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Moderator effects in a randomized controlled trial of the Common Elements Treatment Approach (CETA) for intimate partner violence and hazardous alcohol use in Zambia

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Abstract

Background: Intimate partner violence (IPV) and hazardous alcohol use are prevalent and co-occurring problems in low- and middle-income countries (LMICs). While limited evidence suggests that cognitive behavioral therapy (CBT) interventions can help address these problems, few randomized trials in LMICs have investigated moderators of treatment effectiveness. This study explores moderating factors impacting responsiveness to a CBT-based intervention for IPV and hazardous alcohol use among couples in Zambia.

Methods: Data were obtained from a completed randomized trial of a CBT-based intervention, the Common Elements Treatment Approach (CETA), among 248 couples in Lusaka. Female experiences of IPV and male alcohol use were measured at baseline and 12 months post-baseline. Mixed effects regression models were used to evaluate each moderator: age, educational attainment, employment status, marital status, physical disability, HIV status, trauma exposure, depression, post-traumatic stress disorder, alcohol use disorder, and substance use.

Results: Treatment effectiveness for male alcohol use was moderated by female substance use, with greater reductions among men whose partners reported using non-alcohol substances (e.g., cannabis) ($p < 0.01$). Other marginally significant moderators ($p < 0.15$) of change in male alcohol use included female education and male depression, substance use, and moderate-to-severe alcohol use at baseline. Female HIV status and depression were marginally significant moderators of change in IPV.

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Conflicts of Interest:
No conflict declared.

Conclusions: This study suggests that CETA may be especially effective for highly symptomatic individuals with comorbid mental and behavioral health problems, a promising finding given that such comorbidity is widespread in LMICs. Psychotherapeutic treatments that can flexibly and simultaneously address co-occurring problems are needed.

Keywords

Alcohol use; intimate partner violence; cognitive behavioral therapy; moderation analysis; low- and middle-income country

1. Introduction

A robust body of literature has shown that hazardous alcohol use by one or both partners in a relationship is associated with an increased risk for incidents and severity of intimate partner violence (IPV) (Devries et al., 2014; Foran and O'Leary, 2008; Graham et al., 2011; Greene et al., 2020). In Zambia, the site of the present study, the most recent Demographic and Health Survey data indicate that while around 39% of women report lifetime experiences of physical and/or sexual IPV, this prevalence increases to 77% among those whose husbands frequently abuse alcohol (Zambia Statistics Agency, Ministry of Health Zambia, & ICF, 2019). Despite such evidence, a dearth of interventions have proven effective in targeting these complex and co-occurring issues (Stephens-Lewis et al., 2019). Three trials conducted in high-income countries have suggested that interventions using cognitive behavioral therapy (CBT) approaches that integrate alcohol reduction and IPV prevention strategies may decrease both behaviors (Easton et al., 2018, 2007b; Kraanen et al., 2013). To date, however, few studies have attempted to determine the extent to which such integrated approaches work in low- and middle-income countries (LMICs).

To address these gaps, the authors recently completed a randomized controlled trial (RCT) of a CBT-based intervention, the Common Elements Treatment Approach (CETA), among couples living in urban Zambia, which assessed its effectiveness in decreasing women's experiences of IPV and men's hazardous alcohol use (Murray et al., 2020). Compared to an enhanced control condition, CETA was found to have clinically and statistically significant effects in reducing both female-reported experiences of IPV (mean change difference = −8.2, $d = 0.49$, $p = 0.02$) and male alcohol use (mean change difference = −4.5, $d = 0.43$, $p < 0.001$) at 12 months post-baseline. To our knowledge, there has only been one other RCT of a CBT-based intervention targeting both IPV and alcohol use in a low-resource setting. Conducted among alcohol dependent men ($N = 177$) admitted to an inpatient psychiatric clinic in India, this study found that the intervention reduced spouse-reported IPV experiences but not self-reported alcohol consumption at three-month follow-up (Satyanarayana et al., 2016).

In generating evidence for intervention effectiveness, clinical trial experts have argued that it is critical to determine whether there are differential treatment effects among participant subgroups in order to identify those for whom a particular intervention may be most beneficial (Cook et al., 2004; Hingorani et al., 2013; Kraemer et al., 2002). To date, however, few trials of CBT-based interventions specifically targeting IPV and/or alcohol

use have explored moderators of treatment effectiveness. A notable exception is Easton et al. (2007a), which examined differential treatment response among male perpetrators of IPV using alcohol only compared to those with co-occurring alcohol and drug use. They found that while participants reporting co-occurring use had poorer treatment compliance and worse alcohol use outcomes, there was no difference in IPV between groups, with both groups reporting similar reductions in IPV perpetration. As this trial was conducted in the United States, however, it is unclear whether results are generalizable to LMICs.

More evidence exists regarding moderators of broader mental health-related outcomes in CBT-based interventions, although again, studies have overwhelmingly been conducted in high-income countries. A recent systematic review of moderators of CBT for major depressive disorder found that increased treatment efficacy was associated with younger age, higher initial depression severity, and individual (compared to group) administration (Whiston et al., 2019). Another review synthesized evidence around moderators of CBT-based treatment outcomes for adults with anxiety disorders, post-traumatic stress disorder (PTSD), or obsessive-compulsive disorder, and found substantial variability across the 24 included studies (Schneider et al., 2015). Moderators with the most evidence included higher initial anxiety severity and comorbid mental health problems, although findings were decidedly mixed. Notably, few studies found evidence that sociodemographic factors (i.e., sex, age, race) predicted treatment response. Finally, a recent meta-analysis of CBT for alcohol and substance use disorders explored a number of potential moderators including age, sex, race, primary substance used, symptom severity, treatment length, and treatment modality (Magill et al., 2019). The only statistically significant moderator that emerged was age, with older age associated with smaller effect sizes; the authors noted, however, that subgroup analyses were underpowered.

While results from these reviews may not directly translate to interventions targeting co-occurring IPV and hazardous alcohol use, both outcomes are strongly correlated with other mental and behavioral health problems (Fulu et al., 2013; Jané-Llopis and Matytsina, 2006; Trevillion et al., 2012); as such, these findings present a useful roadmap for the types of participant characteristics that may influence treatment effectiveness. It is clear, however, that further work is needed to illuminate specific factors impacting responsiveness to CBT-based interventions for IPV and alcohol use. It may be particularly important to understand such factors for interventions conducted in LMICs, as this information can guide decision-making around which populations to prioritize given resource limitations, potentially contributing to the overall cost-effectiveness of interventions such as CETA (Torres-Rueda et al., 2020). With these issues in mind, in the current study, we analyzed data from the above-mentioned RCT of CETA among couples in Zambia to explore whether treatment effects on IPV and male alcohol use varied based on participant sociodemographic characteristics, physical health, and mental health. Although this analysis is intended to be exploratory, based on prior research, we hypothesized that both outcomes would be moderated by symptom severity and the co-occurrence of mental and behavioral health problems, with larger treatment effects observed among those with (a) more severe alcohol use disorder; and (b) greater levels of depressive symptoms, PTSD symptoms, and non-alcohol substance use.

2. Methods

2.1. Study design

This study was a secondary analysis of data from a completed RCT, which compared CETA with treatment as usual plus safety checks (TAU-Plus) among heterosexual couples living in Zambia (Murray et al., 2020). The trial was conducted between May 2016 and January 2019 (ClinicalTrials.gov identifier: NCT02790827). The trial methods, which have been presented in detail elsewhere (Kane et al., 2017; Murray et al., 2020), are summarized below.

2.2. Participants and procedures

The trial was conducted in three low-resource neighborhoods in Lusaka. Recruitment was carried out by trained lay mental health counselors, who met with potentially eligible couples (i.e., women and men who were married or dating) to explain the study's purpose. Inclusion criteria were: (a) permanent residence in one of the study neighborhoods; (b) fluency in English, Bemba, or Nyanja; (c) aged 18 or older; (d) female report of recent experiences of moderate or severe past-year IPV perpetrated by the man, as indicated by a score ≥38 on the physical/sexual violence subscale of the Severity of Violence Against Women Scale (SVAWS); and (e) male and/or female report of the man's recent hazardous alcohol use, as indicated by a score of ≥8 on the Alcohol Use Disorders Identification Test (AUDIT). Exclusion criteria were: (a) past-month suicide ideation or attempt; (b) current diagnosis of a psychotic or developmental disorder; or (c) current unstable psychiatric drug regimen.

Following informed consent procedures, female and male partners were screened for eligibility separately through the use of laptop-based Audio Computer Assisted Self-Interviewing (ACASI). Any participant who was flagged as "high-risk" based on reported suicidal ideation, homicidal ideation, or current experiences of violence was immediately referred for help based on a standardized safety plan. Eligible couples immediately completed the full baseline assessment battery and were randomized as a unit to either CETA or TAU-Plus. Although couples were randomized as a unit, there were separate intervention sessions for women and men. Due to the nature of the intervention, study participants and lay counselors were not masked to treatment assignment. The outcomes assessment was administered via ACASI within one month of treatment completion (i.e., around 3-4 months post-baseline), 12 months post-baseline, and 24 months post-baseline. All study assessors were masked to participants' treatment assignments.

Following 12-month post-baseline data collection, an effectiveness analysis was conducted on the request of the data and safety monitoring board (DSMB). As this analysis demonstrated the intervention's effectivenesss, the DSMB recommended stopping the trial early. CETA was then offered to all control participants, who therefore did not participate in the 24-month post-baseline assessment (Murray et al., 2020). As the primary effectiveness analysis was conducted at 12 months post-baseline, the present analysis will focus on the same timepoint.

The final sample size was 248 couples out of 428 couples screened (with 177 couples who were ineligible and 3 who declined). Sample size calculation was based on the expectation

of detecting a 20% reduction in mean physical/sexual IPV score among women randomized to CETA, compared to no change in women randomized to TAU-Plus. The sample size was calculated with power of 80%, alpha of 0.05, counselor-level clustering effects (ICC = 0.1), and estimated loss to follow-up of 20%. Retention was adequate, with 214 women (86% of those enrolled) and 206 men (83% of those enrolled) completing the 12-month post-baseline assessment.

2.3. Treatment arms

2.3.1. CETA.—CETA is a transdiagnostic CBT-based intervention developed to address common mental health problems in LMICs (Murray et al., 2014). The intervention consists of 6 to 12 weekly sessions and is designed to be delivered in-person by lay counselors (i.e., individuals with no formal mental health training). Sessions last for up to 120 minutes and involve a range of cognitive behavioral strategies, including psychoeducation, anxiety management, behavioral activation, cognitive restructuring, and exposure therapy. The intervention's modular nature allows providers to select which specific elements to provide in order to individualize treatment and address comorbidity. In this trial, CETA was modified to include sessions targeting IPV and hazardous alcohol use; this adaptation process has been described in detail elsewhere (Kane et al., 2017). Lay counselors were trained using an apprenticeship model, which was comprised of a 10-day in-person training followed by weekly practice sessions with local supervisors (Murray et al., 2011). Throughout the trial, lay counselors continued to meet with local supervisors, and these supervisors participated in weekly oversight meetings with a CETA trainer. While CETA was initially delivered in a single-sex group format, it was subsequently changed to individual counseling due to feasibility challenges (e.g., scheduling conflicts, unreliable transportation).

2.3.3. TAU-Plus.—Given the high-risk nature of the study population, control participants received TAU-Plus, which consisted of regular safety checks by trained research assessors. During the 12-week treatment phase of the study, control participants received weekly phone check-ins in which they were screened for suicidal ideation, homicidal ideation, child abuse, and current IPV risk. If participants were unavailable by phone, research assessors would follow-up with a home visit. If participants were found to be at risk, a trained clinical supervisor worked with them to create a detailed safety plan. Following the treatment phase, both CETA and TAU-Plus participants continued to receive monthly safety checks using the same process.

2.4. Measures

2.4.1. Primary outcomes.—Women's past-year experiences of IPV were measured using self-report on the SVAWS (Marshall, 1992). This 46-item measure encompasses three subscales: physical violence (21 items), sexual violence (6 items), and threats of violence (19 items). As a primary outcome, we focused on the physical and sexual violence items, which were combined into a single 27-item subscale, as has been done in prior research among IPV-affected couples in South Africa (Peltzer and Pengpid, 2013). Women responded to each item by indicating how often they had experienced IPV perpetrated by their male partner, with Likert-type responses ranging from 1 (never) to 4 (many times). As a SVAWS score of ≥38 was necessary for study inclusion, scores at baseline could range from 38 to

108. Internal reliability of the scale at baseline was excellent (α = 0.92). Past-year male alcohol use was assessed using self-report on the AUDIT (Saunders et al., 1993), which has previously been validated in Zambia (Chishinga et al., 2011). The AUDIT consists of 10 items with a 5-point response scale, and assesses the frequency, quantity, and consequences of alcohol use. Scores range from 0 to 40, with scores ≥8 considered hazardous alcohol use (Babor et al., 2001). Internal reliability of the AUDIT at baseline was very good (α = 0.85).

2.4.2. Moderators.—Potential moderators were included in the analysis based on results from prior studies, theoretical importance, and the authors' clinical judgement through their experiences delivering CETA in LMICs. Sociodemographic moderators included age (18-25, 26-35, 36-45, or 46+), educational attainment (none, some primary school, or completed primary or higher), employment status (formally/informally employed or unemployed), and marital status (married or unmarried). Other moderators related to participants' baseline physical and mental health, and included physical disability, HIV status, high trauma exposure, depression, PTSD, alcohol use disorder, and substance use. Physical disability was measured with a modified version of the Washington Group Short Set, which includes five questions capturing functional impairment with respect to seeing, hearing, walking, remembering/concentrating, and speaking (Madans et al., 2011). Physicial disability was indicated by a response of "a lot of difficulty" or "cannot do at all" to any of the questions, as recommended by the Washington Group. Trauma exposure and PTSD were assessed with the Harvard Trauma Questionnaire (HTQ), which includes 17 items capturing lifetime experiences of trauma (binary response scale; range 0–17; threshold for high trauma exposure defined using a median split) and 39 items assessing past-week symptoms of PTSD (4-point response scale; range 0–117; threshold for PTSD was average item-level score of ≥2.5) (Mollica et al., 1992). Depression was indicated by a score ≥20 on the Center for Epidemiological Studies-Depression Scale (CES-D), a 20-item measure assessing the frequency of past-week depression symptoms (4-point response scale; range 0–60) (Radloff, 1977). Moderate-to-severe alcohol use disorder was indicated by an AUDIT score ≥16 among men and ≥12 among women (Babor et al., 2001). Past three-month substance use was assessed through the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), which includes seven items measuring the frequency and consequences of use for a range of non-alcohol substances (e.g., cannabis, cocaine, opioids) (Humeniuk et al., 2008). Across all variables, female and male participants' responses were considered as separate moderators.

2.5. Statistical analysis

Analysis was intent-to-treat and included all enrolled participants. Missing follow-up data were imputed using multiple imputation via chained equations. The original trial effectiveness analysis consisted of linear mixed effects models that included fixed effects of treatment group (CETA or TAU-Plus), time (baseline, 12 months post-baseline), and an interaction term (group X time). Additional sociodemographic characteristics were included as fixed effects if there was a substantial difference in the variable between treatment groups at baseline or if the variable predicted change in the outcome over time. Random effects were included for participant and counselor. For the present analysis, we re-estimated these mixed-effects linear regression models, but added a three-way interaction term as a fixed

effect: group X time X moderator (all lower order two-way interactions were also included). Separate models were estimated for each moderator/outcome combination. The three-way interaction term was the coefficient of interest in exploring possible effect modification. As we were not powered for moderator analyses, we purposefully set a p-value threshold of $p < 0.15$ to conduct further exploration of effect modification by estimating new models with group, time, and group X time interaction stratified by moderator level. Effect sizes (using Cohen's d) were calculated to measure the size of treatment impact within each moderator level.

2.6. Ethical approval

Informed oral consent was obtained from all trial participants. Oral consent has been used in many of our studies in Zambia because there can often be significant perceived stigma among participants in signing documents, particularly for mental health-related projects. Ethical approval was granted by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and the University of Zambia Biomedical Ethics Review Committee.

3. Results

Baseline sociodemographic characteristics of trial participants are presented in Table 1. Female and male participants were similar with respect to moderator variables across CETA and TAU-Plus. As described by Murray and colleagues (2020), CETA was statistically superior to TAU-Plus for both primary outcomes at 12 months post-baseline, with effect sizes of 0.49 and 0.43 observed for IPV and male alcohol use, respectively. Statistical tests of moderation for both outcomes are summarized in Table 2. The effectiveness of CETA was not significantly moderated by female or male age, employment status, marital status, physical disability, high trauma exposure, or PTSD.

Female substance use was a statistically significant moderator of CETA's effect on male alcohol use ($p < 0.01$), with men whose partners reported using non-alcohol substances in the past three months showing a greater reduction in alcohol use (mean change difference = −10.8, $d = 1.09$) than those whose partners did not (mean change difference = −2.6, $d = 0.25$). In addition, several moderators demonstrated marginal statistical significance ($p < 0.15$). Female education modified CETA's effect on male alcohol use ($p = 0.08$), with larger effect sizes observed among men whose partners had no education (mean change difference = −7.9, $d = 0.59$) compared to those with some primary education (mean change difference = −2.6, $d = 0.27$). Female HIV status moderated CETA's effect on IPV ($p = 0.12$), with a greater reduction in IPV observed among women living with HIV (mean change difference = −11.9, $d = 0.68$) compared to those with an HIV-negative status (mean change difference = −6.3, $d = 0.39$). Female depression modified CETA's effect on IPV only ($p = 0.10$), whereas male depression modified its effect on both IPV ($p = 0.10$) and male alcohol use ($p = 0.12$). For IPV, effect sizes were larger among women with a CES-D score ≥ 20 (mean change difference = −10.7 compared to −1.4, $d = 0.61$ compared to 0.11) as well as partners of men with a CES-D score ≥ 20 (mean change difference = −11.0 compared to −4.1, $d = 0.67$ compared to 0.24). Likewise, for male alcohol use, effect sizes were larger among

men with a CES-D score ≥ 20 (mean change difference = −6.8 compared to −2.5, d = 0.64 compared to 0.31). Finally, both male moderate-to-severe alcohol use and male substance use were moderators of CETA's effect on male alcohol use (p = 0.10 and 0.13, respectively), with greater reductions among those with AUDIT ≥ 16 (mean change difference = −6.3 compared to −2.9, d = 0.89 compared to 0.60) and those who reported past three-month use of non-alcohol substances (mean change difference = −7.3 compared to −3.0, d = 0.73 compared to 0.31). Stratified models results are included in Tables 3 (IPV) and 4 (male alcohol use).

4. Discussion

To our knowledge, this study is the first to examine moderators of treatment effectiveness for an integrated CBT-based intervention addressing IPV and alcohol use in a LMIC. These types of analyses are critical in low-resource settings, as they can help pinpoint vulnerable subpopulations that may particularly benefit from targeted treatment strategies (Kane et al., 2016; Kraemer et al., 2002). We found that among couples where the female partner reported substance use, CETA showed a larger treatment effect on the male partner's alcohol use compared to couples where the female partner did not report substance use. Other marginally significant moderators included female education (male alcohol use), female HIV status (IPV), female depression (IPV), male depression (male alcohol use and IPV), male moderate-to-severe alcohol use (male alcohol use), and male substance use (male alcohol use). While we have reported these marginal findings due to the exploratory nature of this analysis, we want to emphasize that these results should be interpreted as inconclusive.

For both the alcohol use and IPV outcomes, effect sizes were largest among those who reported more severe depressive symptoms at baseline. Given that CETA has been established as an evidence-based treatment for depression in other LMICs and was originally designed as a transdiagnostic strategy for targeting comorbid conditions, it follows that those with greater depressive symptoms would experience additional benefits from this approach (Bolton et al., 2014; Murray et al., 2014). While this finding is unsurprising, however, it underscores the interrelated nature of alcohol use, violence, and psychological distress in Zambia, and indicates that CETA may be especially effective for highly symptomatic individuals with both mental and behavioral health problems. A growing body of evidence has established that comorbid mental and behavioral disorders are widespread in LMICs, with individuals commonly experiencing problems across multiple interrelated domains (Adewuya et al., 2018; Balhara et al., 2017; Quevedo et al., 2020; Saban et al., 2014; Verhey et al., 2018). As suggested elsewhere, it is therefore crucial that psychotherapeutic treatments in these settings can flexibly and simultaneously address a range of co-occurring problems (Kane et al., 2018; Murray & Jordans, 2016).

The importance of comorbidity was also evident in the role of substance use in moderating the alcohol use outcome, with larger reductions among men who either used substances themselves or whose partners used substances. Interestingly, this finding runs counter to that of Easton et al. (2007), who found that their CBT-based intervention was less effective among participants with co-occuring drug and alcohol use. In the context of the current study, we hypothesize that the alcohol use reduction elements within CETA – which were

adapted from a number of empirically supported substance use treatments and incorporated motivation enhancement and relapse prevention strategies (Danielson et al., 2012; Henggeler et al., 2002) – targeted common pathways towards hazardous use among those with polysubstance use. Further, we posit that the role of a female partner's substance use in moderating her male partner's alcohol use reduction may be indicative of the ways in which such strategies come to be shared within households. While research on polysubstance use in LMICs is rare, findings from high-income contexts suggest that co-occurring drug use is often the norm among individuals who misuse alcohol (Connor et al., 2014; Crummy et al., 2020; Staines et al., 2001). Overall, this speaks to the need for better integration across drug and alcohol programs and policies (Arias and Kranzler, 2008; Klimas et al., 2014).

It is also noteworthy that women living with HIV experienced a greater reduction in IPV compared to those who were HIV-negative. This is a particularly promising result given the high prevalence of HIV in Zambia (Chanda-Kapata et al., 2016) and the well-documented relationship between HIV and increased IPV victimization across sub-Saharan Africa (Beres et al., 2020; Durevall and Lindskog, 2015; Kabwama et al., 2019; Tenkorang et al., 2020). Such evidence has led to an emerging focus on integrated strategies that jointly address these syndemic problems. To date, however, intervention trials among HIV-affected populations in sub-Saharan Africa have documented mixed findings in terms of their long-term impact on preventing or reducing IPV (Abramsky et al., 2011; Jewkes et al., 2008; Sharma et al., 2020; Wagman et al., 2015). The current study suggests the potential utility of CBT-based psychotherapeutic approaches in reducing IPV among HIV-affected populations in low-resource settings. Future research should explore the extent to which such strategies may also impact HIV-related outcomes – for instance, by reducing sexual risk behaviors and improving treatment adherence.

Finally, we found little evidence to support moderation of treatment effectiveness by sociodemographic factors. With few exceptions, CETA was beneficial regardless of age, educational attainment, employment status, and marital status, suggesting that CETA may be an appropriate intervention for heterogenous populations. This finding aligns with emerging global consensus around the applicability of CBT-based psychotherapeutic interventions for treating common mental and behavioral disorders among diverse cross-national populations (Cuijpers et al., 2016; Hofmann et al., 2012; Kuo, 2019).

This study had several limitations. Most importantly, while the sample size was powered to assess the treatment effects of CETA relative to TAU-Plus, it was underpowered to assess the moderation of these effects. These results should therefore be treated as exploratory and should not yet be used to guide clinical decision-making. The limitations from the original RCT also remain applicable to the current study. First, given ethical considerations around including IPV-affected couples, we augmented the control condition to include weekly safety checks with participants. It is possible that these safety checks led to reductions in IPV or alcohol use, making it more challenging to detect significant moderator effects. Second, despite high retention rates overall, loss to follow-up was greater in the CETA group ($n = 21$) compared to the TAU-Plus group ($n = 2$). While we have used an intent-to-treat approach combined with multiple imputation procedures to account for missing data, it

remains possible that differential missingness impacted our findings. Finally, this study relied completely on self-report, which is subject to both social desirability and recall bias.

5. Conclusions

Our previous research among couples in Zambia found CETA to be effective in reducing women's experiences of IPV and men's hazardous alcohol use (Murray et al., 2020). The current study extends this work by emphasizing the potential benefits of CETA for highly symptomatic individuals with comorbid mental and behavioral health problems. This is a promising finding given that such comorbidities are often the norm in LMICs, and speaks to the broad utility of using CBT-based transdiagnostic psychotherapeutic interventions to address mental and behavioral health problems in these settings. Further, it suggests that with adequate training and supervision, lay mental health counselors can successfully treat some of the most complex patient populations, a promising service delivery model given the limited capacity for formal treatment programs targeting violence, mental health, and substance use within many LMICs. Future research efforts should focus on the extent to which CETA can be expanded and scaled up within similar low-resource contexts. In addition, given the dearth of studies that consider moderators of treatment effectiveness for CBT-based interventions in LMICs, it is essential that future trials plan for subgroup analyses whenever feasible.

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Table 1.

Baseline characteristics of study sample (Murray et al., 2020)

	CETA		TAU-Plus	
	Women (*n* = 123)	**Men (*n* = 123)**	**Women (*n* = 125)**	**Men (*n* = 125)**
	***N* (column %)**			
Age				
18-25	28 (22.8)	18 (14.6)	37 (29.6)	9 (7.2)
26-35	56 (45.5)	41 (33.3)	43 (34.4)	53 (42.4)
36-45	24 (19.5)	39 (31.7)	25 (20.0)	35 (28.0)
46+	15 (12.2)	25 (20.3)	19 (15.2)	28 (22.4)
Missing	0 (0.0)	0 (0.0)	1 (0.8)	0 (0.0)
Education				
None	30 (24.4)	19 (15.5)	28 (22.4)	11 (8.8)
Some primary	53 (43.1)	40 (32.5)	53 (42.4)	51 (40.8)
Completed primary or higher	40 (35.5)	64 (52.0)	44 (35.2)	63 (50.4)
Employment				
Employed	52 (42.3)	78 (63.4)	50 (40.0)	59 (47.2)
Unemployed	71 (57.7)	45 (36.6)	75 (60.0)	66 (52.8)
Relationship status[a]				
Married	47 (38.2)	-	45 (36.0)	-
Unmarried	76 (61.8)	-	80 (64.0)	-
Physical disability	38 (30.9)	26 (21.1)	32 (25.6)	19 (15.2)
Living with HIV	55 (44.7)	36 (29.3)	46 (36.8)	30 (24.0)
High trauma exposure	67 (54.5)	70 (56.9)	65 (52.0)	66 (52.8)
Depression	91 (74.0)	65 (52.9)	87 (69.6)	80 (64.0)
Post-traumatic stress	57 (46.3)	48 (39.0)	61 (48.8)	48 (38.4)
Moderate-to-severe AUD	49 (39.8)	59 (48.0)	45 (36.0)	60 (48.0)
Other substance use[b]	28 (22.8)	45 (36.6)	27 (21.6)	56 (44.8)

Note. AUD = Alcohol Use Disorder

[a]Relationship status based on female participants' report only

[b]Non-alcohol/tobacco substance use

Table 2.

Results from mixed effects regression models testing moderation of treatment effects on severity of intimate partner violence and male alcohol use ($N = 248$)

	SVAWS		AUDIT	
Moderator	***B (SE)***	***p***	***B (SE)***	***p***
Female age				
18-25	REF	REF	REF	REF
26-35	4.41 (4.84)	0.36	2.66 (3.64)	0.47
36-45	5.21 (8.40)	0.56	1.52 (4.70)	0.75
46+	7.29 (9.85)	0.46	3.78 (3.76)	0.32
Male age				
18-25	REF	REF	REF	REF
26-35	1.37 (8.64)	0.87	3.97 (3.80)	0.30
36-45	8.14 (7.68)	0.29	3.07 (4.83)	0.53
46+	2.14 (12.21)	0.86	1.37 (4.12)	0.74
Female education				
None	REF	REF	REF	REF
Some primary	−5.39 (7.22)	0.46	**5.3 (3.05)**	**0.08**
Completed primary or higher	0.39 (7.62)	0.96	3.18 (3.64)	0.38
Male education				
None	REF	REF	REF	REF
Some primary	−0.60 (7.04)	0.93	−0.03 (3.66)	0.99
Completed primary or higher	−0.10 (6.10)	0.99	−1.34 (3.36)	0.69
Female employment	−2.29 (4.66)	0.62	1.26 (2.65)	0.64
Male employment	−1.17 (3.76)	0.76-	−1.44 (2.78)	0.61
Marital status	−6.84 (5.65)	0.23	−1.77 (2.33)	0.45
Female physical disability	−6.51 (5.16)	0.21	1.95 (3.64)	0.59
Male physical disability	−10.5 (12.0)	0.38	1.18 (3.56)	0.74
Female living with HIV	**−5.71 (3.68)**	**0.12**	0.73 (2.55)	0.78
Male living with HIV	5.24 (7.44)	0.48	−3.81 (4.37)	0.38
Female high trauma exposure	−1.42 (5.10)	0.78	3.62 (3.40)	0.29
Male high trauma exposure	0.75 (6.70)	0.91	0.94 (3.0)	0.76
Female depression	**−9.27 (5.66)**	**0.10**	2.97 (2.72)	0.28
Male depression	**−6.88 (4.14)**	**0.10**	**−4.28 (2.78)**	**0.12**
Female post-traumatic stress	−4.98 (4.94)	0.32	0.01 (3.89)	0.99
Male post-traumatic stress	−0.81 (4.98)	0.87	−2.0 (2.30)	0.38
Female moderate-to-severe AUD	−5.46 (6.36)	0.39	−1.74 (1.68)	0.30
Male moderate-to-severe AUD	0.40 (6.01)	0.98	**−3.36 (2.0)**	**0.10**
Female other substance use	3.78 (5.62)	0.50	**−8.16 (2.93)**	**<0.01**
Male other substance use	3.27 (5.16)	0.53	**−4.27 (2.83)**	**0.13**

Note. SVAWS = Severity of Violence Against Women Scale; AUDIT = Alcohol Use Disorders Identification Test; AUD = Alcohol Use Disorder; All participants included in analysis following multiple imputation. Each moderator was tested in a separate regression model. Betas are the

coefficient of the three-way interaction term in the mixed effects regression model (Moderator x Treatment arm x Time). Bolded items represent those with $p < 0.15$.

Table 3.

Predicted mean SVAWS scores, mean change difference, and between-treatment group effect sizes stratified by moderators

	CETA		TAU-plus				
	Mean (95% CI)[a]		Mean (95% CI)[a]				
Moderator	Baseline	12-month Follow-up	Baseline	12-month Follow-up	Mean change difference (95% CI)[a]	*p* value	Cohen's *d*[b]
Overall (*N* = 248)	65.2 (62.0, 68.3)	41.9 (37.6, 46.2)	61.8 (60.4, 63.2)	46.8 (41.1, 52.4)	−8.2 (−14.9, −1.5)	0.02	0.49
Female HIV status							
HIV positive (*n* = 101)	66.3 (61.2, 71.5)	43.5 (38.1, 49.0)	62.2 (56.5, 67.8)	51.3 (42.7, 59.9)	−11.9 (−20.3, −3.5)	<0.01	0.68
HIV negative (*n* = 147)	64.8 (60.9, 68.6)	41.0 (35.8, 46.1)	62.3 (60.3, 64.2)	44.8 (39.5, 40.0)	−6.3 (−13.3, 0.67)	0.08	0.39
Female depression							
CES-D ≥ 20 (*n* = 178)	68.2 (64.8, 71.6)	43.1 (38.5, 47.8)	64.2 (61.5, 66.9)	49.8 (43.4, 56.2)	−10.7 (−19.0, −2.3)	0.01	0.61
CES-D < 20 (*n* = 70)	57.6 (53.1, 62.2)	39.6 (32.3, 46.9)	56.7 (53.0, 60.4)	40.1 (34.9, 45.3)	−1.4 (−9.91, 7.12)	0.75	0.11
Male depression							
CES-D ≥ 20 (*n* = 145)	67.8 (62.9, 72.6)	43.0 (37.1, 48.8)	61.8 (59.1, 64.5)	48.0 (39.6, 56.4)	−11.0 (−20.1, −1.9)	0.02	0.67
CES-D < 20 (*n* = 103)	61.7 (57.5, 66.0)	40.3 (35.2, 45.4)	61.8 (56.8, 66.9)	44.6 (40.4, 48.7)	−4.1 (−10.1, 1.8)	0.17	0.24

Note. SVAWS = Severity of Violence Against Women Scale; CES-D = Center for Epidemiological Studies-Depression Scale

[a]Predicted means, mean change difference estimates, and corresponding 95% confidence intervals are from the linear mixed effects regression model. The same model was estimated for each level of the specified moderator. A negative value for the difference in mean change suggests a greater difference in change among the CETA group compared to the TAU-plus group.

[b]The effect size was calculated as Cohen's *d* by dividing the difference in mean change by the baseline pooled standard deviation.

Table 4.

Predicted mean AUDIT scores, mean change difference, and between-treatment group effect sizes stratified by moderators

	CETA		TAU-plus				
	Mean (95% CI)[a]		Mean (95% CI)[a]				
Moderator	**Baseline**	**12-month Follow-up**	**Baseline**	**12-month Follow-up**	**Mean change difference (95% CI)[a]**	***p* value**	**Cohen's *d*[b]**
Overall (*N* = 248)	14.9 (13.3, 16.4)	5.7 (3.7, 7.7)	14.6 (13.8, 15.4)	9.9 (8.7, 11.1)	−4.5 (−6.9, −2.2)	<0.0001	0.43
Female education							
None (*n* = 58)	16.7 (12.5, 21.0)	6.7 (2.0, 11.4)	14.0 (9.5, 18.5)	11.9 (9.8, 14.1)	−7.9 (−12.7, −3.2)	<0.01	0.59
Some primary (*n* = 106)	13.3 (11.2, 15.4)	5.8 (3.1, 8.5)	14.4 (12.5, 16.2)	9.5 (7.3, 11.7)	−2.6 (−6.6, 1.4)	0.20	0.27
Completed primary or higher (*n* =84)	16.3 (12.4, 20.3)	5.5 (2.5, 8.4)	15.3 (12.8, 17.9)	9.2 (6.8, 11.7)	−4.8 (−8.8, −0.7)	0.02	0.43
Male depression							
CES-D ≥ 20 (*n* = 145)	17.2 (14.6, 19.9)	5.1 (3.0, 7.1)	16.8 (15.6, 18.0)	11.4 (10.0, 12.8)	−6.8 (−10.7, −2.8)	<0.01	0.64
CES-D < 20 (*n* = 103)	11.8 (9.7, 13.9)	6.0 (3.3, 8.7)	9.9 (7.7, 12.0)	6.6 (3.9, 9.2)	−2.5 (−5.4, 0.5)	0.10	0.31
Male moderate-to-severe AUD							
AUDIT ≥ 16 (*n* = 119)	24.2 (22.1, 26.3)	8.1 (4.7, 11.4)	24.4 (23.4, 25.3)	14.5 (12.6, 16.5)	−6.3 (−9.6, −3.0)	<0.01	0.89
AUDIT < 16 (*n* = 129)	8.1 (6.7, 9.4)	5.3 (3.3, 7.3)	6.8 (5.5, 8.2)	6.9 (5.5, 8.4)	−2.9 (−5.1, −0.8)	<0.01	0.60
Female any recent substance use							
Any use in past 3 months (*n* = 55)	20.4 (17.4, 23.5)	6.6 (2.0, 11.1)	15.6 (10.9, 20.2)	12.5 (7.0, 18.1)	−10.8 (−15.6, −6.1)	<0.0001	1.09
No use in past 3 months (*n* = 193)	13.5 (11.6, 15.4)	5.7 (4.1, 7.3)	14.4 (12.9, 16.0)	9.3 (7.9, 10.7)	−2.6 (−5.3, 0.1)	0.06	0.25
Male any recent substance use							
Any use in past 3 months (*n* = 101)	19.6 (15.1, 24.1)	7.1 (3.5, 10.7)	19.1 (14.6, 23.7)	13.9 (9.9, 17.9)	−7.3 (−11.8, −2.8)	<0.01	0.73
No use in past 3 months (*n* = 147)	12.6 (9.8, 15.4)	5.4 (2.8, 7.9)	11.3 (8.4, 14.2)	7.1 (4.7, 9.5)	−3.0 (−5.6, −0.5)	0.02	0.31

Note. AUDIT = Alcohol Use Disorders Identification Test; CES-D = Center for Epidemiological Studies-Depression Scale; AUD = Alcohol Use Disorder

[a] Predicted means, difference in mean change estimates, and corresponding 95% confidence intervals are from the linear mixed effects regression model. The same model was estimated for each level of the specified moderator. A negative value for the difference in mean change suggests a greater difference in change among the CETA group compared to the TAU-plus group.

[b] The effect size was calculated as Cohen's *d* by dividing the difference in mean change by the baseline pooled standard deviation.

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