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Association between witnessing traumatic events and psychopathology in the South African Stress and Health Study

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Abstract

Background—The high burden of witnessing traumatic events has been demonstrated in previous research in South Africa. However, previous work has focused on PTSD rather than a broader range of psychopathological outcomes. This study examined the association between witnessing trauma and multiple outcomes including mood, anxiety, and substance use disorders.

Methods—Regression models measured the odds of mood, anxiety, and substance use disorders among those who reported witnessing in the South African Stress and Health Study. Discrete-time survival analysis was used to examine whether witnessing was associated with earlier onset of mental disorders.

Results—Witnessing trauma was more commonly reported among males and those with low-average education. Posttraumatic stress disorder, mood, and anxiety disorders varied significantly with witnessing status, and witnessing was associated with exposure to a higher number of traumatic events compared to other types of traumatic events. Respondents reporting witnessing trauma had elevated odds of mood and anxiety disorders, but not substance use disorders.

Conclusion—Witnessing trauma is common in the South African population and results in increased risk of mood and anxiety disorders. Interventions aimed at reducing the burden of

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Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical standard Ethical approval was provided by the University of Michigan, Harvard Medical School, and Columbia University and by a single project assurance of compliance from the Medical University of South Africa that was approved by the National Institute of Mental Health. The study was therefore performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all participants before conducting interviews.

trauma and its outcomes must now increase their focus on bystanders and other observers, rather than just focusing on those directly affected.

Keywords

Trauma; Witnessing; Anxiety disorders; Mood disorders; Africa

Introduction

The recent history of South Africa has been punctuated by the widespread racial political violence of apartheid, exposing a large proportion of citizens to primary and secondary traumatic experiences, such as physical and sexual assault [5]. In the post-apartheid era, similar rates of violence have persisted, perpetuated by social inequity and economic disparity and a legacy of underinvestment in education and skilled job training [22]. The physical and psychological impact of these trends on the health of South Africans has been widely investigated [6, 9], but most studies have focused on convenience samples at the cost of population generalizability [25]. The South African Stress and Health Study (SASH) was implemented as the first survey to capture these exposures and their consequences among nationally representative sample. Findings from SASH data have demonstrated a high prevalence of trauma throughout the country [12, 26]. About three in four South Africans reported experiencing at least one traumatic event, and over half (55.6 %) have experienced multiple events [26]. A subsequent analysis found that witnessing traumatic events was one of the most commonly reported experiences among respondents [4]. Traumatic events involving witnessing also carried the highest conditional risk of posttraumatic stress disorder (PTSD), as well as that of the most chronic symptoms. Over half of all PTSD cases were associated with witnessing traumas.

Witnessing trauma has been hypothesized to have differential effects on memory and feelings of helplessness that may be important in PTSD etiology [7]. By the same mechanisms, it is possible that witnessing may trigger other psychological problems in vulnerable individuals. However, little work has been carried out elsewhere on the psychopathological consequences of witnessing trauma. Most of these assess only trauma witnessed by children [3, 13], or in specific groups such as combat veterans [17]. Studies have examined the independent role of witnessing on broader psychopathological outcomes, such as mood and anxiety disorders other than PTSD [1, 11], but again these have been largely among the same age- or event-specific populations.

The present study aimed to examine the association between witnessing traumatic life events and a wider array of psychopathological outcomes, including mood disorders, anxiety disorders, and substance use disorders in the South African Stress and Health Study. Additional analysis examined differences in the time to diagnosis among those who reported witnessing and those who did not. We hypothesized that witnessing trauma would be associated with a larger number of traumatic events, greater odds of mood, anxiety and substance use disorders, and a significantly earlier onset of those disorders.

Methods

Data source and study population

Data were taken from the South Africa Stress and Health Study (SASH), a population-representative sample of South African adults ages 18 and older. The survey was completed between January 2002 and June 2005, using a fully structured pencil and paper questionnaire to capture data on past year and lifetime prevalence of mental disorders. The SASH also captured data on many key risk factors for mental disorders, including physical and psychological trauma. It was the first attempt to measure these data on a national scale in South Africa [25].

Ethical approval was provided by the University of Michigan, Harvard Medical School, and Columbia University and by a single project assurance of compliance from the Medical University of South Africa that was approved by the National Institute of Mental Health. Informed consent was obtained form all participants before conducting interviews.

The study sample was created using a multistage, area probability sample of civilian non-institutionalized adults living in households and group hostels. The sampling was first determined through identification of 2001 South African Census of Enumerations Areas (EAs). These EAs were then stratified by province, urbanicity, and racial majority using population-representative probabilities. Second, within each EA, households were selected. Then a single individual was selected from within each household. Of the 5,000 individuals who were initially selected, 4,433 (87.1 %) were interviewed. Due to various exclusion criteria, the final sample included 4,351 (85.5 %) adults. Sample data were weighted to adjust for the stratified multistage sample design, differential probability of selection within households due to household size, and clustering, differential non-response rates. Post-stratification weights were used to account for residual differences between the sample and the population profile, according to the 2001 South African Census [21].

A more detailed description of the study methods has been previously published [25].

Measures

Witnessing

Witnessing was queried as part of a series of 27 separate potentially traumatic events (PTEs) included from the WHO Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) DSM-IV PTSD module. The CIDI is a fully structured pencil and paper questionnaire for use by interviewers without any clinical experience [14]. Witnessing included witnessing a death, seeing a dead body or someone seriously hurt, seeing atrocities, and witnessing domestic violence.

Other traumatic events

The remaining 23 traumatic events were categorized into 7 classes: war events (combat, relief worker in a war zone, civilian in a war zone, civilian in a region of terror, refugee and purposely injured, tortured or killed someone), physical violence (physical abuse by caregiver, physical assault by spouse or romantic partner, physical assault by someone else,

mugged or threatened with a weapon, and kidnapped), sexual violence (raped, sexually assaulted and stalked), accidents (toxic chemical exposure, automobile accident, natural disaster, man-made disaster, and a life-threatening illness, other life-threatening accident), unexpected death of a loved one, network events involving others (having a child with a serious illness, traumatic event occurring to a loved one, and accidentally causing serious injury or death) and private events (i.e. any event that the respondent did not wish to discuss). A variable representing the total number of traumatic events was also created by summing the number of different PTEs an individual reported having experienced (0–27). To conserve statistical power and address the potential for collinearity in the regression models, the variable was dichotomized where 0 = no other PTEs, 1 = any other PTE. The number of times a PTE was experienced was not queried, so any reported PTE was counted only once. Information on the full range of traumatic events has been published [4].

Mental and substance use disorders

The CIDI was also used to assess lifetime history of mental disorders. Diagnoses were based on the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) [2]. For this study, history of mood disorders (major depressive episode, minor depressive disorder, dysthymia, major depressive disorder, recurrent brief depression disorder), anxiety disorders (Agoraphobia without panic disorder, Agoraphobia, generalized anxiety disorder, panic attack, panic disorder, social phobia), and substance use disorders (alcohol abuse, alcohol dependence, drug abuse, drug dependence) were considered as separate outcomes. PTSD, based on the WHO CIDI scale of 26 PTEs, was included as a covariate to control for comorbidity between it and other mental disorders.

Demographic covariates

Six socio-demographic variables were included in the analysis: sex, age (18–29, 30–44, 45–59, 60+ years), marital status (married, previously married, and never married), education [low (0–1), low-average (2–7), high-average (8–12), and high (13+ years)], employment status [employed, homemaker, retired, and other (including unemployed and students)], and race (black, white, Indian/Asian, and colored, a classification which represents a heterogeneous racial group from mixed ancestry) [15]. Variables were selected and organized according to a previously published article on trauma and PTSD epidemiology in the SASH sample [4]. Socio-demographic variables were grouped to discrete variables wherever applicable and were dummy coded for the analysis (reference groups include age 60+, married, high education, employed, and white race).

Analysis

Frequency testing

Chi squared tests were used to determine whether the proportion of demographic groups who reported witnessing were similar to or different from those who did not. Also, the experience of witnessing was compared to lifetime diagnosis of mood, anxiety, or substance use disorders. To ensure correct temporal order, the sample was restricted to only individuals who reported their witnessing experience prior to a diagnosis of any mental disorder, and not the other way around (97.79 % of the sample).

Chi squared analysis was also used to test the proportion of respondents who reported experiencing each PTE group according to whether they had also reported witnessing or not. A two-sample *t* test assuming equal variances was used to test if the number of total PTEs reported were statistically significantly different among those who witnessed and those who had not. Because the minimum number of PTEs possible for each group was not equal, the mean scores that were tested and reported did not include the witnessing PTE.

Regression models

The odds of mood, anxiety, or substance use disorders were tested for those who reported witnessing or not using logistic regression modeling. Final models were adjusted for all significant demographic variables. Similar models also adjusted for PTSD diagnosis that preceded any other mental disorder, as well as the experience of any other PTEs. Again, only witnessing that preceded the diagnosis of a mental disorder was included. All tests were completed in STATA using weighted regression analysis with exponentiated coefficients reported as odds ratios (ORs) with corresponding 95 % confidence intervals (95 % CIs).

Survival analysis

A discrete-time survival analysis was used to examine if witnessing was associated with earlier onset of mental disorders other than PTSD. In the regression model, person-years were the unit of analysis to model the time to first onset of a mood, anxiety, or substance use disorder, starting from age one [24]. If an individual has no reported mental disorder diagnosis, this unit was equivalent to their age at the interview. Logistic regression was used to test the odds of disorders among respondents who reported witnessing violence than those who did not, adjusted for the number of years lived without a diagnosis. Also, exposure to witnessing traumatic events and experiencing psychiatric consequences of those events may differ among men and women [18]. To determine if the effect of witnessing on outcomes was similar for men and women, adjusted models were tested for interaction by sex and each mental disorder outcomes.

Results

Socio-demographic associations with witnessing status

In this study, 1084 (27.6 %) of respondents reported witnessing trauma. Men reported witnessing traumatic events more frequently than women (33.4 vs. 22.8 %, $p < 0.0001$). Respondents with low to low-average education had higher rates of witnessing than those with high-average to high education (8 or more years of education). None of the other socio-demographic variables showed any significant association with witnessing status (Table 1).

Other potentially traumatic events

The mean number of traumatic events, not including witnessing, was significantly higher for those who reported witnessing than for those who did not (2.78 vs. 1.38; $p < 0.0001$). Exposure to all other types of traumatic events was statistically significantly higher among those who also reported witnessing (Table 2).

Lifetime mental disorders and witnessing

The differences in prevalence rates of lifetime mental disorder diagnoses by witnessing status were tested. Witnessing trauma was significantly associated with having any anxiety or mood disorder, but there was no association with substance use disorders (Table 3).

Table 4 shows the odds ratios of mood, anxiety, and substance use disorders by witnessing status. Adjusted models were restricted to complete cases only. However, a large proportion of responses for employment status were missing (n = 1731). Because this covariate was non-significant in the regression models, we removed employment status as a covariate in our final models to retain the full analytic sample in the adjusted models. When adjusted for sex, marital status, highest level of education, and age (Model 1 in Table 4), the odds of developing a mood disorder were 72 % higher among respondents reporting witnessing than among those who did not (95 % CI 1.38–2.15; p <0.0001). Likewise, the odds of developing an anxiety disorder were 78 % higher (95 % CI 1.42–2.22; p <0.0001). However, the odds of developing a substance use disorder were 0.71 times lower among those who witnessed than those who did not (95 % CI 0.57–0.90; p = 0.0045).

A similar pattern is seen when further controlling for a prior PTSD diagnosis (Model 2 in Table 4). The odds of mood disorder are 1.69 times higher in the exposed group (95 % CI 1.35–2.13; p <0.0001), the odds of anxiety disorder are 1.76 times higher (95 % CI 1.4–2.21; p <0.0001), and the odds of substance use disorder are 0.69 times lower among those who reported witnessing trauma (95 % CI 0.55–0.88; p = 0.0023) as compared to those who did not.

In order to test the specificity of witnessing versus other traumatic events, another set of models tested the effect of witnessing further adjusted for any other reported PTE experienced prior to the mental disorder diagnosis (Model 3 in Table 4). The effect was similar; among those who reported witnessing, the odds of mood disorder were 1.38 times higher (95 % CI 1.1–1.75; p = 0.0066), and the odds of anxiety disorder were 1.45 times higher (95 % CI 1.17–1.8; p = 0.0008) compared with those who did not report witnessing. The odds of substance use disorder were 0.55 times lower among those who reported witnessing; 95 % CI 0.43–0.7; p <0.0001). Full model parameters are available from the authors on request.

Discrete-time survival analysis

Person-years, starting from age one, were added to test the difference in time to diagnosis by witnessing status. Models were also adjusted for respondent's age at diagnosis, as the best available proxy for time to onset of diagnosis. When adjusted for demographic covariates, prior PTSD, person-years to diagnosis, and age at diagnosis, the odds of mood disorders were 1.62 times higher (95 % CI 1.2–2.2; p = 0.0021) and the odds of anxiety disorders were 1.61 times higher (95 % CI 1.21–2.14; p = 0.001) compared to those who did not report witnessing. The odds of substance use disorder were not significantly associated with witnessing status (OR 1.11; 95 % CI 0.48–2.53; p = 0.8128). Models were also best fit by including only covariates that were statistically significant in the full models, but this

process caused no appreciable change in the full model estimates. Complete model results can be found in Table 5.

To more fully understand the association between sex and psychiatric outcomes, we added an interaction term for sex and witnessing to the adjusted survival models. The model estimates were non-significant for all outcomes (Mood $\beta = 0.018$, $p = 0.840$; Anxiety $\beta = 0.145$, $p = 0.096$; SUD $\beta = 0.182$, $p = 0.532$) and were not included in the final model estimates.

Discussion

This study is the first of its kind to examine fully the impact of witnessing trauma on psychiatric outcomes of an African adult population-based sample. We have four major findings.

First, we have demonstrated that witnessing trauma is more frequent among males and those with low-average education. This perhaps reflects the widespread victimization against males both during the apartheid regime and subsequently after the 1994 democratic elections in South Africa [16]. Previous work has demonstrated that these two factors are significantly associated with trauma exposure in general in the South African population, and our findings fit within this framework [4].

Second, we found that those reporting witnessing trauma also reported a higher number of traumatic events overall. This finding is hardly surprising given that due to the public nature of violent victimization there often is scant differentiation between the direct victims and bystanders. The result is that apart from witnessing others being maimed or killed during such events, the bystander is often also directly affected in one way or the other [16].

Third, respondents who witnessed trauma were around 50 % more likely to develop a mood or an anxiety disorder compared to those who did not report witnessing. This effect remained even after adjusting for prior PTSD diagnosis, and any other reported PTE, providing robust support for the specific relationship between witnessing and psychiatric illness other than PTSD. Moreover, the effect was consistent for men and women.

Adjusting for other PTEs, PTSD diagnosis and demographic covariates, witnessing trauma was associated with reduced risk of substance use. While similar findings have been described elsewhere in relation to risky alcohol use after traumatic injury [23], further investigation of the distinct nature of substance use disorders in this context would be valuable. In this study, however, the results must be interpreted with caution due to the relatively small number of respondents who reported both witnessing and substance use disorders in the sample ($n = 102$; 2.77 %), thereby reducing the statistical power to obtain a valid effect estimate. Another possible explanation for this unusual finding is that respondents may have under-reported substance abuse behaviors to avoid social or cultural stigma.

Finally, by measuring person-time to diagnosis and age at diagnosis, we were able to show that individuals who witnessed trauma were not only significantly more likely to develop

mood and anxiety disorders, but also developed the disorders significantly earlier than those who did not report witnessing. The results for substance use disorders were less conclusive, as the effect of witnessing was not significant in the person-time models. Overall, these findings provide support for prioritizing preventative services to individuals who have witnessed traumatic events in a time-sensitive manner.

This study had a number of important limitations. First, although we were able to control the temporal order of the exposures and outcomes of interest, the survey design was indeed cross-sectional, and potentially subject to recall bias that might be expected when respondents were asked to remember events that occurred approximately 10 years prior. Similarly, individuals may choose not to report witnessing highly sensitive traumatic events, such as sexual assault, due to the stigma associated with such events in South Africa [10].

Also, because individuals living in institutions such as hospitals, prisons, and mental health institutions were excluded from the study [25] the true effect of traumatic exposures may have been attenuated in this study. While notable, correcting this source of bias would likely increase the already significant association we have shown. Finally, the DSM-IV/CIDI tools used within the SASH have not yet been clinically validated in the context of South Africa [20], though other validation studies have shown that this is not likely to bias results [8].

These findings demonstrate the unique and robust association between witnessing a traumatic event and developing not only traumatic stress disorders, but also mood and other anxiety disorders. Future research and services for victims of trauma should consider a broad range of posttraumatic outcomes such as mood, anxiety, and substance use disorders [19]. Even though results were less consistent for the odds of developing substance use disorders, further research may identify disorder-specific risks in those who have witnessed trauma.

Conclusion

Witnessing trauma is common in the South African population and is associated with a unique risk of mood and anxiety disorders. Interventions aimed at reducing the burden of trauma and its outcomes must increase their focus on bystanders and other observers, rather than just focusing on those directly affected.

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Table 1

Socio-demographic frequencies by reported witnessing status

Sample (n = 4255)[a]	Witnessing (%)	No witnessing (%)	χ^2	p
Sex (n = 4253)				
Female	577 (22.8)	2012 (77.2)	33.52	< 0.0001
Male	507 (33.4)	1157 (66.6)		
Age (n = 4250)				
18–29	428 (28.4)	1173 (71.6)	4.2	0.2393
30–44	385 (28.8)	1067 (71.2)		
45–59	192 (26.0)	611 (74.0)		
60+	77 (23.4)	317 (76.6)		
Marital status (n = 4202)				
Currently married	543 (28.6)	1540 (71.4)	1.7	0.4298
Previously married	82 (28.6)	255 (71.4)		
Never Married	446 (26.5)	1336 (73.5)		
Education (n = 4176)				
Low (0–2 years)	163 (27.5)	439 (72.5)	8.9	0.0303
Low-avg (3–7 years)	636 (29.6)	1717 (70.4)		
High-avg (8–12 years)	185 (24.3)	613 (75.7)		
High (13+ years)	83 (23.0)	340 (77.0)		
Employment status (n = 2524)				
Employed	350 (31.5)	889 (68.5)	7.9	0.0967
Unemployed	241 (33.2)	547 (66.8)		
Homemaker	52 (23.2)	192 (76.8)		
Retired	14 (22.7)	62 (77.3)		
Other	46 (26.9)	131 (73.1)		
Race (n = 4255)				
White	82 (29.9)	213 (70.1)	8.1	0.0891
Black	851 (28.6)	2327 (71.4)		
Colored	96 (19.7)	438 (80.3)		
Indian	33 (22.2)	115 (77.8)		
Other	22 (27.6)	78 (72.4)		

[a] Subsamples may not always equal the total sample size due to missing responses

Table 2

Association between witnessing and other potentially traumatic events

	Witnessing (%), *n* = 1084	**No witnessing (%), *n* = 3171**	χ^2	***p***
PTEs (*n* obs = 4255)				
War events	205 (20.9)	222 (8.7)	65.8	< 0.0001
Physical violence	565 (52.8)	932 (30.6)	159.6	< 0.0001
Accidents	487 (45.9)	750 (25.4)	118.1	< 0.0001
Sexual violence	108 (10.5)	186 (6.0)	14.2	0.0002
Unexpected death	624 (57.2)	988 (31.2)	186.0	< 0.0001
Events involving others	236 (20.7)	346 (11.0)	76.1	< 0.0001
Other events	108 (9.9)	155 (4.9)	32.8	< 0.0001
Mean number of PTEs		*F*		*P*
Mean (SE)	2.78 (0.1)	1.38 (0.04)	1143.4	< 0.0001

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Table 3

Association between witnessing and lifetime mental disorders

Disorder	Witnessing (%)	No witnessing (%)	χ^2	*p*
Any mood disorder	175 (15.4)	340 (10.4)	17.2	< 0.0001
Any anxiety disorder	306 (26.9)	614 (18.7)	17.9	< 0.0001
Any substance disorder	102 (10.0)	309 (11.5)	1.52	0.2183
PTSD	36 (3.3)	50 (1.7)	9.4	0.0022

Table 4

ORs of lifetime mental disorders by witnessing

Disorder	Model 1[a]		Model 2[b]		Model 3[c]	
	OR (95 % CI)	*p*	OR (95 % CI)	*p*	OR (95 % CI)	*p*
Mood	1.72 (1.38–2.15)	< 0.0001	1.69 (1.35–2.13)	<0.0001	1.38 (1.1–1.75)	0.0066
Anxiety	1.78 (1.42–2.22)	< 0.0001	1.76 (1.4–2.21)	<0.0001	1.45 (1.17–1.80)	0.0008
Substance use	0.71 (0.57–0.90)	0.0045	0.69 (0.55–0.88)	0.0023	0.55 (0.43–0.70)	< 0.0001

[a] Adjusted for sex, marital status, level of education, race/ethnicity, and age

[b] Adjusted for all model 1 covariates and prior PTSD

[c] Adjusted for all model 2 covariates and for any other PTE

Table 5

Discrete-time survival analysis of ORs of mental disorders by witnessing

Disorder	Full models[a]			Best-fit models		
	OR	95 % CI	*p*	OR	95 % CI	*p*
Mood	1.62	1.2–2.2	0.0021	1.53[b]	1.14–2.04	0.0043
Anxiety	1.61	1.21–2.14	0.001	1.61[c]	1.21–2.13	0.0009
SUD	1.11	0.48–2.53	0.8128	1.12[d]	0.47–2.63	0.8027

[a] Adjusted for person-time to event or end of study, age at diagnosis, sex, marital status, education, race, age, prior PTSD, any other PTE

[b] Adjusted for person-time to event or end of study, age at diagnosis, marital status, education, age, prior PTSD, any other PTE

[c] Adjusted for person-time to event or end of study, age at diagnosis, sex, education, age, prior PTSD, any other PTE

[d] Adjusted for person-time to event or end of study, age at diagnosis, marital status, age, prior PTSD, any other PTE