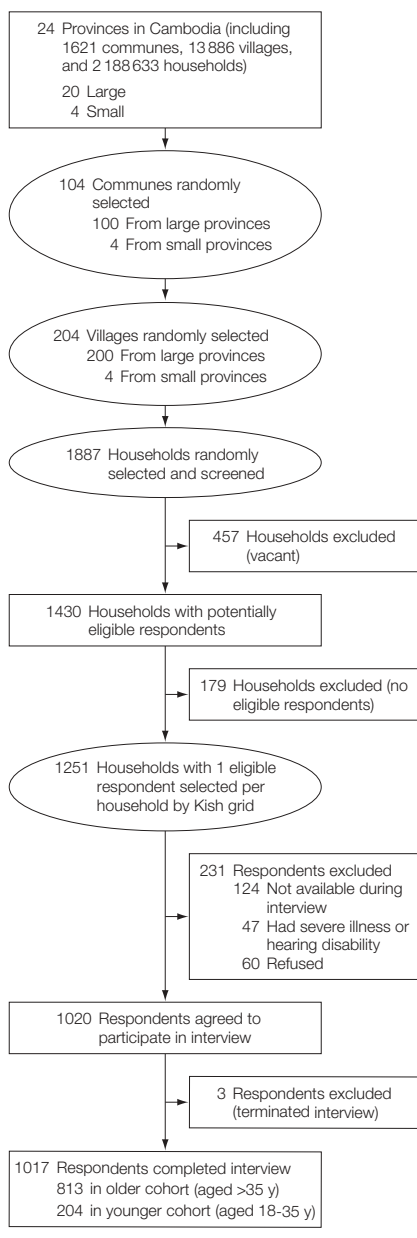
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**Figure.** Flow Diagram of Sample From the Cambodian Population

bodia” but commonly referred to as the “Khmer Rouge trials”) has been empanelled to try the senior leadership of the KR.<sup>8,9</sup> In the last 3 years, 5 top leaders have been arrested and pretrial hearings have been held.<sup>9</sup> But what effect will the trials have on Cambodians?

Although the primary goals of tribunals are to assess the guilt or innocence of the accused and mete out punish-

ment for the guilty, some have suggested that countrywide mechanisms for dealing with legacies of widespread violence, such as tribunals, may help reduce mental health symptoms and associated impairment.<sup>10</sup> Since anger and desire for revenge have been shown to be associated with PTSD symptoms and functional disability,<sup>11-13</sup> tribunals might reduce the prevalence and severity of PTSD and impairment in postconflict societies by facilitating feelings of justice and reducing the desire for revenge. However, others have suggested that trials may actually increase PTSD prevalence and severity by “retraumatizing” survivors.<sup>14,15</sup>

The purpose of this study was to determine the prevalence of PTSD symptoms and disability in a national probability sample of adult Cambodians and, among adults old enough to have lived through the KR era, the effects on PTSD of desire for revenge, perceived justice for KR atrocities, and knowledge of and attitudes toward the KR trials.

## METHODS

This study used a cross-sectional design to collect data from a national sample of adult Cambodian residents prior to the start of public hearings of the KR trials. We used face-to-face interviews to measure symptoms of PTSD, mental and physical disability, and their correlates.

### Sample Design and Participants

The study sample was designed to be representative of the noninstitutionalized adult population of Cambodia. Individuals were eligible for inclusion if they were aged 18 years or older and permanent residents of Cambodia. Because we focused attention on adults who were at least 3 years of age at the start of the KR era in 1975, 33 years prior to the start of data collection, we deliberately oversampled adults older than 35 years.

The sample was selected using a 4-stage design.<sup>16</sup> We first stratified by the 24 provinces in Cambodia, ranging in population size from 22 906 (Krong Pailin) to 1.6 million (Kampong Cham). Next, we randomly selected communes from the 1621

communes in Cambodia (the primary sampling unit) within each province, with probability of commune selection proportional to its population size.<sup>17</sup> Most communes have more than 1000 persons and fewer than 10 000 persons, but some, such as Sala Karu commune in Krong Pailin province ( $n=744$ ), are smaller, and some, such as Kraek commune in Kampong Cham province ( $n=36\,045$ ), are larger.<sup>17</sup> The number of communes selected per province was based on the proportion of the total Cambodian population in each province and varied from 1 commune in the smallest provinces to 9 communes in the largest province (Kampong Cham). Estimates of commune and village population size were based on data from the 1998 Cambodian national census (the only census that had been conducted since 1962 at the time of the survey) as the sampling frame.<sup>18</sup>

Villages, the secondary sampling unit, were also selected with probability proportional to size, with 2 villages selected per commune for the 20 larger provinces and 1 village per commune from the 4 small provinces, for a total of 204 villages.

Five households, the tertiary sampling unit, were selected per village. We implemented a 4:1 oversample of persons older than 35 years to those aged 18 to 35 years by selecting 4 households per village from which we selected a person older than 35 years and 1 household from which we selected a younger person. The four older-than-35-years households and the one 18-to-35-year household were selected using linear systematic sampling with equal probability of selection.<sup>19</sup> A random start within each village was chosen based on the last 2 digits of a local currency bill (the riel) serial number, and households were sampled based on a fixed interval of selection after the random start.

The fourth stage of sampling selection was the choice of a respondent within the household, accomplished using Kish grids.<sup>20</sup> Screening the selected households to identify an eligible participant was conducted at 1887 households. Selection of the sample is shown in the FIGURE. Based on a stan-

dard formula from the American Association for Public Opinion Research (AAPOR),<sup>21</sup> the cooperation rate—ie, the percentage of persons who participated among those eligible, available, and physically able to participate—was 94.2%. The AAPOR response rate—ie, the percentage of persons who participated among those who were eligible (both available and unavailable) and those of unknown eligibility, based on the most conservative assumption that all of the households of unknown eligibility were actually eligible (ie, the assumption that would result in the lowest calculated response rate)—was 59.5%. If we assume, still conservatively, that eligibility among households of unknown eligibility was equal to the eligibility of all households of known eligibility (or 87.6% in this study), the response rate was 61.7%.<sup>21</sup> The difference between the cooperation rate and the response rate was due to a relatively large number of households (n=457) that were selected but were vacant during the time of the survey.

### Interviewers and Procedures

The face-to-face survey was administered by the Center for Advanced Study, a not-for-profit survey research organization based in Phnom Penh, Cambodia. Trained research assistants traveled in 2 separate research teams to the 24 provinces in Cambodia. Of the 1017 interviews, 997 (98%) were completed between December 25, 2006, and January 23, 2007. Due to logistical difficulties in getting to 4 villages (Chnaeng village in Mondol Kiri province, Damnak Chambak in Krong Kaeb province, Ou Ta Vao in Krong Pailin province, Kandal village in Otdor Mean Chey province), 20 interviews in those 4 villages were conducted between August 7, 2007, and August 29, 2007.

Supervisors in the field during the survey implemented strict quality control, including detailed review of completed interviews and random observation of interviews in progress. The mean (SD) interview duration was 81 (32) minutes.

### Human Subjects Protection

The research protocol was approved by the University of North Carolina behavioral institutional review board. Since there is no equivalent structure in Cambodia, the protocol was also reviewed by a small group of local social scientists who had experience working with trauma survivors. Persons eligible to participate were not offered a monetary incentive for participation. Because of the high rate of illiteracy and fear of signing forms, participants gave oral rather than written consent.

### Instruments and Scales

The questionnaire consisted of measures of 3 major outcomes—probable PTSD, physical disability, and mental disability—and 3 groups of factors potentially associated with those outcomes: exposure to traumatic events during and after the KR era, perceived justice and desire for revenge for KR violations committed against one's self or one's family, and knowledge of and attitudes toward the KR trials.

Probable PTSD was measured using the PTSD Checklist, Civilian version (PCL-C), with 1 item anchored to each of the 17 key symptoms required for determination of PTSD from the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition, Text Revision) (*DSM-IV-TR*). We used the term *probable PTSD* because the PCL-C, despite excellent measurement properties, is not a diagnostic interview. The PCL-C has been shown in a variety of research with survivors of diverse types of trauma, including a recent study by Field and Chhim<sup>22</sup> in Cambodia, to have excellent internal reliability and high convergent validity.<sup>23</sup> We used a cutoff of 44 on the PCL-C as indicating probable PTSD, a threshold that has demonstrated a better balance of sensitivity and specificity for general population studies than the higher standard of 50.<sup>23,24</sup> In the current study, the PCL-C had excellent internal reliability (Cronbach  $\alpha=0.91$ ).

Mental disability was based on scores on the mental component summary score (MCS-12) from the Medical Out-

comes Study 12-item Short Form Health Survey (SF-12), version 1, a widely used measure of functional status, including a study of the largest Cambodian refugee community in the United States.<sup>5</sup> The mental health component of the SF-12 measures vitality, social functioning, emotional functioning, and mental health status over the past 30 days. We used weighted and normed scoring rules for the MCS-12 recommended by the developers of the SF-12.<sup>25</sup> We defined at least moderate mental disability on the MCS-12 as a score of 40 or less. Although there were no normative data on the MCS-12 in Cambodian populations, this cutoff performed well in predicting other indicators of mental disability in a Vietnamese refugee population in a large population-based survey in Australia.<sup>26</sup> In the current study, the MCS-12 had very good internal reliability ( $\alpha=0.83$ ). The physical health component of the SF-12 measures physical functioning, role functioning, body pain, and general health status over the past 30 days. A cutoff of 40 or less on the PCS-12 was used to define at least moderate physical disability. In the current study, the PCS-12 had very good internal reliability ( $\alpha=0.83$ ).

Exposure to traumatic events during the KR era was measured with items from the Cambodian version of the Harvard Trauma Questionnaire, an instrument originally developed for use with Cambodian refugees and one that is the most widely used and extensively validated instrument of its type in the world.<sup>27</sup> It measures different types of trauma, such as torture, witnessing murder, and experiencing a combat situation. The number of different traumas, out of 10 selected as relevant to this study, was summed to create an index of trauma experienced during the KR era.

Exposure to trauma since the KR era was measured with the Cambodian adaptation of the Traumatic Life Events and Social History Questionnaire.<sup>4</sup> We included 7 items measuring exposure to trauma, including natural disasters, physical assault, and others.



**Table 1.** Age and Sex Distribution of the Sample (N = 1017) and the 1998 Cambodian Census<sup>a</sup>

Age Group, y	Men		Women	
	Sample Unweighted No. (Weighted % of Total Sample) <sup>b</sup>	Census No. (% of Total Population)	Sample Unweighted No. (Weighted % of Total Sample) <sup>b</sup>	Census No. (% of Total Population)
18-25	38 (11.5)	679 699 (12.0)	62 (13.2)	745 545 (13.2)
26-35	37 (12.6)	782 621 (13.9)	67 (12.4)	855 262 (15.1)
36-45	130 (9.5)	484 736 (8.6)	171 (10.9)	640 814 (11.3)
46-55	94 (5.7)	291 928 (5.2)	147 (9.0)	396 002 (7.0)
56-65	67 (3.3)	187 929 (3.3)	93 (5.6)	254 198 (4.5)
>65	50 (3.0)	138 207 (2.4)	61 (3.3)	192 997 (3.4)
<b>Total</b>	<b>416 (45.6)</b>	<b>2 565 120 (45.4)</b>	<b>601 (54.4)</b>	<b>3 084 818 (54.6)</b>

<sup>a</sup>Data obtained from National Institute of Statistics, Kingdom of Cambodia.<sup>18</sup>

<sup>b</sup>The weighted percentage shown is based on the sample weights.

Perceived justice for violations to self or family by the KR was measured with a 3-item scale developed for this study that assessed satisfaction with punishment of perpetrators, apologies by perpetrators, and financial restitution for suffering, eg, "My family and I have received fair payment for our suffering." In the current study, the scale had good reliability ( $\alpha=0.78$ ) and excellent criterion validity, as indicated by correlation with an item measuring global satisfaction with justice for violations suffered during the KR era (Spearman  $r=0.53$ ,  $P<.001$ ).

Desire for revenge against perpetrators of KR era atrocities was measured with the 5-item revenge subscale of the Transgression-Related Interpersonal Motivation Scale.<sup>28</sup> This scale has been shown in previous studies<sup>29</sup> to have excellent internal reliability and construct validity, including a study by Field and Chhim<sup>22</sup> in Cambodia. In the current study, the desire for revenge scale had excellent internal reliability ( $\alpha=0.89$ ). Items included "I would like to make them suffer for what they did," and "I would like to get back at them."

Knowledge of the trials was defined as a correct response to at least 1 of 2 questions about the trials, pertaining to the nationalities of the judges in the trials (correct answer: United Nations and Cambodian judges) and the members of the KR who will be tried (correct answer: senior leaders).

A scale of attitudes toward the KR tribunal assessed the degree to which re-

spondents believed that it will be fair, able to promote reconciliation, and able to bring justice to the perpetrators. Items were selected from the study by Gibson<sup>30</sup> of the South African Truth and Reconciliation Commission and the study by Pham et al<sup>31</sup> of the International Criminal Tribunal for Rwanda. Interviewers first asked questions about knowledge of the tribunal. They then read the following statement about the tribunal, prior to asking about various attitudes: "Next, I will ask you your attitudes about the Khmer Rouge trials. The government of Cambodia and the United Nations will be holding trials of the top leaders of the Khmer Rouge over the next 3 years." The theoretical range for this 7-item scale is 7 to 35, with higher scores indicating more positive attitudes. The scale had good reliability ( $\alpha=0.78$ ).

Demographic characteristics were included in the study as potential confounders of the associations between probable PTSD and trauma, desire for revenge, perceived justice, knowledge of the trials, and attitudes toward the trials and were measured using standard questions adapted from previous research in Cambodia.<sup>4</sup>

#### Translation, Pilot-Testing, and Population Comparison

The questionnaire was translated into Khmer and back-translated into English using standard methodology.<sup>32</sup> The instrument was extensively pilot-tested using the "talk aloud" method in

a 3-day group interview with a convenience sample of 15 residents of Phnom Penh and then further pilot-tested and revised with 60 respondents from rural areas near Phnom Penh.

To determine whether the sample was representative of the Cambodian population, we compared sample and population characteristics based on the Cambodian Inter-Censal Population Survey (CIPS). The CIPS was a nationally representative survey of 21 000 households conducted in 2004 by the Cambodian National Institute of Statistics, the government agency that conducts the national census.<sup>33</sup>

#### Power Analysis

Assuming a prevalence of PTSD of 20% in the population, based on previous estimates in population-based surveys in Cambodia, and a cluster sample design effect of 2, we estimated that 768 adults older than 18 years would be required to detect a prevalence between 16% and 24%, at a 95% confidence level.<sup>34</sup> We chose to select a sample of 1000 to account for potential attrition if the sample were to be followed up longitudinally.

Calculated a priori, the power to detect a difference of 13.5% in prevalence of PTSD symptoms between respondents older than 35 years and those aged 18 to 35 years was 88%, assuming the following: an estimated prevalence of 27% in the group older than 35 years and 13.5% in the younger group, a design effect of 2.0 for probable PTSD, and 800 older respondents and 200 younger (ie, a 4:1 oversample of older to younger respondents).

#### Statistical Analysis

Sampling weights, calculated as the product of the inverse of the probability of selection at each stage, were assigned to each observation.<sup>16</sup> Because the age and sex distribution of the sample was slightly different from the census (TABLE 1), we added poststratification weights to render the age-sex distribution of the sample comparable with that of the total population.<sup>16</sup> Poststratification weights represent the ratio

of the proportion of the total population in each of 6 age-sex categories from the 1998 census to the proportion of the total weighted sample in those same age-sex categories in the sample. The final weights are the product of the sampling weights and the poststratification weights.

Analyses were conducted in SAS version 9.13 (SAS Institute, Cary, North Carolina) and SUDAAN version 9 (Research Triangle Institute, Research Triangle Park, North Carolina) and accounted for the weights and the design effect introduced by the complex sampling scheme. Estimates of the population prevalence of probable PTSD are based on analysis of the entire sample (N=1017). The analyses of factors associated with probable PTSD and disability, which focused on events and attitudes regarding the KR era, were limited to the sample older than 35 years (n=813). We refer to respondents older than 35 years as the older cohort and respondents aged between 18 and 35 years as the younger cohort.

Missing data were rare. Data were missing on exposure to trauma during the KR era in 4 respondents, on mental or physical disability in 1 respondent, and on PTSD in 33 respondents, including 28 among the younger cohort and 5 in the older cohort.

Differences in categorical variables across population groups (eg, age) were assessed with the Rao-Scott  $\chi^2$  test.<sup>35</sup> Differences in continuous variables were evaluated with *t* tests, with the degrees of freedom calculated as the number of primary sampling units (104) minus the number of strata that contained more than 1 primary sampling unit (20).<sup>36</sup> Bivariate associations between independent variables and PTSD are reported as crude (unadjusted) odds ratios (ORs) with their associated 95% confidence intervals (CIs). Logistic regression was used to identify variables predictive of probable PTSD, after controlling for all other variables in the model.<sup>37</sup> If continuous or ordinal variables did not meet the assumption of linearity in the logit, they were recoded into 4-category ordinal

variables based on quartiles of the original distribution; if the 4-category ordinal variable was not linear in the logit, the variable was dichotomized into high (above the median) and low (below the median).<sup>37</sup> The overall discrimination of the model was assessed with the C statistic.<sup>37</sup> All statistical tests were 2-tailed and  $\alpha$  was set at .05.

**RESULTS**

**Demographic Characteristics**

TABLE 2 reports characteristics of the sample by age group. More than 70% of respondents in both age groups had a family monthly income less than US \$100. In the older age group, 685 respondents (81.1%) had no formal education or only primary school education compared with 112 (43.0%) in the younger age group. No differences existed in demographic characteristics between the 997 respondents interviewed in December or January and the 20 interviewed in August.

Sample demographic characteristics were similar to those of the Cam-

**Table 2.** Demographic Characteristics of Respondents (N = 1017)<sup>a</sup>

Characteristic	Younger Cohort (18-35 y) (n = 204)		Older Cohort (>35 y) (n = 813)		Difference in % or Mean (95% CI) <sup>b</sup>	P Value <sup>c</sup>
	Unweighted No.	Weighted % or Mean (95% CI)	Unweighted No.	Weighted % or Mean (95% CI)		
Female sex	129	51.4 (42.1 to 60.7)	472	57.3 (51.8 to 62.8)	5.9 (-3.4 to 15.2)	.20
Age, mean, y		25.8 (24.9 to 26.7)		50.6 (49.7 to 51.5)	24.2 (23.6 to 26.0)	<.001
Family monthly income, US \$						
≤50	108	46.5 (38.5 to 54.4)	477	54.9 (49.7 to 60.2)	8.6 (0.7 to 16.2)	.29
51-100	49	27.4 (19.9 to 34.9)	195	24.3 (20.3 to 28.3)	-3.1 (-11.1 to 4.8)	
101-200	25	17.3 (9.8 to 24.8)	85	12.7 (8.7 to 16.6)	-4.6 (-12.8 to 3.5)	
201-300	8	2.6 (0.8 to 4.4)	31	3.7 (2.1 to 5.3)	1.1 (-1.2 to 3.4)	
>300	14	6.2 (1.9 to 10.6)	25	4.4 (2.0 to 6.9)	-1.8 (-6.7 to 3.1)	
Buddhist religion	197	98.3 (96.4 to 100)	782	97.4 (95.8 to 99.0)	-0.9 (-2.8 to 1.0)	.41
Marital status						
Married	125	54.2 (45.7 to 62.7)	602	76.6 (72.8 to 80.4)	22.4 (13.5 to 31.3)	<.001
Single or divorced	76	44.3 (35.5 to 53.2)	34	4.2 (2.3 to 6.1)	-40.1 (-48.8 to -31.4)	
Widowed	3	1.5 (0 to 4.0)	177	19.2 (16.0 to 22.3)	17.7 (13.4 to 22.0)	
Education						
No formal education	40	13.1 (7.5 to 18.6)	303	32.2 (27.5 to 36.9)	19.5 (13.2 to 25.1)	<.001
Primary	72	29.9 (22.6 to 37.3)	382	48.8 (44.5 to 53.2)	18.9 (10.4 to 27.5)	
Secondary level 1, middle school	64	41.5 (31.9 to 51.1)	98	15.1 (11.1 to 19.0)	-26.4 (-35.2 to -17.6)	
Secondary level 2, high school	25	14.5 (8.5 to 20.4)	27	3.4 (1.7 to 5.1)	-11.1 (-16.9 to -5.3)	
Above secondary level 2	3	1.1 (0 to 2.6)	3	0.5 (0.4 to 0.9)	-0.6 (-2.4 to 1.2)	

Abbreviation: CI, confidence interval.

<sup>a</sup>Percentages may not sum to 100% because of rounding.

<sup>b</sup>Difference in percentage or mean between respondents older than 35 years and those aged 18-35 years.

<sup>c</sup>For categorical variables with multiple categories, such as income, P values are reported for differences in the distribution of the variable across the 2 age groups, not for differences across each level of the variable.

bodian population based on the CIPS. The percentage of persons in the study sample living in a rural area (85.5%; n=891) was similar to the Cambodian population, based on data from the CIPS (85.0%). The percentage of Buddhists was 97.8% (n=979) in the sample and 96.4% in the CIPS. Of the 416 men in the sample, 76.1% (n=305) were married, and 92.4% (n=366) were literate, compared with 78.1% and 84.7%, respectively, in the CIPS. Of the 601 women in the sample, 67.4% (n=345) were married and 68.7% (n=356) were literate, compared with 68.8% and 64.1%, respectively, in the CIPS.

### Exposure to Traumatic Events

There were modest differences in the types of trauma experienced since the KR era between the older and younger cohorts (TABLE 3). Older respondents were somewhat more likely to have been exposed to a natural disaster than the younger cohort (498 [61.3%] vs 105 [48.9%];  $\chi^2=8.2$ ;  $P=.004$ ) but somewhat less likely to have witnessed someone badly injured or killed between the KR era and the present (221 [28.8%] vs 78 [38.0%];  $\chi^2=4.0$ ;  $P=.05$ ). There was no difference in the mean number of trauma types (out of 7 total) experienced by the younger cohort (1.9; 95% CI, 1.7-2.1) compared with the older

cohort (2.0; 95% CI, 1.9-2.1;  $t_{84}=0.81$ ;  $P=.42$ ).

A substantial percentage of the older cohort reported being exposed to trauma during the KR era (Table 3). Approximately half (n=391; 50.1%, 95% CI, 47.0%-53.2%) reported that they were close to death during the KR era, and 243 respondents (31.4%; 95% CI, 27.6%-35.1%) reported physical or mental torture. The mean number of types of trauma experienced during the KR era was 3.4 (95% CI, 3.2-3.6) out of 9 on the questionnaire.

### Attitudes Toward the Events of the KR Era

The mean score on the 5-item scale measuring desire for revenge, out of a maximum of 25 (with higher scores indicating greater desire for revenge), was 19.7 (95% CI, 19.2-20.2), indicating strong desire for revenge. Sixty-three percent of respondents strongly agreed and 21% agreed with the statement, "I would like to make them suffer." Respondents were dissatisfied with each component of justice scale, as indicated by the low mean scores (on a 1 to 5 scale, with 1 indicating lowest satisfaction and 5 highest) for the items pertaining to punishment of perpetrators (2.54; 95% CI, 2.36-2.72), financial restitution (1.96; 95% CI, 1.82-

2.11), and apology by perpetrators (1.93; 95% CI, 1.79-2.06). The mean score on the 3-item scale measuring satisfaction with justice for human rights violations to self or family by the KR, out of a maximum of 15, was 6.4 (95% CI, 6.2-6.8), indicating overall dissatisfaction with justice.

### Prevalence of Probable PTSD, Mental Disability, and Physical Disability

The prevalence of probable PTSD, using a cutoff of 44 or greater on the PCL-C as the criterion, was 11.2% (95% CI, 8.6%-13.9%; n=126). The prevalence in the younger cohort was 7.9% (95% CI, 3.8%-12.0%; n=18) and in the older cohort, 14.2% (95% CI, 11.0%-17.3%; n=108) (TABLE 4). The percentage of respondents meeting DSM-IV-TR criteria for reexperiencing symptoms (33.6%; n=359) or arousal symptoms (26.5%; n=338) was greater than the percentage meeting criteria for avoidance/numbing symptoms (12.0%; n=133).

More than one-quarter of the older cohort members reported being at least moderately physically disabled (26.8%; 95% CI, 23.4%-30.2%; n=229) and 16.0% reported being at least moderately mentally disabled (95% CI, 13.2%-18.8%; n=141). There was an approxi-

**Table 3.** Exposure to Traumatic Events (N = 1017)

Characteristic	Younger Cohort (18-35 y) (n = 204)		Older Cohort (>35 y) (n = 813)		Difference in % (95% CI) <sup>a</sup>	P Value
	Unweighted No.	Weighted % (95% CI)	Unweighted No.	Weighted % (95% CI)		
From the KR era until the present						
Life-threatening accident	56	22.7 (16.2 to 29.2)	188	23.9 (21.3 to 26.6)	1.2 (-5.9 to 8.3)	.73
Fire, flood, or other natural disaster	105	48.9 (41.2 to 56.6)	498	61.3 (56.6 to 66.1)	12.4 (4.1 to 20.8)	.004
Witnessed someone badly injured or killed	78	38.0 (29.0 to 46.9)	221	28.8 (25.2 to 32.5)	-9.2 (-18.6 to 0.3)	.05
Seriously physically attacked or assaulted	10	5.8 (1.5 to 10.2)	34	4.0 (2.0 to 6.0)	-1.8 (-6.5 to 2.9)	.40
During the KR era <sup>b</sup>						
Forced separation from family			653	81.5 (77.1 to 85.9)		
In combat situation			500	62.8 (58.3 to 67.3)		
Close to death			391	50.1 (47.0 to 53.2)		
Physical or mental torture			243	31.4 (27.6 to 35.1)		
Witnessed murder of family member or friend			172	22.1 (18.67 to 25.6)		
Seriously injured			78	10.1 (7.6 to 12.6)		
Imprisoned			67	8.3 (6.2 to 10.4)		

Abbreviations: CI, confidence interval; KR, Khmer Rouge.

<sup>a</sup> Difference in percentage between respondents older than 35 years and those aged 18-35 years.

<sup>b</sup> Respondents aged 18-35 years were not asked about trauma during the KR era.

mately 4-fold greater prevalence of physical disability and mental disability in the older cohort than the younger cohort (physical disability, 229 [26.8%] vs 12 [5.7%]; prevalence ratio, 4.69; 95% CI, 2.34-9.41; mental disability, 141 [16.0%] vs 13 [4.2%]; prevalence ratio, 3.77; 95% CI, 1.84-7.73).

**Knowledge of and Attitudes Toward the KR Trials**

Of the 204 respondents in the younger group, 74 (39.4%) had knowledge of the KR trials, compared with 336 of 813

older respondents (47.8%;  $\chi^2_1=2.5$ ;  $P=.11$ ).

The mean score on the 7-item scale of positive attitudes toward the KR trials, out of a maximum of 35, was 28.6 in the younger cohort and 29.2 in those in the older cohort (difference in means, 0.6; 95% CI, -0.3 to 1.4;  $t_{84}=1.3$ ,  $P=.19$ ), indicating highly positive attitudes toward the trials among all Cambodians. Attitudes regarding various aspects of the trials are shown in TABLE 5. More than 75% of respondents believed that the trials would help promote reconcilia-

tion, prevent future atrocities, and reveal historical truths about the KR era. Although only 169 respondents (13.3%) believed that the trials would “produce more hatred,” a sizeable minority (42.5%; 95% CI, 38.1%-47.0%;  $n=432$ ) in this overwhelmingly Buddhist country believed that the trials “go against the teaching of the Buddha.” Although Cambodians had high expectations for the trials, 87.2% (95% CI, 83.9%-90.6%;  $n=681$ ) of the older cohort believed that the trials would “produce painful memories of what happened to me during the Khmer

**Table 4.** Prevalence of Current Probable PTSD, PTSD Symptom Clusters, and Mental and Physical Disability (N = 1017)

Characteristic	Younger Cohort (18-35 y) (n = 204)		Older Cohort (>35 y) (n = 813)		Difference in % or Mean (95% CI) <sup>a</sup>	P Value
	Unweighted No.	Weighted % (95% CI)	Unweighted No.	Weighted % (95% CI)		
Probable PTSD <sup>b</sup>	18	7.9 (3.8 to 12.0)	108	14.2 (11.0 to 17.3)	6.3 (-1.1 to 11.1)	.14
DSM-IV-TR PTSD symptom clusters <sup>c</sup>						
At least 1 reexperiencing symptom	48	26.6 (18.3 to 34.9)	311	39.7 (32.9 to 46.4)	13.1 (3.6 to 22.3)	.006
At least 3 avoidance/numbing symptoms	16	10.1 (4.1 to 16.2)	117	13.9 (10.8 to 17.0)	3.8 (-3.6 to 11.1)	.34
At least 2 arousal symptoms	45	17.4 (10.7 to 24.1)	293	35.6 (31.3 to 40.0)	18.2 (10.2 to 26.2)	<.001
MCS-12, mean		47.3 (45.4 to 49.2)		42.0 (41.0 to 43.0)	-5.3 (-7.5 to -3.1)	<.001
Mental disability <sup>d</sup>	13	4.2 (1.3 to 7.2)	141	16.0 (13.2 to 18.8)	11.8 (7.7 to 15.8)	<.001
PCS-12, mean		49.1 (47.7 to 50.4)		42.3 (41.5 to 43.2)	-6.8 (-8.4 to -5.1)	<.001
Physical disability <sup>d</sup>	12	5.7 (1.9 to 9.52)	229	26.8 (23.4 to 30.2)	21.1 (15.6 to 26.6)	<.001

Abbreviations. CI, confidence interval; DSM-IV-TR, Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition, Text Revision); MCS-12, mental component summary score, Medical Outcomes Study 12-item Short Form Health Survey version 1; PTSD, posttraumatic stress disorder.

<sup>a</sup>Difference in percentage between respondents older than 35 years and those aged 18-35 years.

<sup>b</sup>Probable PTSD was defined as a score greater than 44 on the PTSD Checklist, Civilian version.

<sup>c</sup>Each of the 17 core symptoms of PTSD was judged to be present if the respondent reported being bothered at least “moderately” (3 on a 5-point scale) in the past month.

<sup>d</sup>Moderate or greater mental disability was defined as a score on the MCS-12 of 40 or less. Moderate or greater physical disability was defined as a score on the PCS-12 of 40 or less.

**Table 5.** Attitudes Regarding the Khmer Rouge Trials (N = 1017)

Item on Questionnaire	Younger Cohort (18-35 y) (n = 204)		Older Cohort (>35 y) (n = 813)		Difference in % (95% CI) <sup>a</sup>	P Value
	Unweighted No.	Weighted % (95% CI)	Unweighted No.	Weighted % (95% CI)		
The Khmer Rouge trials will put a final end to the cycles of revenge and hatred.	162	81.7 (75.2 to 88.3)	659	82.2 (78.3 to 86.1)	0.5 (7.7 to 8.0)	.91
The Khmer Rouge trials will be able to reveal the truth about what happened in Cambodia.	172	84.7 (79.4 to 90.0)	675	85.5 (82.9 to 88.2)	0.8 (5.4 to 7.1)	.79
The Khmer Rouge trials will help prevent atrocities like those of Democratic Kampuchea from happening again.	186	92.3 (87.8 to 96.8)	735	91.8 (89.5 to 94.1)	-0.5 (-5.2 to -4.2)	.84
The judges of the Khmer Rouge trials will be fair.	156	73.2 (65.7 to 80.8)	599	76.6 (72.3 to 80.8)	3.3 (-4.4 to 11.0)	.37
The Khmer Rouge trials will help to rebuild trust among Cambodians.	153	77.6 (71.5 to 83.7)	612	76.2 (71.7 to 80.6)	-1.4 (-8.8 to 6.0)	.71
The Khmer Rouge trials will help people of different groups in Cambodia get along better.	166	81.2 (74.9 to 87.4)	649	80.1 (76.4 to 83.9)	-1.1 (-8.7 to 6.6)	.79
The Khmer Rouge trials will be valuable in bringing justice to those most responsible for what happened.	139	71.1 (64.2 to 80.0)	549	70.5 (65.9 to 75.1)	-0.6 (-8.8 to 7.6)	.88

Abbreviation: CI, confidence interval.

<sup>a</sup>Difference in percentage between respondents older than 35 years and those aged 18-35 years.



Rouge regime.” Respondents who had knowledge of the trials had slightly higher mean attitude scores than those without knowledge (29.3 vs 28.5; difference in means, 0.8;  $t_{84}=1.99$ ;  $P=.05$ ). Older Cambodians with knowledge of the trials were more likely than those without knowledge to believe that the trials would produce painful memories (304 of 336 with knowledge [92.9%] vs 377 of 477 with no knowledge [82.1%];  $\chi^2_{1,813}=22.0$ ;  $P<.001$ ).

**Factors Associated With Probable PTSD**

TABLE 6 shows the crude and adjusted associations between probable PTSD and trauma (during and after the KR era), desire for revenge, perceived justice related to KR violations, knowledge of the KR trials, and attitudes toward the KR trials among respondents in the older cohort. Trauma during the KR era, trauma after the KR era, and desire for revenge were directly associated with probable PTSD in the bivariate model. In the multivariate model that controlled for sex, family income, widowhood (yes/no), education, age, and the other variables in the table, respondents in the highest quartile of exposure to trauma during the KR era were more likely to have probable PTSD than respondents in the lowest quar-

tile of KR trauma. Respondents in the top 3 quartiles of exposure to trauma after the KR era were also more likely to have probable PTSD than those in the lowest quartile of trauma. Respondents with high desire for revenge were more likely to have probable PTSD than those with low desire for revenge in the bivariate model. However, this difference did not remain statistically significant in the multivariate model (12.0% vs 7.2%; adjusted OR [AOR], 1.76; 95% CI, 0.99-3.11).

The strength of belief that justice had been done regarding violations against themselves or their family during the KR era was inversely associated with probable PTSD. Respondents with high perceived justice related to these violations were less likely to report having probable PTSD than respondents with low levels of perceived justice (7.4% vs 12.7%; AOR, 0.54; 95% CI, 0.34-0.86). The strength of the association between perceived justice and probable PTSD was slightly attenuated in the multivariate model because desire for revenge and perceived justice were inversely associated with each other (46.7% with high desire for revenge had high perceived justice and 60.0% with low desire for revenge had high perceived justice; OR, 0.58; 95% CI, 0.37-0.92). Knowledge of the KR

trials was not associated with probable PTSD in the bivariate model (10.6% vs 11.8%; OR, 0.88; 95% CI, 0.55-1.41) but was moderately associated in the multivariate model (12.8% vs 7.3%; AOR, 1.87; 95% CI, 1.13-3.10). Attitudes toward the tribunal were not associated with probable PTSD (AOR, 0.89; 95% CI, 0.70-1.13).

The multivariate logistic regression model had very good discrimination, ie, ability to distinguish respondents who did or did not have probable PTSD, based on the set of factors included in the model (C statistic, 0.76).

**Factors Related to Disability**

Probable PTSD was associated with at least moderate mental disability after controlling for demographic covariates and exposure to trauma (40.2% with probable PTSD had at least moderate mental disability vs 7.9% without probable PTSD; AOR, 7.80; 95% CI, 3.90-15.60). It was also associated with at least moderate physical disability after controlling for demographic covariates and exposure to trauma (39.6% with probable PTSD had at least moderate physical disability vs 20.1% without probable PTSD; AOR, 2.60; 95% CI, 1.26-5.39). Perceived justice and attitudes toward the tribunal were not associated with mental or physical dis-

**Table 6.** Factors Associated With Probable PTSD Among Cambodians Older Than 35 Years (n = 808)<sup>a</sup>

Factor	No. (Weighted %)			Crude OR (95% CI)	P Value	Adjusted OR (95% CI)	P Value
	Total Sample (n = 808)	Probable PTSD (n = 108) <sup>b</sup>	No Probable PTSD (n = 700)				
Trauma during the KR era <sup>c</sup>				1.58 (1.13-2.21)	.007	1.49 (1.03-2.16)	.04
Trauma after the KR era <sup>c</sup>				1.61 (1.23-2.12)	<.001	1.78 (1.24-2.57)	.002
Desire for revenge <sup>d</sup>							
Low	373 (43.9)	32 (28.9)	341 (46.4)	1 [Reference]		1 [Reference]	
High	435 (56.1)	76 (71.1)	359 (53.6)	2.13 (1.23-3.69)	.007	1.76 (0.99-3.11)	.05
Perceived justice for violations committed against self or family during the KR era <sup>d</sup>							
Low	349 (47.3)	68 (64.9)	281 (44.5)	1 [Reference]		1 [Reference]	
High	459 (52.6)	40 (45.1)	419 (55.5)	0.43 (0.30-0.62)	<.001	0.54 (0.34-0.86)	.009
Knowledge of the KR trials <sup>c</sup>	333 (47.8)	48 (54.2)	285 (46.7)	0.88 (0.55-1.41)	.60	1.87 (1.13-3.10)	.02
Positive attitudes toward the KR trials <sup>c</sup>				0.79 (0.60-1.05)	.10	0.89 (0.70-1.13)	.35

Abbreviations: CI, confidence interval; KR, Khmer Rouge; OR, odds ratio; PTSD, posttraumatic stress disorder.  
<sup>a</sup>There were 813 respondents older than 35 years. Five observations with missing data on PTSD were deleted from the analyses. Adjusted ORs were adjusted for the effect of all other variables shown in the table and sex, family income, widowhood, education, age, and general political knowledge.  
<sup>b</sup>The number and weighted percentage with PTSD and with no PTSD are reported for dichotomous variables.  
<sup>c</sup>Coded as 4-category ordinal variables.  
<sup>d</sup>Coded as dichotomous variables above and below the median.

ability, although respondents with high desire for revenge were more likely to have physical disability than those with low desire for revenge (29.9% vs 14.6%; AOR, 2.49; 95% CI, 1.57-3.99).

## COMMENT

This study has produced 5 main findings. First, the 1-month (ie, current) prevalence of probable PTSD in noninstitutionalized adults older than 18 years in Cambodia was 11.2% (95% CI, 8.6%-13.9%). Although substantially lower than the prevalence of PTSD reported in a Cambodian refugee community in the United States,<sup>5</sup> this figure is still almost 5 times higher than the 1-month prevalence of PTSD of 2.3% in the United States, estimated from the National Comorbidity Survey.<sup>38</sup>

Second, knowledge of the trials was directly associated with probable PTSD after controlling for important confounding variables, including education, sex, political knowledge, and trauma. This is consistent with the finding that a greater percentage of those with knowledge were concerned that the trials might produce "painful memories" and raises concern that the trials may increase probable PTSD. However, because the temporal direction of causality is uncertain in this cross-sectional study, it is unclear whether knowledge increases the likelihood of probable PTSD or whether respondents with probable PTSD are more likely to know about the trials (perhaps because of increased interest among survivors).

Third, Cambodians had positive expectations about the ability of the KR trials to be fair and to promote reconciliation and justice. Positive attitudes reflect Cambodians' hopes for the trials rather than their assessment of how well the trials have met their expectations, simply because, at the time of data collection, the public hearings had not started. This interpretation is supported by the finding that attitudes toward the trials were generally similar in those with and without specific knowledge of the trials. One key issue for Cambodia's future is whether the expectations, prior to the trials, can be transformed into positive attitudes to-

ward the process now that the trials have begun.

The fourth major finding was that perceived justice was inversely associated with probable PTSD. Desire for revenge was associated with PTSD but not significantly so in the multivariate model because the lower confidence limit (0.99) was slightly below 1.00. These findings are consistent with the results of Pham and colleagues,<sup>31</sup> who reported an inverse association between positive attitudes toward the International Criminal Tribunal for Rwanda and PTSD symptoms and with a large body of research that has shown a connection between anger or desire for revenge and PTSD in a variety of contexts.<sup>11-13</sup> Previously, Basoglu and colleagues<sup>39</sup> reported no association between justice and PTSD or desire for revenge and PTSD in their study of war survivors from the former Yugoslavia. These difference in findings may be due to differences in the measurement of justice and desire for revenge.

The fifth major finding was that probable PTSD was associated with mental disability and physical disability. The association with mental disability is perhaps not unexpected. However, respondents with probable PTSD had about twice the odds of physical disability as respondents without probable PTSD. Other studies have observed similar associations between PTSD and physical disability.<sup>40</sup>

## Limitations

The most important limitation of this study is that the cross-sectional design limits our ability to draw directional causal inferences. For example, the inverse association between justice and probable PTSD may mean that respondents who feel that justice has been done are less likely to have probable PTSD, or that those without probable PTSD are more likely to feel that justice has been done. Second, because the primary outcome, probable PTSD, was measured with a self-report checklist rather than a diagnostic interview, the prevalence figures reflect probable PTSD rather than diagnosed PTSD. Third, there may have been error in the measurement of expo-

sure to trauma, particularly exposure to trauma during the KR era, which occurred more than 30 years prior to the study. Fourth, we did not measure or control for other health conditions in the multivariate models for mental and physical disability. Fifth, while the refusal rate was very low (5.8%), the final response rate was only 59.5%. Although the demographics of our sample were similar to those of the 2004 CIPS, systematic differences between our sample and the Cambodian population may exist for characteristics that were not measured. Sixth, the study was not powered to detect the 6.3% difference in prevalence of PTSD observed in the study between the older and younger cohorts. The observed prevalences of 14.2% and 7.9% in the older and younger cohorts, respectively, were about half as large as the estimated prevalences used in the power calculations. Finally, attitudes toward the trials may have changed in the time between the end of data collection (August 2007) and now. Although substantive hearings for the public trials started in March 2009, pretrial hearings garnered publicity and outreach efforts have been undertaken by the public affairs office of the KR trials.<sup>9</sup>

## CONCLUSION

We conducted a national study in Cambodia of trauma, mental health, and attitudes regarding desire for revenge, justice, and the upcoming trials of the KR. The finding that perceived justice was inversely associated with probable PTSD raises the possibility that the trials might be an effective societal-level intervention for reducing PTSD symptoms among persons whose symptoms are related to KR-era trauma. If the trials are able to promote feelings of justice, they may reduce the prevalence of probable PTSD. However, the potential impact of the trials on mental health may be limited to those whose symptoms are due to trauma experienced during the KR era.

On the other hand, knowledge of the trials was associated with probable PTSD, and almost 93% of those with knowledge of the trials reported that the pros-

ecutions would produce painful memories of what happened during the KR era. These findings raise the possibility that the trials could increase the prevalence and severity of symptoms of PTSD. The crucial question is whether the KR trials will reduce symptoms of PTSD by increasing feelings of justice or increase PTSD symptoms by reviving traumatic memories of survivors without providing an opportunity to process and re-

frame those memories. That question can only be answered through a longitudinal study over the course of the trials.

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