Identifying Priorities for Mental Health Interventions in War-Affected Youth: A Longitudinal Study

Theresa S. Betancourt, ScD, MAa, Stephen E. Gilman, ScD, PhD, Robert T. Brennan, EdD, EdM, MAa, Ista Zahn, MAe,f, Tyler J. VanderWeele, PhDd

BACKGROUND: War-affected youth often suffer from multiple co-occurring mental health problems. These youth often live in low-resource settings where it may be infeasible to provide mental health services that simultaneously address all of these co-occurring mental health issues. It is therefore important to identify the areas where targeted interventions would do the most good.

METHODS: This analysis uses observational data from 3 waves of a longitudinal study on mental health in a sample of 529 war-affected youth (24.2% female; ages 10–17 at T1, 2002) in Sierra Leone. We regressed 4 mental health outcomes at T3 (2008) on internalizing (depression/anxiety) and externalizing (hostility/aggression) problems and prosocial attitudes/behaviors and community variables at T2 (2004) controlling for demographics, war exposures, and previous mental health scores at T1, allowing us to assess the relative impact of potential mental health intervention targets in shaping mental health outcomes over time.

RESULTS: Controlling for baseline covariates at T1 and all other exposures/potential intervention targets at T2, we observed a significant association between internalizing problems at T2 and 3 of the 4 outcomes at T3: internalizing (β = 0.27, 95% confidence interval [CI]: 0.11–0.42), prosocial attitudes (β = -0.20, 95% CI: -0.33 to -0.07) and posttraumatic stress symptoms (β = 0.22, 95% CI: 0.02–0.43). No other potential intervention target had similar substantial effects.

CONCLUSIONS: Reductions in internalizing may have multiple benefits for other mental health outcomes at a later point in time, even after controlling for confounding variables.

WHAT’S KNOWN ON THIS SUBJECT: War-affected youth often suffer from multiple co-occurring mental health problems. The relationship of these conditions to later mental health has yet to be thoroughly investigated. There is a need to explore potential targets for mental health interventions.

WHAT THIS STUDY ADDS: After controlling for preexisting conditions and contemporary confounders, internalizing (depression and anxiety) remained the major predictor of future mental health symptoms (internalizing symptoms, prosocial attitudes/behaviors, and posttraumatic stress symptoms). Interventions targeting internalizing in war-affected youth hold promise.

Departments of aGlobal Health and Population, bSocial and Behavioral Sciences, and dEpidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; cDepartment of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts; eFXB Center for Health and Human Rights and fThe Institute for Quantitative Social Science, Harvard University, Cambridge, Massachusetts

Dr Betancourt conceptualized and designed the study, oversaw acquisition of the data, and contributed to statistical analysis and interpretation of the data, drafting of the manuscript, obtaining funding, and supervision of the study; Dr Gilman contributed to drafting of the manuscript and overview of data analysis and approved the final manuscript as submitted; Dr Brennan contributed to the analysis and interpretation of data, participated in the drafting the article, and revised it critically for intellectual content; Mr Zahn managed the data, conducted the analyses, and participated in the drafting the article; Dr VanderWeele conceived of and oversaw the analysis and interpretation of the data and contributed to drafting of the manuscript; and all authors approved the final manuscript as submitted.


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Address correspondence to Theresa S. Betancourt, ScD, MA, Department of Global Health and Population, Harvard T.H. Chan School of Public Health, 665 Huntington Ave, 12th Floor, Boston, MA 02115. E-mail: theresa_betancourt@harvard.edu

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War has wide-reaching, often catastrophic consequences for children and adolescents.\(^1,2\) In day-to-day settings (schools, neighborhoods, communities), the family and broader social relationships that normally support healthy child development are disrupted. The direct and indirect consequences of war have been shown to persist long after the cessation of armed conflict, particularly in the domains of social and psychological well-being.\(^3\) Few longitudinal studies have examined the determinants of mental health of conflict-affected youth over the long term, and as a result, there is a gap in knowledge of potential intervention targets to improve mental health in vulnerable children. In the Occupied Palestinian Territories and Jerusalem, a cohort of 600 children in 3 initial age cohorts (8, 11, and 14 years old) has been followed over 3 years to study the relationship of exposure to political conflict with violence in the family, community, and school to posttraumatic stress (PTS) symptoms and aggressive behavior.\(^4,5\)

Findings have documented both the cumulative effects of exposure to political violence and the need to examine and understand the full spectrum of violence exposure and the dynamics underway between community and familial violence and stress that shape mental health and adjustment in war-affected youth. In Northern Ireland, a study of 700 mother-child dyads in both Protestant and Catholic neighborhoods found that sectarian community violence was associated with elevated family conflict as well as children’s reduced security about multiple aspects of their social environment (family, parent-child relations, and community).\(^6\) This reduced security was linked to adjustment problems and lower levels of prosocial behavior.

In a longitudinal study in Sierra Leone following a cohort of 529 male and female war-affected youth (10–17 years of age at baseline) over 3 waves from 2002 to 2008, perpetration of violence and community stigma were linked to externalizing problems and deficits in prosocial attitudes and behaviors, while internalizing problems were related to longer time spent with armed groups and young age of involvement as well as postconflict hardships.\(^7\) In the same sample, losing a caregiver and multiple daily hardships were associated with being in the subgroup of individuals who experienced a worsening of internalizing symptoms over time. Family abuse and neglect postconflict and social disorder in the community were associated with membership in the subgroup that maintained elevated levels of internalizing problems.\(^8\)

To evaluate potential interventions for war-exposed youth, longitudinal data are needed to determine factors associated with improvements in children’s outcomes. However, the research literature is characterized by a disconnect between evidence-based intervention research and naturalistic longitudinal studies on war-affected populations. Few longitudinal studies exist of war-affected youth, and none of those have specifically identified intervention foci that, if formally targeted, might carry the most promise for producing maximal therapeutic benefit. In this manner, the current 3-wave longitudinal study contributes to a gap in the available literature on war-affected youth.

From our observational data, we identified 6 variables assessed in the second data collection wave 2 years after cessation of the civil war, that we considered to be potential intervention targets that could form the basis of successful interventions. In the context of the Sierra Leone conflict in which war-exposed children have been followed for 6 years postconflict, we theorized that certain factors such as social support and improved family and community relationships would serve as protective mechanisms leading to improved mental health.\(^7\) Specifically, accounting for potential confounding due to baseline levels of these mental health outcomes and war exposures assessed immediately after the conclusion of conflict, we examined the influence of potentially modifiable mental health and social conditions 2 years later on 4 important mental health outcomes, internalizing (depression and anxiety), externalizing (hostility and aggression), prosocial behaviors, and PTS symptoms after an additional 4 years.

**METHODS**

**Sample**

The Longitudinal Study of War-Affected Youth in Sierra Leone includes war-affected youth (25% female, aged 10–17 at baseline) interviewed at up to 3 time points: T1 (2002), T2 (2004), and T3 (2008). The sample comprised 3 groups: (1) former child soldiers who had received services through nongovernmental organization (NGO)-run interim care centers (ICCs) during the most active period of demobilization (June 2001–February 2002; \(n = 264\), (2) a community sample of war-affected youth not served by ICCs (\(n = 137\)), and (3) a cohort of self-reintegrated former child soldiers recruited at T2 (\(n = 127\)). ICC-served youth in 5 districts of Sierra Leone (Bo, Kenema, Kono, Moyamba, and Pujehun) were identified according to registries from a major NGO. The community sample was recruited via random door-to-door sampling in these same communities of reintegration; this cohort was screened to ensure no previous involvement with ICCs. The cohort of self-reintegrated child soldiers (\(n = 127\)) was identified from outreach lists compiled by an NGO in the Bombali district of Sierra Leone.

**Procedures**

Among those approached and invited to participate in interviews, there were no refusals at baseline. T2 data collection was cut short because of the death of the director of our collaborating NGO, which halted all study activities when only 58% of the
original ICC-served cohort had been recontacted. However, at T3, the research team traced and reinterviewed 387 youth, thus maintaining 73% of the full sample.

Data for all participants were collected through in-home, 1-on-1 interviews conducted by Sierra Leonean research assistants trained and monitored by the study principal investigator and research staff. All participating youth provided verbal assent, and verbal consent was also provided by youths’ caregivers. At each time point, social workers traveled with the research team to respond to serious risk of harm situations (eg, suicidality) and make referrals to local service programs as appropriate. At T3, 5% of the sample was referred.

Ethical approval was given by the Institutional Review Boards of the Boston University Medical School/Boston Medical Center and the Harvard T.H. Chan School of Public Health.

Measures

We developed assessments of mental health and postconflict factors using a mix of standard measures and locally derived measures informed by qualitative data. All measures were selected and adapted in close consultation with local staff and community members. Focus groups of youth and adults were used to develop additional questionnaire items and to determine the face validity and cultural relevance of standard measures. Similar combined methods for cross-cultural instrument development have been used in recent studies of former child soldiers. After a standardized protocol, measures were forward- and back-translated from English to Sierra Leonean Krio, the local language spoken by all participants and interviewers.

Three of our scales were taken from the Oxford Measure of Psychosocial Adjustment developed and validated for use among former child soldiers in Sierra Leone and northern Uganda. The instrument was administered at all periods. These scales have shown to be related to theoretically associated constructs and strong correlations with other standard measures of mental health outcomes used in research with war-affected children. The depression and anxiety subscales (correlation at T2 = 0.65) were combined to create a unified internalizing scale as previously reported from this sample. Examples of questions include the following: "Are you afraid something bad will happen to you?" and "Do you cry easily?" The reliability coefficients (internal consistency, Cronbach’s α) associated with this scale were α = 0.71 at T1, α = 0.77 at T2, and α = 0.71 at T3. An externalizing subscale of the Oxford Measure of Psychosocial Adjustment comprised 12 items, which evaluated hostile or aggressive behavior over the past 6 months. The scale demonstrated good internal consistency in this sample (α = 0.86 at T2, α = 0.80 at T3). Examples of questions include the following: “Do you destroy things that belong to others?” and “Do you take things from other places without permission?” A subscale of adaptive/prosocial behaviors assessed items related to confidence and prosocial behaviors. Examples of questions include the following: "Do you share with others?" and "Are you helpful to adults?" The subscale comprised 18 items, range 0 to 72, T1 to T3 average α = 0.84. The 9-item short form of the Child Posttraumatic Stress Disorder Reaction Index was administered, with an additional 3 items from the original long-form. The 12-item measure showed good internal consistency in this sample (α = 0.89 at T2, α = 0.83 at T3). Frequency of symptoms over the past month was reported on a 3-point scale. This scale has demonstrated strong psychometric properties in studies of war-exposed youth.

The Child War Trauma Questionnaire was adapted for the Sierra Leone and used to assess individual war experiences. The adapted instrument included 42 items describing a range of war exposures. Based on previous research, 3 specific war experiences thought to be exemplary of “toxic” forms of war-related trauma were included in modeling given their potential to serve as confounders in mental health outcomes over time: (1) being a victim of rape, (2) injuring or killing others, and 3) death of primary caregivers due to war.

Postconflict factors were also selected in light of recent research indicating that stressors in the postconflict environment deserve equal attention in understanding the long-term adjustment of war-affected children, youth, and families. A scale of perceived community acceptance was developed from qualitative data collected in 2002 and administered at all 3 waves. Examples of questions include the following: "Adults in the community like you" and "People in this community want you to do better." Finally, social support at T1 was assessed using an 8-item scale relating to personal support within and outside the family. A typical question was “If you have a problem, are there any friends who come around you?” Responses were on a 5-point Likert scale. Internal consistency for the 8 items was high (α = 0.92). At T2, social support was measured using four items assessed on a 3-point scale covering seeking support from others from a 29-item scale covering a broad range of coping strategies. "I talk to a friend about my worries," was typical of items. Internal
consistency was reasonable for a 4-item scale (α = 0.61).

**Data Analysis**

The gold standard for assessing the effectiveness of interventions is often taken to be a randomized controlled trial, in which confounding by other covariates is eliminated by randomization across treatment groups. However, in many settings it is difficult, unethical, expensive, or infeasible to randomize. When using observational data, other approaches to estimating causal effects are needed. Here we take advantage of observational data collected prospectively over 6 years to investigate changes in mental health outcomes between T2 and T3 that are associated with changes in potential intervention targets between T1 and T2 by fitting linear regressions. This may provide insight into the causal effects of the various constructs examined and help inform what practical intervention should target.

Estimates of the effect of changes in potential intervention targets at T2 on mental health outcomes at T3 were obtained by fitting a series of linear regression models. Separate models were fit for each combination of potential intervention target (community acceptance, internalizing, externalizing, prosocial behaviors, school participation, and social support, all observed at T2) and outcome (internalizing, externalizing, prosocial behaviors, and PTS, observed at T3). Specifically, we constructed 2 models for each potential intervention target/outcome pair: In the first model (Model 1), we estimated the association between the T2 potential intervention target and T3 mental health controlling for (1) demographics (age, gender; traumatic war experiences), (2) the intervention target variable at T1, and (3) the mental health at T2; in the second model (Model 2), we also controlled for all other potential intervention targets at T2. Adjusting for previous mental health at T2 helps control for confounding and reverse causation; for instance, without T2 control an association between T2 externalizing and T3 PTS may in fact arise because both are caused by T2 PTS. Control for the previous values of potential intervention targets measured at T1 facilitates interpreting the effect estimates for T2 as the effect of a potential intervention at T2 on the outcomes at T3. Controlling for other potential intervention targets at T2 (in Model 2 only) gives a more conservative estimate of the effect of a hypothetical intervention at T2, assuming that the intervention changed only the targeted variable (and had no effect on related variables). Effect sizes that follow are reported in terms of standard deviations of the outcome per 1 SD of the exposure.

Demographic and war exposure variables, if missing at original interview, were reassessed in subsequent interviews until complete data were obtained. Participants with measurements at only 1 of the 3 time points were excluded from the analyses, leaving an analytic sample of 425. For subjects with measurements at 2 time points, multiple imputation was performed using an expectation maximization algorithm. Ten imputed data sets were created using an imputation model that included a superset of the variables included in the regression analyses. Sensitivity analyses were conducted using complete case.

**RESULTS**

Approximately one-quarter (24.2%) of youth were female. During the conflict, 15.8% of all subjects reported being victims of rape or sexual assault, whereas approximately one-third (31.4%) reported killing or injuring others, and a similar number lost a parent or caregiver (31.2%). School enrollment at T1 was 72.5%, increased to 80.3% at T2, and then declined to 57.1% as the children aged at T3. Further details of the sample appear in Table 1 and are presented from the complete case (ie, unimputed) data. Table 2 displays the results of our regression models investigating the effects of potentially modifiable intervention targets. Analyses using multiple imputation and complete case yielded similar results (the results of the complete case analyses are given in the supplemental information). Internalizing at T2 was significantly associated with internalizing at T3, both in Model 1 (β = 0.27, 95% confidence interval [CI]: 0.11-0.42) and after additionally controlling for other potential intervention targets in Model 2 (β = 0.30, 95% CI: 0.07-0.53). Internalizing at T2 also had a statistically significant effect on prosocial attitudes at T3, both in Model 1 (β = −0.20, 95% CI: −0.33 to −0.07) and Model 2 (β = −0.18, 95% CI: −0.34 to −0.02). Internalizing at T2 likewise had a statistically significant effect on PTS symptoms at T3 (β = 0.22, 95% CI: 0.02-0.43) in Model 1, although the CI for the effect does just include zero after controlling for the other intervention targets in Model 2 (β = 0.24, 95% CI: −0.02 to 0.50). Prosocial attitudes at T2 had a statistically significant effect on prosocial attitudes at T3 (β = 0.18, 95% CI: 0.07-0.29) only in Model 1. None of the effect estimates for any of the other T2 potential intervention targets were statistically significant. In all cases, in both Models 1 and 2, none of the effect size estimates below 0.18 SDs were statistically significant, and whenever the effects sizes were at least 0.18 SDs, the estimate was statistically significant, with the exception of the effect of internalizing at T2 on PTS symptoms at T3 in Model 2.

**DISCUSSION**

We sought to identify modifiable intervention targets to improve mental health outcomes among war-exposed youth. We found that reductions in internalizing symptoms in this war-affected population could have multiple benefits for a range of...
TABLE 1 Descriptive Characteristics of Sample

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<tr>
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<tbody>
<tr>
<td>Age (y)</td>
<td>14.75 (2.53)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Community support</td>
<td>10.69 (2.29)</td>
<td>10.06 (2.7)</td>
<td>9.75 (2.66)</td>
</tr>
<tr>
<td>Externalizing</td>
<td>19.4 (4.98)</td>
<td>20.88 (6.12)</td>
<td>17.92 (4.34)</td>
</tr>
<tr>
<td>Internalizing</td>
<td>34.52 (7.75)</td>
<td>35.97 (7.58)</td>
<td>34.94 (6.22)</td>
</tr>
<tr>
<td>Prosocial</td>
<td>34.9 (3.98)</td>
<td>33.24 (4.81)</td>
<td>33.31 (4.05)</td>
</tr>
<tr>
<td>PTSD</td>
<td>—</td>
<td>15.24 (8.81)</td>
<td>11.36 (7.2)</td>
</tr>
<tr>
<td>Social supportb</td>
<td>33.3 (5.4)</td>
<td>8.53 (1.65)</td>
<td>—</td>
</tr>
</tbody>
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PTSD, posttraumatic stress disorder; —, not assessed at time point.

b Measures were different at each wave due to superior psychometrics of later scales.

mental health problems at a later time points, including, internalizing symptoms, prosocial attitudes/behaviors, and PTS symptoms, even after controlling for previous internalizing and all other covariates. There were small effects for potentially altering prosocial attitudes and behaviors at T2, but these relationships did not hold up after controlling for other potential intervention targets (ie, Model 2). We present both models (1 and 2) because although ideally it is useful to control for the influence of plausible alternative explanatory variables, Model 2 might also mask an important association due to multicollinearity among the predictors (modifiable intervention targets). We chose to focus our interpretation on the more robust findings from the Model 2 results.

These findings suggest an opportunity to improve important life outcomes for war-affected youth by implementing programs to reduce depression and anxiety in this population. Typically, these youth live in low- and middle-income countries, such as Sierra Leone, where resources for treating mental health disorders are scarce. Although the treatment of complex trauma and related conditions, such as posttraumatic stress disorder, often requires highly trained mental health professionals (eg, psychiatrists and/or doctoral-level psychologists) and, often, an individual therapy setting, there is a growing evidence base suggesting that internalizing disorders can be treated by bachelor’s-level mental health workers with rigorous training and supervision using evidenced-based techniques such as cognitive behavioral therapy and/or interpersonal therapy with minimal risk of adverse iatrogenic effects. Furthermore, a stepped care approach can be adopted in which the most acute individuals or those suffering from resistant trauma symptoms can be directed toward more sophisticated treatment resources tailored to their conditions if initial stabilization-focused interventions do not yield sufficient symptom relief. A focus on war trauma has dominated many of the interventions for war-affected youth. It may be the case that trauma-informed, rather than trauma-focused, intervention targeting internalizing is also needed.

Previous research among war-affected youth in Sierra Leone found that daily stressors were highly associated with internalizing problems, whereas past trauma exposures were more likely to be associated with externalizing problems or deficits in prosocial attitudes and behaviors. In the present analysis, we did not have data on daily stressors available at all time points. In fact, previous data suggest that a more complex investigation of daily stressors and other factors that

TABLE 2 Estimated Standardized Regression Coefficients (95% CI) of Potential Intervention Targets Predicting Mental Health Outcomes

<table>
<thead>
<tr>
<th>Predictor at T2</th>
<th>Internalizing at T3</th>
<th>Externalizing at T3</th>
<th>Prosocial at T3</th>
<th>PTS Symptoms at T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community acceptance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1</td>
<td>0.08 (–0.06 to 0.21)</td>
<td>0.07 (–0.05 to 0.18)</td>
<td>0.10 (–0.02 to 0.23)</td>
<td>0.01 (–0.14 to 0.17)</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.05 (–0.11 to 0.19)</td>
<td>0.1 (–0.03 to 0.24)</td>
<td>0.07 (–0.05 to 0.2)</td>
<td>0.038 (–0.13 to 0.21)</td>
</tr>
</tbody>
</table>

Internalizing |
| Model 1         | 0.27 (0.11 to 0.42)  | –0.01 (–0.17 to 0.15) | –0.20 (–0.33 to –0.07) | 0.22 (0.02 to 0.43)  |
| Model 2         | 0.30 (0.07 to 0.53)  | 0.02 (–0.15 to 0.2)   | –0.18 (–0.34 to –0.02) | 0.24 (–0.02 to 0.50) |

Externalizing |
| Model 1         | –0.08 (–0.27 to 0.1) | 0.09 (–0.06 to 0.24)  | –0.12 (–0.25 to 0.02) | 0.06 (–0.10 to 0.22) |
| Model 2         | –0.06 (–0.24 to 0.12) | 0.09 (–0.08 to 0.28)  | –0.012 (–0.17 to 0.15) | –0.05 (–0.22 to 0.13) |

Prosocial |
| Model 1         | 0.11 (0.00 to 0.22)  | –0.09 (–0.2 to 0.02)  | 0.18 (0.07 to 0.29)   | 0.03 (–0.08 to 0.15) |
| Model 2         | 0.11 (–0.03 to 0.25) | –0.12 (–0.27 to 0.03) | 0.13 (–0.01 to 0.26)  | –0.01 (–0.15 to 0.12) |

School |
| Model 1         | –0.01 (–0.04 to 0.03) | –0.02 (–0.06 to 0.01) | 0.02 (–0.01 – 0.06)   | 0.01 (–0.02 to 0.04) |
| Model 2         | –0.01 (–0.04 to 0.02) | –0.02 (–0.05 to 0.13) | 0.02 (–0.01 to 0.06)  | 0.02 (–0.02 to 0.05) |

Social support |
| Model 1         | 0.00 (–0.13 to 0.13) | –0.03 (–0.14 to 0.09) | –0.02 (–0.13 to 0.10) | 0.05 (–0.07 to 0.17) |
| Model 2         | –0.05 (–0.19 to 0.08) | –0.01 (–0.15 to 0.12) | 0.02 (–0.09 to 0.13)  | 0.01 (–0.15 to 0.14) |

Both Model 1 and Model 2 controlled for demographics at T1, the outcome and potential intervention target at T1, and the outcome at time two. Model 2 also controlled for the other potential intervention targets at T2.
sustain higher levels of internalizing problems are important. Interventions that also address these basic needs (strongly linked to internalizing symptoms)\textsuperscript{29} deserve further attention in addition to targeting internalizing symptoms directly via interventions.

Our longitudinal data with a range of background and mental health measures allowed us to address many potential threats of confounding and reverse causation, which is strengthened by the temporal precedence of our potential intervention targets to the mental health outcomes. Although causal inference from an observational study is always limited due to possible uncontrolled confounding, we believe that the results of our investigation pointing to internalizing as the best potential target of those tested for mental health intervention in terms of long-term benefits for war-affected youth provide useful guidance and a stronger inferential basis for intervention than cross-sectional results. Other typical limitations apply to our study, such as those associated with self-report, although ours may be somewhat of somewhat less relevance because of the diversity of our measures, the interview format, and the lengthy period between data collections. Although in the context of this study, internalizing showed the best promise as an intervention target, the data collection was not designed to address specifically the question of identifying modifiable targets for interventions. Not only may we not have measured the ideal candidates for intervention, but the time lapse of 4 years between T2 and T3 may not have been optimal for detecting the sorts of relationships that suggest the best potential targets for intervention. Future observational longitudinal studies of war-affected youth should attend more specifically to the measurement of potentially modifiable social and mental health processes that might be identified for study as interventions. Nonetheless, on the basis of the results of the present investigation, subsequent intervention models might be centered on helping young people to address feelings of hopelessness and anxiety while also helping them to navigate challenging environments. Such interventions might also promote improved community relationships and better help more troubled war-affected youth thrive in the postconflict environment.\textsuperscript{30}

**CONCLUSIONS**

In this longitudinal sample of Sierra Leonean war-affected youth, we find that reductions in internalizing at 1 time point may have far-ranging benefits for other mental health outcomes at a later point in time, even when we controlled for any number of possible confounding variables. Our findings emphasize the need for low-cost, group-based, trauma-informed mental health interventions grounded in evidence-based techniques, which can be implemented in low- and middle-income countries by mental health workers with strong training and supervision, reserving the scarcest resources for youth with the greatest need. Future research into such interventions for war-affected youth should consider innovative, low-cost approaches that target internalizing symptoms as components of treatments that will have lasting effects.

**ACKNOWLEDGMENTS**

We extend our gratitude to our participants, as well as the local research assistants who conducted interviews in Sierra Leone, and our project coordinators and colleagues at the International Rescue Committee.

**ABBREVIATIONS**

CI: confidence interval
ICC: interim care center
NGO: nongovernmental organization
PTS: posttraumatic stress
RCT: randomized controlled trial
T1: 2002
T2: 2004
T3: 2008

**REFERENCES**


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