Mindfulness-Based Trauma Recovery for Refugees (MBTR-R): Randomized Waitlist-Control
Evidence of Efficacy and Safety

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Abstract

Refugees and asylum seekers often suffer from trauma- and stress-related mental health problems. We thus developed Mindfulness-Based Trauma Recovery for Refugees (MBTR-R) – a 9-week, mindfulness-based, trauma-sensitive and socio-culturally adapted, group intervention for refugees and asylum seekers. We conducted a randomized waitlist-control study testing its efficacy and safety among a community sample of 158 Eritrean asylum seekers (46.2% female) with a severe trauma history and chronic post-migration stress. Relative to waitlist-controls, MBTR-R demonstrated significantly reduced rates and symptom severity of PTSD, depression, anxiety and multi-morbidity at post-intervention and 5-week follow-up. Therapeutic effects were not dependent on key demographics, trauma history severity, or post-migration living difficulties. Finally, there was no evidence of adverse effects or lasting clinically significant deterioration in monitored outcomes. The brief intervention format, group-based delivery, and limited attrition indicate that MBTR-R may be a feasible, acceptable, readily implemented and scalable mental health intervention for refugees and asylum seekers.

Keywords: Asylum Seekers, Anxiety, Compassion, Depression, Forcibly Displaced People, Meditation, Mindfulness, PTSD, Post-Migration Stress, Randomized Controlled Study, Refugees, Stress, Trauma

Today, an unprecedented 79.5 million people, among them refugees and asylum seekers, are forcibly displaced from their homes by conflict, persecution, and other forms of human brutality (UNHCR, 2019). Following traumatic events and chronic stressors post-displacement, refugees and asylum seekers suffer at high rates from various trauma- and stress-related mental health problems including posttraumatic stress, depression, and anxiety (Bogic et al., 2015; Burri & Maercker, 2014; Priebe et al., 2016; Silove et al., 2017). The personal suffering of the forcibly displaced, fracturing of families and communities, and inter-generational transmission of trauma will challenge re-settlement communities, aid organizations, policy makers, and practitioners around the world for many years to come (Guruge & Butt, 2015; Patel et al., 2018; Schick et al., 2016; Silove et al., 2017).

This crisis has led to global calls for the development and delivery of mental health interventions that are effective, safe, generalize to diverse individuals and populations (e.g., gender, education), yet are also brief, cost-effective, disseminable, transportable, readily implemented, and scalable (Haagen et al., 2017; Schick et al., 2018; Siriwardhana et al., 2014; Tol, Augustinavicius, Carswell, Brown, et al., 2018; WHO, 2013). Developing and implementing intervention programs that meet these demanding criteria is a, if not the, seminal challenge facing the field of global mental health in the coming decade (Patel et al., 2018; Singla et al., 2017; Slobodin & de Jong, 2015; Tol et al., 2014)

Field-wide efforts are under way. First, intensive, typically individual, trauma-focused exposure-based therapies, such as Narrative Exposure Therapy (NET), have demonstrated moderate efficacy and effectiveness among diverse refugee populations (Elbert et al., 2015; Nickerson, Liddell, et al., 2017; Robjant & Fazel, 2010; Shapiro, 2001; Slobodin & de Jong, 2015). Second, emerging mental health interventions for refugees and asylum seekers entail low-intensity

cognitive-behavior therapy, focused on coping with here-and-now post-migration stressors. For example, Problem Management Plus (PM+) and e-health Self Help Plus (SH+) have demonstrated promising feasibility, fidelity, and adherence (Purgato et al., 2019; Tol, Augustinavicius, Carswell, Leku, et al., 2018). Preliminary evidence of SH+ effectiveness has been recently reported although documented therapeutic effect sizes are modest (Tol et al., 2020). Third, other commonly implemented mental health intervention approaches include individual psychotherapy, such as cognitive-behavioral therapy and the common elements treatment approach (CETA), have demonstrated evidence of modest efficacy (Bolton et al., 2014; Buhmann et al., 2016; Carlsson et al., 2018). Likewise, psychosocial interventions typically targeting community-level resilience and -support are commonly implemented although only a small number of studies have tested their therapeutic efficacy (Meyer, 2013; Silove et al., 2017; Turrini et al., 2019; Weinstein et al., 2016).

These early therapeutic models represent seminal building blocks of a public refugee mental health intervention portfolio (Singla et al., 2017; Tol et al., 2014). Interventions tailored to the complex, uncertain and stressful contexts and post-migration realities of forcibly displaced persons, and in particular, asylum seekers, are much needed (Nickerson, Liddell, et al., 2017; Patel et al., 2018; Tol et al., 2014). The large majority (~70%) of refugees and asylum seekers in the current crisis reside in urban post-displacement settings, often characterized by insecure visa or unrecognized asylum status, economic instability, and post-migration stressors (Cahill et al., 2006; Kazdin & Blase, 2011; Murray, Tol, et al., 2014; UNHCR, 2019). These populations may be less likely to access or benefit from intensive, individual or trauma-focused exposure therapies (Hinton et al., 2011), yet may be particularly burdened by a range of mental health problems linked to chronic ongoing post-migration stressors (Nickerson, Liddell, et al., 2017; Silove et al., 2017; Tol et al., 2014). It may therefore be useful to draw on therapeutic approaches with a strong clinical

evidence-base relevant to the trauma- and stress-related mental health needs of refugees, that are also pragmatically well-suited to the implementation challenges facing refugee mental health intervention efforts (Patel et al., 2018). Work over the past number of years led us to speculate that mindfulness-based interventions (MBIs) may represent one such promising approach (Bernstein et al., 2019; Reeb et al., 2017; Singla et al., 2017; Wielgosz et al., 2019; Yuval & Bernstein, 2017).

MBIs are a family of mental training interventions, of which the most common are Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn (1990, 2017)) and Mindfulness-Based Cognitive Therapy (MBCT; Segal et al. (2002)). MBIs entail practice in formal mindfulness meditation as well as informal practice of mindfulness in daily living to cultivate present moment attention and awareness characterized by a number of attitudinal qualities (e.g., acceptance, non-judgment, self-compassion) (Crane et al., 2017). MBIs have varied applications and implementation in various sectors, contexts, and populations (Bernstein et al., 2019; Crane et al., 2017; Dimidjian & Segal, 2015).

Central features of MBIs may be well-suited to some of the implementation challenges facing refugee mental health intervention efforts. First, there is a growing body of evidence documenting robust stress-buffering effects of MBIs (Boyd et al., 2018; Galante et al., 2018; Jha et al., 2017; Pascoe et al., 2017), including increased subjective well-being, reduced severity, persistence and relapse of common mental health problems, enhanced coping (Bernstein et al., 2011; Fjorback et al., 2011; Keng et al., 2011), and protective effects on physiological markers of chronic stress and trauma including hyperarousal, numbing and psychosomatic symptoms (Gallegos et al., 2015; Smith et al., 2011). Furthermore, emerging evidence has linked MBIs to trauma recovery in Western Educated Industrialized Rich Democratic (WEIRD) populations and

contexts (Goldsmith et al., 2014; Hopwood & Schutte, 2017; Müller-Engelmann et al., 2019; Nidich et al., 2018; Polusny et al., 2015; Possemato et al., 2015; Stephenson et al., 2017).

Second, MBIs target mechanisms and risk processes implicated in trauma recovery or the buffering of chronic stress. These include meta-cognitive processes such as decentering (Bernstein et al., 2015; Shoham et al., 2017; Teasdale et al., 2002); executive functions such as inhibitory control in working memory or attentional control (Jha et al., 2017; Teper et al., 2013); emotion regulation skills including interoceptive awareness, acceptance, and reduced reactivity (Gu et al., 2015; Held & Owens, 2015; Lindsay & Creswell, 2017); (mal)adaptive self-referentiality including reduced perseverative negative thinking (Gu et al., 2015; Van Der Velden et al., 2015) and enhanced self-compassion (Garland et al., 2015; Germer & Neff, 2015; Winders et al., 2020). Notably, a number of these targeted processes are thought to transcend culture (e.g., attention, executive functions, awareness) (Kabat-Zinn, 2019; Thupten, 2019).

Third, the training techniques, format, modes of MBI delivery, and the potential cost-effective reach and scalability of MBIs are well-suited to address common barriers to implementation of mental health interventions for asylum seekers and refugee populations (Hinton et al., 2005; Kazdin & Blase, 2011; Murray, Dorsey, et al., 2014; Nickerson et al., 2011; WHO, 2016). MBIs are relatively brief and can be delivered by trained para-professionals under supervision, regardless of geographic distance/isolation (Crane et al., 2017; Crane & Kuyken, 2019; Didonna, 2009); may be delivered through a number of formats including groups, self-help audio recordings, text, and web- or mobile-supported platforms (Krusche et al., 2013; Mrazek et al., 2019; Segal et al., 2019); and, relative to more linguistically-mediated psychotherapeutic interventions, MBIs require relatively less verbal interactions between trainers and participants. MBIs may be readily scaled-up even in under-resourced health systems, as they are brief, group-

based, low cost, and beneficial to participants with a range of stress-related distress and personal goals (Schick et al., 2018; Singla et al., 2017; Tol, Augustinavicius, Carswell, Brown, et al., 2018). Likewise, MBIs, and specifically meditation practices, may be adapted to be trauma-sensitive for vulnerable participants with a traumatic stress history or posttraumatic stress symptoms (Kim et al., 2013; Treleaven, 2018). Finally, contemporary secularized MBIs have been successfully adapted to a variety of populations and contexts in ways that are socio-culturally sensitive to diverse backgrounds, belief systems and languages (Crane et al., 2016; Hinton et al., 2013).

To-date, the potential for MBIs to promote well-being, trauma recovery, and coping with post-migration stressors among refugees and asylum seekers has been preliminary explored via qualitative studies and via non-randomized, uncontrolled intervention studies of small samples (Banks et al., 2015; Hinton et al., 2013; Sobczak & West, 2013; Van der Gucht et al., 2015). Yet, to the best of our knowledge: (1) no MBI has been specifically designed to care for stress- and trauma-related mental health needs of refugees and asylum seekers; and (2) we do not yet have any experimental evidence of the efficacy or safety of a MBI among refugees or asylum seekers. In light of the global public health urgency, significance and expected longevity of the current humanitarian and mental health crisis, as well as challenging barriers to effective mental health intervention implementation, such research is timely and much needed.

Present Study & Aims

The present study reports efficacy and safety outcomes of a randomized waitlist-control study of a novel specialized MBI – Mindfulness-Based Trauma Recovery for Refugees (MBTR-R) – among N=158 (55.7% women) Eritrean asylum seekers residing in an urban post-migration setting in the Middle East (Israel). MBTR-R is a 9-session mindfulness-based group intervention

that is trauma-sensitive and socio-culturally adapted for diverse populations of refugees and asylum seekers.

Efficacy

First, we tested whether, relative to a waitlist-control, MBTR-R led to significantly reduced rates of stress- and trauma-related mental health problems including post-traumatic stress, depression, anxiety, multi-morbidity and wellbeing – at 1-week and 5-weeks post-intervention. Due to the residential insecurity of asylum seekers in this population (Birger et al., 2018), we limited follow-up (5-weeks post-intervention) to ensure prospective retention (Western et al., 2016). Second, we tested whether expected therapeutic effects of MBTR-R were moderated by key demographics of the studied population including, gender, age and education level, or by pre-existing vulnerability factors at pre-intervention such as trauma exposure history or current post-migration living difficulties. The potential impact of MBTR-R depends on the degree to which expected therapeutic benefits of MBTR-R generalize to diverse forcibly displaced people from various backgrounds and are not circumscribed to narrow, specific sub-groups (Patel et al., 2018; Tol et al., 2014).

Safety

Third, we tested whether, relative to the waitlist-control condition, MBTR-R was safe and thus not associated with participant-level clinically significant deterioration in any of the monitored primary mental health outcomes at post-intervention or at follow-up (Jacobson & Truax, 1991). In the event of adverse responding, we planned to test candidate contraindications for MBTR-R including key demographic factors or pre-existing vulnerability factors at pre-intervention that may predict participant-level deterioration or adverse responding to the intervention (Baer et al., 2019; Dobkin et al., 2012; Wong et al., 2018).

Method

Study Design & Participants

This study was a single-site randomized control intervention study examining MBTR-R versus a waitlist-control in a community sample of Eritrean asylum seekers residing in the Middle East (Israel). The study received human subjects' research ethics approval by a University of Haifa Institutional Review Board committee. Participants were recruited via public flyers, community recruitment and via local NGOs and municipal organizations working with refugees. Over the course of one year, male and female Eritrean asylum seekers were recruited in three cohorts, and randomized to either MBTR-R or waitlist-control. Exclusion criteria were (a) active suicidality, (b) current psychotic symptoms, (c) current mental health treatment (psychiatrist, psychotherapy, psycho-social support group). Randomization was conducted via random number generation in blocks of two conditions with a ratio of three MBTR-R participants to two waitlist-control participants. This was done based on a power analysis to, first, ensure sufficient number of participants to detect medium size between-group effects; and, second, to ensure sufficient power to detect moderate effects in planned within-group analyses among the MBTR-R group (Borm et al., 2007; Moher et al., 2009).

The selected population of Eritrean asylum seekers are representative of large and fast-growing proportion of forcibly displaced people worldwide (UNHCR, 2019). First, members of this community were exposed to a large number of severely traumatizing events including serious violations of human rights, arbitrary detention, torture, sexual and gender-based violence, religious and political persecution (Connell, 2012; Van Reisen & Mawere, 2017). Second, members of this community have not received refugee or formal residential status so that their future remains

unpredictable and uncertain due to threat of detention or deportation (Orgal et al., 2019; Rozen, 2015). Third, members of this community are struggling with chronic and often severe post-migratory life-stressors (Giacco et al., 2018; Li et al., 2016; Miller & Rasmussen, 2017; Yuval et al., (in press)). Finally, members of this community are suffering from high rates of stress- and trauma-related mental health problems (Nakash et al., 2017; Yuval & Bernstein, 2017; Yuval et al., 2016). See Supplementary Materials (SM) for more details on participants.

Procedure

Following assessment for eligibility to participate in the study through a phone screening, consent and randomization to condition (see Consort Diagram), participants completed the pre-intervention assessment including self-report questionnaires and behavioral/cognitive-experimental tasks. All self-report measures of vulnerability and mental health are included in the present report. MBTR-R participants also completed brief weekly assessments of targeted change processes before and after each intervention session. Following the 9-week intervention or identical waitlist-control period, participants completed assessments at one-week post-intervention. MBTR-R participants also completed a follow-up assessment five weeks after the post-intervention assessment. Critical to ethical study of this vulnerable population, waitlist-control participants only completed the 1-week post-intervention assessment – to ensure that we did not unnecessarily withhold treatment for asylum seekers in the waitlist-control condition (Gold et al., 2017) (See SM for additional information).

MBTR-R Intervention Condition

See Table 1 in SM for a session-by-session overview of MBTR-R. MBTR-R is a mindfulness-based group (10-20 participants) intervention consisting of nine 2.5-hour weekly sessions. MBTR-R format and structure parallel common MBIs (Crane et al., 2017) including

MBSR and MBCT (Kabat-Zinn, 2017; Segal et al., 2013). MBTR-R includes systematic training in formal and informal mindfulness practices (e.g., body scan, sitting meditation, mindful movement, 3-minute breathing space) although with key trauma-sensitive adaptations (Treleaven, 2018); experiential inquiry-based discussions of all in-session practices (Crane et al., 2015); and home practice via web-based audio recordings and handouts (Crane et al., 2017). Critically, trauma-sensitive adaptations to mindfulness meditation practices were included to reduce risk of adverse responding and to optimize salutary benefits from MBTR-R (Treleaven, 2018). First, a “safe place” practice was practiced in which participants trained bringing attention to objects of awareness that feel neutral, safe, or calm when feeling overwhelmed or numb during mindfulness meditation (Treleaven, 2018). Second, psychoeducation about posttraumatic stress, stress reactivity, and depression is integrated in the intervention to normalize and de-stigmatize, trauma- and stress-related mental health problems (Dutton et al., 2013; Kelly & Garland, 2016). Third, loving-kindness and self-compassion practices are taught as ways of coping with fear, self-judgement, guilt, shame, and hostility, common to trauma- and stress-related mental health problems (Van den Brink & Koster, 2015).

To provide optimal conditions for participants to learn mindfulness and key intervention principles and to benefit from the group format, delivery of MBTR-R was socio-culturally adapted. First, a cultural mediator from the refugee community that was personally familiar with mindfulness practice worked alongside the mindfulness instructor (See SM for instructor and cultural mediator qualifications and training). Cultural mediators conducted real-time linguistic translation (Tigrinya) of guided practices and group discussions (Bernal & Sáez-Santiago, 2006; Fondacaro & Harder, 2014; Miller et al., 2005). Second, socio-culturally specific metaphors and idioms were integrated in the intervention protocol to communicate key ideas (Bernal & Sáez-

Santiago, 2006; Hinton et al., 2011; Tol et al., 2014). Third, MBTR-R groups were conducted for men and women separately, and led, respectively, by male and female instructors and cultural mediators. Fourth, MBTR-R was delivered in a geographically accessible, familiar and “safe space” in the local asylum seeker community (Fondacaro & Harder, 2014). Fifth, group meetings included a shared mid-session meal consisting of traditional Eritrean food, during which mindfulness was also practiced to encourage adoption of mindfulness into daily living (Dutton et al., 2013). Finally, to reduce obstacles for session attendance, female participants were offered free child care (Dutton et al., 2013).

Waitlist-control Condition

Following the 9-week waitlist period and 1-week post-intervention assessment, participants randomized to waitlist-control were offered an equivalent group intervention (i.e., 22.5 total hours, group instructor and cultural mediator, psychoeducation and low-intensity cognitive behavior therapy skill training, relaxation techniques). We chose to offer participants this intervention after the 9-week waitlist period primarily due to ethical considerations. It was important to ensure that all participants seeking assistance through study participation, also those randomized to waitlist-control, would be able to receive mental health care (Gold et al., 2017). Such cautious ethical considerations are of the utmost importance in working with such vulnerable populations in the midst of a crisis of forced displacement (Hugman et al., 2011). Critically, as this was the first study of MBTR-R, we did not yet know safety or efficacy outcomes of MBTR-R, and were committed to provide participants seeking assistance randomized to waitlist-control mental health care that would not involve exposing them to any unnecessary risk (Gold et al., 2017). When participants were randomized, MBTR-R and the intervention offered after the waitlist-control

period were described nearly identically – in terms of purpose, total number of hours, compensation, etc. – so as to ensure similar expectancy effects and motivation between conditions.

Measures

All measures were translated and back-translated, and psychometrically evaluated and validated for this study or in earlier research – either in our or other research groups’ studies of these specific African refugee populations (Badri et al., 2012; Reebbs et al., 2017; Tanay & Bernstein, 2013; Yuval & Bernstein, 2017; Yuval et al., (in press); Yuval et al., 2016). All translated measures were pilot-tested and revised, in an iterative process, which included cognitive interviewing with translators and Eritrean asylum seekers to ensure linguistic as well as socio-cultural meaning (Miller & Fernando, 2008; Sartorius & Kuyken, 1994).

The *Harvard Trauma Questionnaire* (HTQ; (Mollica et al., 1992)) was used to measure traumatic stress exposure and PTSD symptoms. The *Brief Patient Health Questionnaire* (PHQ-9; (Spitzer et al., 1999)) was used to measure symptom levels of depression. The *Beck Anxiety Inventory* (BAI; (Beck et al., 1988; Norman et al., 2006)) was used to measure levels of anxiety symptoms. Using the categorical (diagnostic) symptom status for PTSD, depression, and anxiety, we computed a *comorbidity index* (0 = no elevated psychiatric symptomatology, 1 = uni-morbid or diagnostic symptom levels in one condition, 2 = co-morbid or diagnostic symptom levels in two conditions, 3 = multi-morbid or diagnostic symptom levels in all three conditions). The *Brief Inventory of Thriving* (BIT; (Su et al., 2014)) was used to measure subjective well-being. Finally, the *Post-Migration Living Difficulties Scale* (Silove et al., 1997) was used to measure current post-migration stressors. See SM for more details on measures.

Statistical Analysis

Randomization

To test randomization, we applied t-tests and logistic regression to compare MBTR-R to waitlist-control for all demographic variables as well as mental health measures at pre-intervention.

Aim 1. MBTR-R Efficacy

We tested MBTR-R efficacy relative to waitlist-control for 1-week and 5-weeks post-intervention outcomes using ANCOVAs for continuous symptom severity scores and logistic regression for categorical (diagnostic) symptom status. We controlled for pre-intervention levels of each outcome in each respective ANCOVA and logistic regression. To test the therapeutic efficacy of MBTR-R among participants who received an adequate dose of the intervention, and so may be expected to benefit from the intervention, primary analyses were conducted among intervention completers – participants who attended more than half (> 4) of the MBTR-R sessions (Kuyken et al., 2016; Teasdale et al., 2000). This definition of completion is aligned with MBCT studies (Kuyken et al., 2016; Spinhoven et al., 2017) as well as reasonable expectations due to real-world constraints on regular attendance of refugees and asylum seekers due to post-migration environmental instability and stressors (Asgary & Segar, 2011; Spiegel et al., 2010). Analyses were thus conducted among intervention completers with elevated symptoms at baseline pre-intervention as well as among all intervention completers regardless of levels of baseline symptomatology. In addition, we also ran parallel analyses among the more inclusive Full Case Complete Intent-To-Treat (ITT) sample (see Consort Diagram in Figure 1) common in tests of efficacy (*cf.* effectiveness) (Goldberg, 2020) and mental health intervention trials among refugee populations (Tol et al., 2020). Accordingly, the ITT analysis included all participants who could be prospectively tracked, including participants randomized to MBTR-R but who did not attend any sessions.

Aim 2. Generalizability of MBTR-R Efficacy: Moderated Therapeutic Effects of MBTR-R

To test whether expected therapeutic effects of MBTR-R (Aim 1) were dependent on key demographics of the studied population (gender, age, level of education), trauma stress history severity, or current post-migration living difficulties, we conducted a test of moderation per outcome (Aim 1) using PROCESS (Hayes, 2017) in SPSS. Candidate moderating factors were tested to rigorously examine whether MBTR-R is therapeutically beneficial to refugees and asylum seekers across key demographic factors and levels of pre-existing vulnerability. These demographics and pre-existing indicators of vulnerability are well-documented barriers to therapeutic gains and could potentially require specialized or more personalized interventions (Patel, 2016; Turrini et al., 2019).

Aim 3. Safety & Adverse Effects of MBTR-R

To identify individual participants who experienced clinically significant deterioration over the course of the intervention, we calculated a Reliable Change Index (RCI) (Jacobson & Truax, 1991). The RCI reflects change from baseline pre-intervention levels to 1-week and to 5-weeks post-intervention, for each mental health outcome, per participant, by group. RCI is an established and frequently used method to determine clinically significant, participant-level change in medical and mental health research (Ehlers et al., 2013; Ekeröth & Birgegård, 2014; Stein et al., 2012; van den Berg et al., 2016; Zahra & Hedge, 2010). To maximize the sensitivity of this analysis and likelihood of identifying individual participant(s) who experienced deterioration, we calculated RCI among the full case complete ITT sample – all participants with pre- and post-intervention data regardless of intervention attendance or attrition.

Results

Sample & context: Demographics, trauma history, post-migration stress, & mental health symptomatology

See Consort Diagram for details on screening and randomization (Figure 1). Two-hundred adult Eritrean asylum seekers in Israel were screened for participation, 158 were randomized to either MBTR-R intervention or waitlist-control and completed the pre-intervention assessment. We randomized 98 participants (47.9% men) to MBTR-R Intervention and 60 (63.3% men) to waitlist-control (see Consort Diagram for more details).

Participants' were 20-48 years old ($M(SD) = 31.8(5.21)$ years), 53.8% were men, and education levels varied between 1-6 years (23.5% men, 32.9% women), 7-12 years (65.9% men, 57.5% women), 13-16 years (9.4% men, 8.2% women) and > 16 years (1.2% of men, 1.4% of women). Participants reported severe trauma history including experiencing torture, rape or sexual abuse and the murder of a family member or friend ($M(SD) = 6.16 (4.28)$ number of traumatic event types). Likewise, participants reported high rates of post-migration living difficulties including fear of deportation to their home country, not having enough money for food or rent, and worries about being homeless ($M(SD) = 5.44 (2.58)$ number of reported post-migration living difficulties). See Table 1 for rates of post-migration living difficulties and trauma exposure history at pre-intervention.

See Table 2 for continuous mental health outcomes by group and Table 3 for point-prevalence rates of mental health outcomes by group. Finally, 66.7 % of participants demonstrated diagnostically elevated symptom levels of either PTSD, depression, or anxiety disorder at baseline. Among all participants, 16% demonstrated unimorbidity of PTSD, depression or anxiety, 19.2% comorbidity, and 31.4% multi-morbid elevation of PTSD, depression and anxiety symptomatology.

Intervention Attendance & Study Attrition

See Figure 1 Consort Diagram for details regarding study attrition. First, from all participants (Full ITT), 83 of 98 (83% men, 86.3% women) participants randomized to MBTR-R and 48 of 60 (84.2% men, 72.7% women) participants randomized to waitlist-control condition were prospectively retained in the study and completed pre- as well as post-intervention assessment. Thus, the full case complete ITT sample entailed $n=83$ MBTR-R and $n=48$ wait-list control participants ($N=131$, 82.9% prospective retention). Importantly, there were no significant differences between the full case complete ITT sample (82.9%) and participants that did not complete post-intervention assessment and thus were not part of the full case complete ITT analyses (17.1%). Specifically, participants that could vs. those that could not be included in the ITT sample analyses did not differ with regard to gender, age, level of education, trauma history, post-migration living difficulties, PTSD, depression, anxiety or well-being. Accordingly, findings from the full case complete ITT analyses are likely to be robust and unbiased.

Second, among all participants randomized to MBTR-R, 79.6% attended at least one MBTR-R session; and among these participants who initiated MBTR-R, 66.6% (63.4% men, 70.2% women) attended five or more sessions ($M(SD)_{\text{Sessions Attended}} = 5.83(2.84)$). Participants classified as intervention completers attended $M(SD) = 7.63(1.21)$ sessions and those classified as non-completers attended only $M(SD) = 2.23(1.31)$ sessions. Importantly, participants that did and those who did not complete the intervention did not differ in any systematic way – not with respect to gender, age, level of education, trauma history, post-migration living difficulties, PTSD, depression, anxiety nor well-being at pre-intervention; nor did any of these factors predict number of intervention sessions attended or likelihood of intervention completion (see Table 2 in SM).

Test of Randomization at Pre-Intervention

Consistent with successful randomization, there were no differences between participants randomized to MBTR-R or waitlist-control with respect to trauma exposure history, post-migration living difficulties, anxiety, or well-being. However, there were significant, albeit small, differences in levels of PTSD severity ($t(156) = 2.84, p = .005$) and point-prevalence of PTSD ($\chi^2(1) = 2.72, p < .01$) as well as in levels of depression severity ($t(155) = -2.65, p = .009$) and point-prevalence of depression ($\chi^2(1) = 7.55, p = .006$) between conditions wherein symptomatology was slightly higher in waitlist-control than in MBTR-R.

Aim 1: MBTR-R Efficacy

Continuous Symptom Severity Outcomes

See Table 2. Relative to waitlist-controls, participants randomized to MBTR-R demonstrated significantly lower levels of (1) total PTSD, re-experiencing, and hyperarousal symptoms, as well posttraumatic stress measured via cultural idioms, (2) depression symptoms, (3) anxiety symptoms as well as (4) co- and multi-morbidity at post-intervention and 5-week follow-up. In addition, MBTR-R demonstrated marginally significant higher levels of (5) subjective well-being at post-intervention but not at follow-up. Effect sizes were moderate to large in magnitude ($\eta^2 = .05$ to $.29$). Inconsistent with prediction, MBTR-R was not associated with lower levels of PTSD avoidance symptoms at post-intervention or follow-up. When including all participants randomized to MBTR-R in the full case complete ITT analyses, observed therapeutic effects of MBTR-R were identical, although of smaller magnitude, with the exception of posttraumatic stress measured via cultural idioms which was null in the ITT analysis (see Table 3 in SM). Second, among all treatment completers, including participants without elevated symptoms of psychopathology, the same curative effects of MBTR-R on mental health outcomes were observed, with the exception of depression and well-being. Significant improvement in

depression symptoms were observed at 5-weeks follow-up but not immediately following the intervention – indeed, levels of depression were lower at follow-up than at post-intervention (see Table 4 in SM). In the parallel full case complete ITT sample, the same effects were observed for PTSD and anxiety outcomes but not for depression symptoms or subjective well-being at post-intervention (see Table 3 in SM). Finally, when re-coding PTSD symptom cluster using DSM-5 criteria (i.e., 3-cluster vs. 4-cluster), findings were nearly identical to those reported for DSM-IV criteria in all analyses (American Psychiatric Association, 2013; Berthold et al., 2018).

Diagnostic-Level of Symptoms: Categorical Status

See Table 3. Whereas 90.9% of the waitlist-control who demonstrated categorical (diagnostic) symptom status of PTSD at pre-intervention still presented PTSD at post-intervention, a significantly smaller 48.3% of MBTR-R participants still did so at post-intervention and 62% at follow-up. Likewise, whereas 88.5% of waitlist-controls with categorical (diagnostic) symptom status of depression at pre-intervention still presented with depression at post-intervention, a significantly smaller 58.8% of MBTR-R participants did so at 5-weeks follow-up but a smaller, though non-significantly lower, 70.6% still presented with depression at 1-week post-intervention. Finally, whereas 90% of waitlist-controls who demonstrated categorical (diagnostic) symptom status of anxiety at pre-intervention still presented with anxiety at post-intervention, a significantly smaller, albeit still elevated, 66.7% of MBTR-R participants did so at post-intervention and a non-significantly lower 78.3% at follow-up.

Aim 2: Generalizability of MBTR-R Efficacy: Moderation of Therapeutic Effects

See Table 5 in SM. None of the observed reported therapeutic effects of MBTR-R on tested mental health and wellbeing outcomes at post- intervention or 5-weeks follow-up (Aim 1) were moderated by age, gender, education, traumatic stress history or post-migration living difficulties.

Aim 3: Safety & Adverse Effects of MBTR-R

Among the full case complete ITT sample, we found that only one participant randomized to MBTR-R demonstrated clinically significant deterioration in depression symptoms (>1.96 *SDs* change) at post-intervention; although, at 5-weeks follow-up, this participant's levels of depression symptoms returned to pre-intervention levels. For comparison, we found that two participants in the waitlist-control group demonstrated significant deterioration (anxiety symptoms) at post-intervention. Second, due to the very low base rate of adverse responding, planned analyses testing predictors of adverse outcomes could not be conducted – as no harm of MBTR-R was observed regardless of degree of pre-intervention demographics or level of vulnerability.

Discussion

We are in the midst of a global mental health- and human rights- crisis (Nickerson, Liddell, et al., 2017; Patel et al., 2018; UNHCR, 2019). Today, tens of millions of forcibly displaced persons may be suffering from trauma- and stress-related mental health problems (Giacco et al., 2018; Priebe et al., 2016). Relative to the scale, scope and urgency of this still growing crisis (UNHCR, 2019), our collective capacity to care for these survivors via evidence-based mental health interventions tailored to refugees and asylum seekers is strikingly limited (Patel et al., 2018; Tol et al., 2014). Accordingly, in the hopes of contributing to field-wide efforts to develop a portfolio of specialized intervention programs tailored to refugees and asylum seekers (Singla et al., 2017; Tol et al., 2014), we developed MBTR-R. MBTR-R is a 9-session trauma-sensitive and socio-culturally adapted mindfulness- and compassion-based group intervention for refugees and asylum seekers. We tested whether MBTR-R may be an efficacious and safe intervention for

stress- and trauma-related mental health outcomes among a traumatized community sample of African asylum seekers residing in an urban post-displacement setting in the Middle East (Israel).

First, relative to waitlist-control, MBTR-R led to significant improvements in stress- and trauma-related mental health outcomes including PTSD, depression, anxiety, multi-morbidity as well as elevations in subjective wellbeing. Curative effects were observed for continuous symptom severity as well as categorical point-prevalence outcomes, at 1-week and again at 5-weeks post-intervention, respectively. The largest effects were observed for PTSD and posttraumatic re-experiencing and hyperarousal symptoms. These effects were observed when quantifying posttraumatic stress via western psychiatric nosological (DSM) as well when operationalizing posttraumatic stress via socio-culturally-specific idioms (Badri et al., 2012; Berthold et al., 2018). Notably, effects for all studied outcomes were robust enough among treatment completers that they remained significant in the parallel full case complete ITT sample analyses. In light of the high rates of retention of participants retained in the full case complete ITT sample, including prospective retention of participants that dropped out of the intervention, lack of differences in rate of attrition between conditions, as well as the lack of differences between participants prospectively retained in the study (N=131) and those that dropped out (N=27), therapeutic efficacy outcomes are likely largely robust and unbiased. Thus, due to the prevalence and severity of observed stress- and trauma-related mental health problems in this community-based sample of asylum seekers, their severe trauma history, and the ongoing extensive post-migration living difficulties they face, the observed curative effects are especially noteworthy.

Second, the intervention was similarly therapeutic among participants across key demographics of the studied population, trauma history severity, post-migration living difficulties or severity of each respective mental health outcome at pre-intervention. These findings may be

important in that they may indicate that the curative and salutary effects of MBTR-R are not likely limited to a small, circumscribed sub-group of the studied refugees or asylum seekers, and critically, as effective among the most vulnerable participants. In light of the huge spectrum of populations and backgrounds who have been forcibly displaced in recent years (UNHCR, 2019) and the potential public health importance of a sufficiently universal framework for mental health care that may be locally and socio-culturally adapted (Singla et al., 2017), these are encouraging findings.

Third, we found that, MBTR-R appears to be safe, for even the most vulnerable asylum seekers. Indeed, MBTR-R was not associated with elevated participant-level rates of clinically significant deterioration (RCI-based classification) in any of the monitored mental health outcomes. This is critical, first, due to important questions about the capacity to safely adapt MBIs to participants with traumatic histories and trauma-related mental health problems (Baer et al., 2019; Treleaven, 2018). This is furthermore important due to the ethical imperative to ensure that vulnerable refugees and asylum seekers, who have already experienced often multiple traumatic events and live under significant and chronic post-migration stress, are not harmed by even the best of therapeutic intentions (Gold et al., 2017; Lilienfeld, 2007).

Although only the first study of MBTR-R efficacy and safety, findings appear promising within the context of extant refugee global mental health research. First, MBTR-R was associated with clinically significant, medium to large therapeutic effects on prevalent and debilitating mental health disorders among refugees and asylum seekers (Bogic et al., 2015; Giacco et al., 2018). Although MBTR-R significantly therapeutically impacted all facets of PTSD, these effects were particularly large for PTSD hyperarousal. These are promising findings in light of evidence that hyperarousal is often markedly elevated among traumatized refugee populations exposed to

ongoing chronic stress (Giacco et al., 2018), functionally important in the maintenance of PTSD symptomatology among refugees (Spiller et al., 2017; Yuval et al., (in press)), as well as important to refugee trauma recovery (Neuner et al., 2018). Furthermore, therapeutic effects were not limited to PTSD symptoms and included depression, anxiety and co- and multi-morbidity. These are therapeutically important findings in light of the prevalence, impairment and disability associated with depression (Priebe et al., 2016) as well as multi-morbidity among forcibly displaced people (Buhmann et al., 2016; Haagen et al., 2017; Momartin et al., 2004; Mørkved et al., 2014; Nickerson, Schick, et al., 2017).

Second, despite the group-format of the intervention delivery – the size of the observed therapeutic effects was similar to or larger than reported effect sizes of intensive individualized psychotherapeutic interventions among refugees including exposure-based therapies (e.g., NET) (Lely et al., 2019), brief individual trans-diagnostic interventions such as PM+ (Bryant et al., 2017; Rahman et al., 2016) and group-based mental health interventions for refugees such as SH+ (Tol et al., 2020). To estimate the reliability or robustness of the observed therapeutic effect size, a replication is critical (Shrout & Rodgers, 2018). Observed effects are nevertheless a promising indicator of MBTR-R therapeutic potential to promote trauma recovery among this population.

Third, there was no demand on participants to continue mindfulness meditation or related practices, and no booster or follow-up mindfulness practice sessions were offered upon completion of MBTR-R. Yet, therapeutic effects of the intervention were largely maintained at 5-weeks follow-up, and for depression, further improved. We speculate that systematically supporting participants to continue practicing after the intervention could help to promote longer-term maintenance of therapeutic gains. This could be facilitated through an instructor-backed mobile

MBTR-R e-health platform designed to help MBTR-R participants maintain or even improve therapeutic gains following the 9-session program (Bennett et al., 2019).

The present findings not only support MBTR-R's efficacy and safety, but also provide initial evidence for the feasibility, acceptability implementability and potential scalability of MBTR-R. First, in line with its feasibility and acceptability, rates of MBTR-R session attendance were slightly lower than in other RCTs of MBIs in Western Educated Industrialized Rich Democratic (WEIRD) (Colgan et al., 2019; Kuyken et al., 2016; Polusny et al., 2015), but similar to RCTs conducted among refugees including individual psychotherapy-based interventions (Bolton et al., 2014; Buhmann et al., 2016). Furthermore, MBTR-R feasibility and acceptability is bolstered by the potentially important finding that key demographics, trauma history severity, post-migration living difficulties, as well as mental health symptomatology at pre-intervention, did not predict number of interventions sessions attended or the likelihood to drop-out or complete the intervention. Nor were attrition rates different between conditions. Thus, we speculate that intervention engagement and attrition are largely accounted for by extraneous factors that are a by-product of the challenging, unpredictable and unstable life circumstances among this population (e.g., employment insecurity, long working hours, family obligations) (Asgary & Segar, 2011; Western et al., 2016). Accordingly, MBTR-R attendance and study attrition suggest that MBTR-R might be an acceptable and feasible intervention in a general population of asylum seekers with varying levels of vulnerability and demographic characteristics (Roos et al., 2019; Simons & Kursawe, 2019). In addition, the group-based intervention format and brief, flexible mode of delivery of MBTR-R may enable scaling up of its delivery. Thus, MBTR-R appears to be efficacious and safe, as well as feasible, readily implemented and scalable even in stressful, insecure and uncertain urban post-displacement settings. In light of the well-documented barriers

to the implementation of effective mental health refugees and asylum seeker populations around the world (Patel et al., 2018; Singla et al., 2017; Turrini et al., 2019), the observed findings may ultimately have public health significance.

Furthermore, we also observed secondary, albeit potentially important findings that the prospective course of symptomatology among controls across the 9-week waitlist period was highly stable. Of public health importance, these data indicate that similar populations of asylum seekers may be unlikely to demonstrate spontaneous improvement in their symptoms over time (Miller & Rasmussen, 2010; Miller & Rasmussen, 2014). These prospective data thereby illustrate the urgency and importance to develop, test and deliver mental health interventions tailored for refugees and asylum seekers (Nickerson, Liddell, et al., 2017; Tol et al., 2014). Finally, findings may also have implications for MBIs among other trauma-affected populations (Boyd et al., 2018; Winders et al., 2020). In light of growing interest in the application of MBIs among traumatized populations, and the still limited standardized and tested trauma-sensitive MBI protocols, adaptations of MBTR-R to other trauma-affected-populations may represent a promising future direction (see SM for more details on MBIs and trauma recovery).

The study is limited in a number of ways. First, there was no active intervention comparison. A waitlist-control design appeared most ethically justifiable (as previously noted) (Gold et al., 2017); and methodologically justifiable so as not to include a control intervention that may well be safe but is not directly comparable to MBTR-R, such as individual exposure-based psychotherapy (Davidson & Kaszniak, 2015; Goldberg et al., 2017). Future research may examine the effects of MBTR-R with respect to emerging group-based mental health interventions with evidence of safety and efficacy for refugees to account for the specific effects of group-based

interventions such as social -engagement and -support or of psychoeducation or adaptive coping (Dawson et al., 2015).

Second, the study was conducted among Eritrean asylum seekers in the Middle East (Israel). We do not know with confidence that observed findings generalize to other refugee populations (e.g. country of origin, post-displacement, socio-cultural background) or contexts (e.g., stable re-settlement communities, refugee camps). It is important for future work to test the degree to which observed findings are observed among socio-culturally- and linguistically- diverse refugee populations and contexts. Notably, this sampling strategy was also a strength of the design. Eritrean asylum seekers constitute a large group of asylum seekers worldwide (UNHCR, 2017). Their stressful, uncertain and insecure urban post-displacement setting represents a fast-growing context for forcibly displaced populations (UNHCR, 2019). Furthermore, and more practically, this permitted robust socio-cultural adaptation of MBTR-R to this population per recommended best-practices in global mental health interventions (Kirmayer et al., 2017; Lewis-Fernández & Marques, 2014; Singla et al., 2017). Importantly, the socio-cultural and linguistic homogeneity of the sample protects against potential threats of internal validity that emerge from ad-mixing of distinct refugee populations (Kirmayer et al., 2017; Michalopoulos et al., 2015). Indeed, refugees or asylum seekers are a political status and not a socio-cultural group (Kirmayer & Ryder, 2016; UNHCR, 2011). Thus, and although potentially limited to this population of Eritrean refugees, this approach to sampling is likely to yield findings that are robust and replicable.

Third, although safety and efficacy were measured with well-established and socio-culturally adapted self-report measures, it remains to be tested whether we would have observed similar findings using other measurement modalities such as structured interviews or clinician ratings. We speculate that structured interviews could, paradoxically, bias the validity of

measurement (Kirmayer et al., 2017; Warner et al., 2011). Due to stigma, diagnostic tools administered by an interviewer could potentiate under-reporting of trauma history and symptomatology at pre-intervention (Nickerson et al., 2019; Shannon et al., 2012); likewise, experimental demand characteristics could increase over-reporting of desired curative effects at post-intervention (Kanter et al., 2002; Orne, 1962). The interaction between measurement psychometrics and socio-cultural factors among diverse populations of refugees and asylum seekers is likely to represent an important focus for global mental health research in the coming years (Silove et al., 2007).

Finally, follow-up post-intervention was limited to 5-weeks, because there was a great deal of uncertainty about future residential status of this population of asylum seekers at the time of the study (see SM for more details) (Guthmann, 2018). Nevertheless, it is important that future research tests the longer-term maintenance of observed therapeutic effects. Despite the challenges of such prospective data collection in the uncertain and challenging context of post-displacement, such knowledge is critical to guide the optimization and implementation of MBTR-R to ensure long-term therapeutic gains.

Together, we hope this study will contribute to field-wide efforts to promote refugee mental health among forcibly displaced people, and the potential role of mindfulness- and compassion-based practices in such efforts. Reported findings of MBTR-R efficacy and safety are promising. Important next steps entail study of MBTR-R mechanisms of action (Baker et al., 2008), a second randomized control experimental test of MBTR-R efficacy (Chambless & Ollendick, 2001), and direct study of barriers to its implementation in urban post-displacement and refugee camp settings (Patel et al., 2018).

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Table 1:***Rates of Post-Migration-Living Difficulties and Trauma Exposure History at Pre-Intervention among whole Sample (n = 158)***

	Control Group		MBTR-R Group		Total
	Men (n = 37)	Women (n = 21)	Men (n = 46)	Women (n = 49)	
Post-Migration Living Difficulties*					
Communication Difficulties	15 (40.5%)	8 (38.1%)	19 (41.3%)	23 (46.9%)	65 (42.5%)
Separation from your family	31 (83.8%)	17 (85%)	37 (82.2%)	41 (83.7%)	126 (83.4%)
Not being able to find work or Bad working conditions	22 (61.1%)	14 (70%)	20 (45.5%)	29 (61.7%)	85 (57.8%)
Conflict with immigration officials	24 (64.9%)	7 (35%)	18 (40.9%)	18 (38.3%)	67 (45.3%)
Being fearful of being sent home	30 (78.9%)	19 (95%)	41 (89.1%)	42 (87.5%)	132 (86.8%)
Not enough money to buy life essentials	21 (56.8%)	14 (70%)	19 (41.3%)	34 (72.3%)	88 (58.7%)
Poor access to educational services	32 (86.5%)	16 (80%)	37 (82.2%)	37 (77.1%)	122 (81.3%)
Loneliness, boredom, isolation	22 (59.5%)	16 (80%)	26 (59.1%)	26 (55.3%)	90 (61.8%)
Worries about not having a regular place to sleep	19 (51.4%)	13 (65%)	20 (44.4%)	27 (58.7%)	79 (53.4%)
Trauma Exposure History					
Lack of food or water	18 (47.4%)	13 (61.9%)	29 (63%)	26 (52%)	86 (55.5%)
Ill health without access to medical care	20 (52.6%)	9 (42.9%)	26 (56.5%)	23 (45.1%)	78 (50%)
Imprisonment	26 (68.4%)	9 (42.9%)	31 (67.4%)	14 (28%)	80 (51.6%)
Serious injury	23 (60.5%)	5 (23.8%)	21 (45.7%)	15 (30%)	64 (41.3%)
Combat situation	16 (43.2%)	10 (47.6%)	19 (41.3%)	22 (43.1%)	67 (43.2%)

Rape or sexual abuse	6 (16.2%)	4 (19%)	2 (4.3%)	10 (19.6%)	22 (14.2%)
Being close to death	21 (55.3%)	9 (42.9%)	20 (43.5%)	19 (37.3%)	69 (44.2%)
Unnatural death of family/friend (incl. suicide)	13 (34.2%)	8 (36.4%)	15 (32.6%)	17 (33.3%)	53 (33.8%)
Lost or kidnapped	18 (48.6%)	5 (25%)	20 (42.6%)	12 (23.5%)	55 (35.5%)
Torture	22 (61.1%)	11 (52.4%)	24 (54.5%)	22 (44%)	79 (52.3%)

Note: *post-migration living difficulties posed moderate to very serious problem for participants

Table 2:
Continuous Mental Health Outcomes by Group and ANCOVAs among Treatment Completers with elevated Levels of Psychopathology (n=76)

	Waitlist-Control				MBTR-R						ANCOVA							
	Pre-Intervention		Post-Intervention		Pre-Intervention		Post-Intervention		Follow-Up		Post-Intervention				5-weeks Follow-Up			
	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)	N	df	F	η^2	<i>p</i>	df	F	η^2	<i>p</i>
Total PTSD Symptoms (HTQ)	2.85 (.45)	41	2.63 (.48)	33	2.71 (.45)	29	2.10 (.59)	29	2.09 (.60)	28	1	12.44	.17	.001	1	10.44	.16	.002
PTSD Re-Experiencing Symptoms (HTQ)	2.96 (.58)	41	2.67 (.61)	33	2.69 (.70)	29	2.05 (.68)	29	1.95 (.65)	28	1	9.76	.14	.003	1	12.34	.18	.000
PTSD Hyperarousal Symptoms (HTQ)	3.05 (.55)	41	2.95 (.66)	32	2.98 (.56)	29	2.14 (.72)	29	2.17 (.79)	28	1	23.93	.29	.000	1	19.23	.26	.001
PTSD Avoidance Symptoms (HTQ)	2.66 (.56)	41	2.41 (.51)	32	2.53 (.53)	29	2.10 (.62)	29	2.11 (.55)	28	1	3.26	.05	.076	1	2.64	.05	.110
Cultural Idioms of PTSD Symptoms (HTQ)	3.08 (.53)	41	2.88 (.69)	33	2.77 (.66)	29	2.10 (.73)	29	2.11 (.80)	28	1	10.85	.16	.002	1	7.91	.12	.007

Depression Symptoms (PHQ-9)	16.03 (4.46)	29	15.27 (5.16)	26	15.12 (4.08)	17	11.41 (5.76)	17	11.35 (7.30)	17	1	6.52	.14	.015	1	4.74	.11	.035
Anxiety Symptoms (BAI)	31.63 (13.18)	19	31.62 (14.33)	16	32.68 (9.25)	19	23.53 (14.15)	19	24.28 (14.83)	18	1	12.65	.20	.001	1	4.56	.10	.039
Comorbidity Index	2.33 (.80)	45	2.30 (1.00)	37	2.29 (.82)	31	1.50 (1.25)	30	1.74 (1.20)	27	1	8.43	.12	.005	1	4.11	.06	.047
Levels of Well- Being (BIT)	2.42 (.98)	45	2.32 (.88)	37	2.68 (1.10)	30	2.97 (1.32)	31	2.76 (1.25)	29	1	3.62	.06	.062	1	.807	.01	.373

Note: HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); PHQ-9 = Patient Health Questionnaire (Spitzer et al., 1999); BAI = Beck's Anxiety Inventory

(Beck et al., 1988); BIT = Brief Inventory of Thriving (Su et al., 2014)

Table 3:*Point-Prevalence Rates of Mental Health Outcomes at Pre-Intervention by Group and Gender and Logistic Regressions*

Diagnostic Symptom Status	Waitlist-Control		MBTR-R		Total	Differences in Diagnostic Status at Post-Intervention					Differences in Diagnostic Status at Follow-Up				
	Men (N = 38)	Women (N = 22)	Men (N = 47)	Women (N = 49)		χ^2	B (SE)	<i>p</i>	OR	95% CI [LL, UL]	χ^2	B (SE)	<i>p</i>	OR	95% CI [LL, UL]
PTSD (HTQ)	27 (71.1%)	14 (63.6%)	27 (57.4%)	27 (52.9%)	95 (60.1%)	14.43	2.37	.001	10.71	[2.66, 43.12]	7.47	1.83	.012	6.25	[1.50, 26.01]
Depression (PHQ-9)	19 (50%)	10 (45.5%)	14 (29.8%)	12 (24%)	55 (35%)	2.12	1.16	.153	3.19	[.65, 15.70]	5.01	1.68	.033	5.37	[1.15, 25.11]
Anxiety (BAI)	19 (50%)	16 (72.7%)	23 (48.9%)	24 (49%)	82 (52.6%)	4.54	1.50	.044	4.50	[1.04, 17.00]	1.39	.92	.247	2.50	[.53, 11.79]

Note: Note: HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); PHQ-9 = Patient Health Questionnaire (Spitzer et al., 1999); BAI = Beck's Anxiety Inventory (Beck et al., 1988); BIT = Brief Inventory of Thriving (Su et al., 2014). Cut-off for PTSD diagnostic symptom status: HTQ $\geq$ 2, cut-off for depression diagnostic symptom status: PHQ-9 $\geq$ 10, cut-off for anxiety diagnostic symptom status equals: BAI $\geq$ 16

Figure 1
Consort Diagram

Supplemental Materials for “Mindfulness-Based Trauma Recovery for Refugees
(MBTR-R): Randomized Waitlist-Control Evidence of Efficacy and Safety”

Aizik-Reebs, A., Yuval, K., Hadash, Y., Gebreyohans Gebremariam, S., &
Bernstein, A.

Method Supplement

Participants

As participants could not reliably report on whether they were receiving psychiatric medication, we chose to only exclude participants based on the above mentioned criteria. Considering, that sampling was community-based and the rates of participants receiving psychiatric care in this community is low (see CONSORT), we believe that we indeed excluded participants that received any form of mental health treatment and most likely those receiving psychiatric medication and the exclusion criteria are well justified.

The selected sample of Eritrean asylum seekers are representative of a large and fast-growing population of forcibly displaced people in the current global refugee crisis (UNHCR, 2019). First, members of this community were exposed to a large number of potentially traumatic events including serious violations of human rights, arbitrary detention, torture, sexual and gender-based violence, religious and political persecution (Connell, 2012; Van Reisen & Mawere, 2017). They fled from a highly repressive state and compulsory military service in Eritrea, violations of human rights, arbitrary detention, enforced disappearances, sexual and gender-based violence, religious and political persecution; and then while fleeing from their home country, a large percent of this community were survivors of human trafficking and torture in the Egyptian Sinai desert (Connell, 2012; Nakash, Nagar, Shoshani, & Lurie, 2015; United Nations High Commissioner for

Refugees, 2016). Furthermore, this population of African refugees residing in Israel is representative of the millions of African refugees who have been forcibly displaced throughout Europe in recent years (UNHCR, 2015; United Nations, 2015). East African refugees constitute the largest refugee population from and in Africa and are one of the largest refugee populations world-wide; Sudan (including South Sudan) and Eritrea are among the top 10 major source countries of refugees world-wide (UNHCR, 2014, 2015, 2016). Second, members of this community have not received refugee or formal residential status or protections such that their future remains unpredictable and uncertain due to threat of detention or deportation (Orgal, Liberman, & Avivi, 2019; Rozen, 2015). Third, members of this community are struggling with chronic and often severe post-migratory life-stressors implicated in stress-related mental health problems that interfere with trauma recovery yet only a tiny fraction receive any mental health care let alone evidence-based care (Giacco, Laxhman, & Priebe, 2018; Li, Liddell, & Nickerson, 2016; Miller & Rasmussen, 2017; Yuval, Reebs, Lurie, Demoz, & Bernstein, (in press)). Their ongoing chronic migrant status instability, future uncertainty, and post-migratory life-stressors represent a fast-growing population of forcibly displaced people worldwide (Patel et al., 2018; UNHCR, 2019). Finally, this sampling strategy – study of a single socio-cultural population of asylum seekers, as opposed to selection of diverse forcibly displaced people – is also a strength of the design. The socio-cultural and linguistic homogeneity of the sample protects against potential threats to internal validity that emerge from ad-mixing of distinct refugee populations (Yuval et al., (in press)). Likewise, this permitted more unified socio-cultural adaptation of MBTR-R delivery for this population (Kirmayer, Gomez-Carrillo, & Veissière, 2017; Lewis-Fernández & Marques, 2014; Singla et al., 2017).

Furthermore, the post-migration context in which these participants reside, had important implications for the study design and procedure. During the time of the study in 2018/19, there was tremendous political turmoil in Israel and a great deal of uncertainty about future residential status of this population of asylum seekers (Guthmann, 2018). In the months preceding the study start and during the first months of data collection, refugees' deportation was threatened and a number of refugees received notices indicating that they must leave the country within 60 days or be incarcerated indefinitely. Fortunately, following public outcry and advocacy, the government ultimately canceled/delayed the deportation plan - though insecurity over potential alternative steps for forced deportation remained. In this context, it was not possible for this population to commit to follow-up, nor was it possible for the study team to commit to follow-up. Therefore, we limited follow-up to five weeks after MBTR-R intervention completion.

Financial Compensation. Participants in the mindfulness condition received up to a total of 840NIS (240\$) for participation only in assessment sessions of the study and were not paid for participating in MBTR-R sessions. This was done to protect against coercion as well as to ensure that participants could still participate and complete assessments while freely choosing to drop-out of the intervention. Participants that could not readily travel or afford to travel to attend any of the assessments, received an addition ~\$12 in travel expenses per assessment session.

Procedure

We chose a waitlist-control design for a number of reasons. First, in accordance with established guidelines and procedures for development or adaptation of novel interventions, this first study of MBTR-R focused on efficacy and safety relative to a waitlist-control condition (Onken, Carroll, Shoham, Cuthbert, & Riddle, 2013). In the initial stage trials of a novel intervention, a wait-list design is well-suited, because overestimating type II errors are viewed as

a more serious problem as they could potentially end the assessment of a promising intervention prematurely (Mohr et al., 2009). Therefore a waitlist-control appeared to be an appropriate choice to form a first empirical impression of whether or not the intervention is effective relative to the most common alternative – the absence of an intervention (Gold et al., 2017). In this initial investigation of MBTR-R efficacy, the purpose of the follow-up assessment was to evaluate whether intervention gains were maintained beyond post-intervention assessment (Onken et al., 2013). Therefore, of participants randomized to MBTR-R, only those who received a minimal dose of the intervention, and thus could in theory demonstrate some form of respective therapeutic gain due to the intervention, participated in follow-up assessment session (Kazdin, 2003).

In the event of emergency during screening, assessment session, or any MBTR-R group session, an on-call psychiatrist, specialized in mental health care for refugees was available for risk assessment and crisis care. We used this emergency response three times at screening and not again over the course of the intervention or at pre- or post-intervention assessments.

MBTR-R Intervention

Development. MBTR-R was developed and modified based on feedback from multiple researchers and clinician experts in mindfulness in traumatic stress and refugee mental health, asylum seekers with expertise in refugee mental health, and via cognitive interviews with asylum seekers from our research team and involved in the linguistic and socio-cultural translation of the intervention. Furthermore, as noted in the main manuscript, MBTR-R format and structure parallel common MBIs including MBSR and MBCT. Yet, key cognitive elements of MBCT (e.g., reducing believability in negative thoughts) were not included in MBTR-R. Indeed, refugees' and asylum seekers' negative cognitions may often reflect real and immediate threats that they and their loved ones' experience in their chaotic environments post-displacement.

MBTR-R Mindfulness Instructors Qualification and Training. One male and one female mindfulness instructors taught the men's and women's mindfulness groups. Instructors were trained mindfulness-based teachers (trained to deliver MBSR/MBCT via Bangor University or UMass Center for Mindfulness) with 10-15 years of experience in teaching mindfulness. Both had an MA-level training in clinical or counseling psychology and previous experience in working post-traumatic stress in clinical mental health settings. Before the beginning of the study they received training to gain competency in refugee mental health and fluency in the MBTR-R intervention protocol. Throughout the intervention delivery instructors received weekly supervision by the intervention developers to ensure treatment fidelity, participant safety, and optimal delivery of weekly sessions.

MBTR-R Cultural Mediators Qualification and Training. In MBTR-R, cultural mediators have two important roles. First, in each group a cultural mediator works closely with one of the instructors to conduct real-time translation of guided practices, to facilitate communication between Eritrean group members and instructors during group discussions, and to bridge socio-cultural differences between participants and instructors. Accordingly, two male and one female cultural mediator were selected based on previous formal training and experience in translation work with the Eritrean refugee community in Israel, as well as previous experience with cultural mediation and linguistic translation in psycho-social support groups provided to asylum seekers from this community.

Second, cultural mediators came from inside the refugee community and thus functioned as important role models for group participants. Accordingly, in MBTR-R groups it is important that cultural mediators embody mindful qualities and attitudes, and thereby facilitate direct, implicit, and experiential learning of mindfulness. Therefore, cultural mediators received training

to develop a personal mindfulness practice and to learn important principles integral to MBTR-R prior to study initiation. To do so, cultural mediators participated in an 8-week mindfulness-based intervention (MBSR, MBCT, or MBTR). Afterwards, cultural mediators attended multiple meetings with their groups' instructor to support their personal mindfulness practice, to learn the intervention protocol, to understand intervention-consistent communication and language, to understand their role in the group and intervention, and to build a collaborative relationship with the mindfulness instructors. Throughout the intervention delivery they met with the instructors for weekly supervision before each MBTR-R session to discuss and clarify session procedure, practices, and principles, as well as to check-in with respect to individual participant needs.

Measures

All self-report measures of vulnerability and mental health are included in the present report. Only one additional measure related to sensitivity to traumatic experiences and posttraumatic stress symptoms was not included in analyses as it is part of a larger psychometric study involved in the methodological development of a new measure.

The *Harvard Trauma Questionnaire* (HTQ; (Mollica et al., 1992) was used to measure traumatic stress exposure as well as PTSD symptoms. HTQ was developed to be used and adapted across socio-cultural groups and languages, and thus is a well-established instrument to measure traumatic stress and PTSD symptoms in diverse forcibly displaced populations, including E. African populations specifically (Darzi, 2017; Hollifield et al., 2002; Nakeyar & Frewen, 2016; Reeb, Yuval, & Bernstein, 2017). HTQ mean cut-off score ≥ 2 is commonly used to identify categorical (diagnostic) symptom status of PTSD (Oruc et al., 2008; Silove et al., 2007; Tinghög et al., 2017). The HTQ has three subscales, measuring re-experiencing, avoidance and arousal. In addition, a subscale of items measuring idioms of post-traumatic distress specific to East African

refugees was included (e.g. “feeling isolated because of loss of social role”) (Badri, Crutzen, & Van den Borne, 2012).

The *Brief Patient Health Questionnaire* (PHQ-9; (Spitzer, Kroenke, & Williams, 1999) was used to measure symptom levels of depression. PHQ cut-off score ≥ 10 is commonly used to identify categorical (diagnostic) symptom status of depression (Manea, Gilbody, & McMillan, 2012). The PHQ-9 is a commonly used measure of depression in diverse populations and refugee populations (Poole et al., 2019).

The *Beck Anxiety Inventory* (BAI; (Beck, Epstein, Brown, & Steer, 1988; Norman, Hami Cissell, Means-Christensen, & Stein, 2006)) was used to measure levels of anxiety symptoms. BAI has been commonly used as a self-report tool to measure anxiety, also among refugee populations (Alexander, David, & Grills, 2013; Turner, Bowie, Dunn, Shapo, & Yule, 2003). BAI total cut-off score ≥ 16 is commonly used to identify categorical (diagnostic) symptom status of anxiety disorder (Bardhoshi, Duncan, & Erford, 2016; Beck & Steer, 1993). For an initial sub-sample of 49 participants, we used an adapted version of the Overall Anxiety Impairment Scale (OASIS) and a sum score > 8 was used as a cut-off to diagnose anxiety (Norman et al., 2006). OASIS was discontinued because of low comprehensibility of item content among participants.

Using the categorical (diagnostic) symptom status for PTSD, depression, and anxiety, we computed a *comorbidity index* (0 = no elevated psychiatric symptomatology, 1 = uni-morbid or diagnostic symptom levels in one condition, 2 = co-morbid or diagnostic symptom levels in two conditions, 3 = multi-morbid or diagnostic symptom levels in all three conditions).

The *Brief Inventory of Thriving* (BIT; (Su, Tay, & Diener, 2014)) was used to measure subjective well-being. The *BIT* has been commonly used as a self-report tool to measure thriving and wellbeing.

Finally, the *Post-Migration Living Difficulties Scale* (Silove, Sinnerbrink, Field, Manicavasagar, & Steel, 1997) was used to measure current post-migration stressors. Participants were asked to rate whether they experienced nine post-migration living difficulties over the past 12 months on a 5-point Likert scale (1 = *not a problem/did not happen* to 5 = *a very serious problem*). The *PMLDS* was scored both continuously as a mean score of post-migration stressors to measure the severity of post-migration living difficulties, as well as categorically (whether a post-migration living difficulty was a problem at all or not) to measure the rates at which post-migration living difficulties were experienced in this population. The *PMLDS* has been widely applied to measure post-migration stressors across a variety of refugee and migrant populations (Li et al., 2016; Schick et al., 2018).

Discussion Supplement

First, findings are in line with the growing body of research, among various Western Educated Industrialized Rich Democratic (WEIRD) samples, documenting reduced rates of trauma- and stress-related symptoms following participation in a MBI (Felleman, Stewart, Simpson, Heppner, & Kearney, 2016; Hopwood & Schutte, 2017; Lang, 2017; Müller-Engelmann et al., 2019; Possemato et al., 2015; Treleaven, 2018; Van der Gucht, Takano, Van Broeck, & Raes, 2015) as well as the more acute stress-buffering effects of MBIs (Boyd, Lanius, & McKinnon, 2018). Second, similar to findings in studies of MBIs on depression and/or PTSD among WEIRD samples (Barnhofer, 2019; Kuyken et al., 2016; Williams et al., 2014), MBTR-R appears to be efficacious for a wide range of asylum seekers including those with elevated depression symptoms at pre-intervention, participants with a history of trauma (Kuyken et al., 2016) and co-occurring depression and PTSD. Third, despite early mixed findings with respect to

effects of MBIs on anxiety outcomes (Hofmann, Sawyer, Witt, & Oh, 2010; Strauss, Cavanagh, Oliver, & Pettman, 2014; Vøllestad, Nielsen, & Nielsen, 2012), recent meta-analytic evidence indicates that MBIs outperform no treatment control conditions and are equivalent to other active therapies for anxiety (Goldberg et al., 2018). The present anxiolytic effects of MBTR-R are consistent with the latter meta-analytic findings.

Table 1***Mindfulness-Based Trauma Recovery for Refugees (MBTR-R) Session-by-Session Overview***

Session	Main Themes	Practices
1. Mindfulness and Safe Place	<ul style="list-style-type: none">• Learning what mindfulness is – conceptually and experientially• Understanding the safe place – why bringing attention to a safe place can help to self-regulate when feeling threat and arousal due to trauma	<ul style="list-style-type: none">• Raising exercise• Safe place
2. Difficulties are Guests	<ul style="list-style-type: none">• Relating to difficulties as guests – allowing them to come and go and letting go of internal struggle and negative judgements• Learning to recognize hyperarousal and hypoarousal and to use the safe place to self-regulate and get back to the range of tolerance	<ul style="list-style-type: none">• Safe place• Short body scan
3. Mindful Movement	<ul style="list-style-type: none">• Learning how to bring ease to the body using gentle movement• Noticing pleasant experiences as a remedy to negativity bias	<ul style="list-style-type: none">• Mindful standing up movement• Sitting meditation – awareness of the breath• Breathing space• Walking meditation
4. Stress Reactions	<ul style="list-style-type: none">• Exploring participant's own physical and mental markers of stress• Learning about the physiological, behavioral and psychological bases of stress reactivity and chronic stress• Psychoeducation on trauma and typical stress reactions to traumatic experiences	<ul style="list-style-type: none">• Sitting meditation – awareness of breath and body
5. Using Mindfulness when Facing Difficulties	<ul style="list-style-type: none">• Learning about maladaptive reactions to stress and their effects on chronic stress• Cultivating an attitude of acceptance, stability, and curiosity towards unpleasant emotions and sensations• Developing attention regulation skills when facing difficulties	<ul style="list-style-type: none">• Sitting with the difficulty meditation
6. Self-Compassion	<ul style="list-style-type: none">• Learning about the key elements of self-compassion• Learning loving-kindness and self-compassion as a new way of coping with difficulties, self-judgements, and guilt.	<ul style="list-style-type: none">• Loving-kindness meditation focused on benefactor and self• Breathing space with kindness
7. Practice Session	<ul style="list-style-type: none">• Cultivating curiosity, allowing, non-striving, and self-kindness during mindfulness practice	<ul style="list-style-type: none">• Sitting mindfulness meditation

		<ul style="list-style-type: none"> • Mindful standing up movement • Short body scan • Walking meditation • Loving-kindness meditation • Mindful standing up movement • Sitting mindfulness meditation • Loving-kindness meditation • Body scan
8. How Can I Best Take Care of Myself?	<ul style="list-style-type: none"> • Learning to recognize personal depleting and nurturing activities • Learning to use nurturing activities to cope with stress and lowering mood 	
9. Living Mindfully	<ul style="list-style-type: none"> • Summary and personal reflection on the course • Setting intentions and a personal plan for maintaining formal and informal mindfulness practice after the intervention 	

Note: Safe place is a trauma-sensitive practice adapted for MBTR-R in which participants, first, learn to find a sensation or image in their body, environment, or mind that feels neutral, safe, or calm; and, second, practice bringing attention to their personal safe place to self-regulate when feeling overwhelmed (hyperarousal) or numb (hypoarousal). It is taught and practiced extensively in sessions 1 & 2 and integrated into each practice in all following sessions.

Table 2

Demographics, Trauma History and Post-Migration Living Difficulties predicting Intervention Completion and Session Attendance

	Intervention Completion				Session Attendance			
	B (SE)	<i>p</i>	OR	95% CI [LL, UL]	B (SE)	β	<i>t</i>	<i>p</i>
Gender	-.66(.55)	.23	.52	[.18, 1.52]	1.06(.71)	.19	1.48	.14
Age	-.05(.06)	.38	.95	[.85, 1.07]	.11(.07)	.18	1.52	.13
Education	-.02(.40)	.97	.98	[.45, 2.16]	-.12(.48)	-.03	-.24	.81
Post-Migration	.25(.34)	.46	1.29	[.66, 2.51]	.35(.41)	.12	.85	.40
Living Difficulties (PMLD)								
Trauma History (HTQ)	.00(.08)	.98	1.00	[.86, 1.16]	.04(1.0)	.05	.38	.71

Note: PMLD = Post-Migration Living Difficulties Scale (Silove et al., 1997); HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992);

Table 3:*Continuous Mental Health Outcomes by Group and ANCOVAs among Intent-to-Treat Sample (n = 158)*

	Waitlist-Control				MBTR-R				ANCOVA			
	Pre-Intervention		Post-Intervention		Pre-Intervention		Post-Intervention		Post-Intervention			
	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)	N	df	F	η^2	p
ITT sample with elevated levels of symptomatology (n = 104)												
Total PTSD Symptoms (HTQ)	2.85 (.45)	41	2.63 (.48)	54	2.63 (.44)	46	2.15 (.59)	38	1	8.85	.10	.004
PTSD Re-Experiencing Symptoms (HTQ)	2.96 (.58)	41	2.67 (.61)	54	2.66 (.68)	46	2.06 (.72)	38	1	10.65	.12	.002
PTSD Arousal Symptoms (HTQ)	3.05 (.55)	41	2.95 (.66)	54	2.84 (.57)	46	2.19 (.73)	38	1	20.24	.21	.000
PTSD Avoidance Symptoms (HTQ)	2.66 (.56)	41	2.41 (.51)	54	2.44 (.50)	46	2.17 (.60)	38	1	.86	.01	.356
Cultural Idioms of PTSD Symptoms (HTQ)	3.08 (.53)	41	2.88 (.69)	54	2.71 (.60)	46	2.28 (.77)	38	1	4.22	.05	.043
Depression Symptoms (PHQ-9)	16.03 (4.46)	29	15.27 (5.16)	26	15.73 (4.45)	24	13.00 (6.29)	20	1	4.41	.07	.071
Anxiety Symptoms (BAI)	31.63 (13.18)	19	31.63 (14.33)	16	32.00 (9.53)	28	23.00 (14.14)	26	1	12.15	.16	.001
Comorbidity Index	2.33 (.80)	45	2.30 (1.00)	37	2.15 (.83)	59	1.53 (1.26)	49	1	9.29	.10	.003

Well-Being (BIT)	2.42 (.98)	45	2.32 (.88)	37	2.63 (1.03)	57	2.97 (1.25)	50	1	5.15	.06	.026
ITT sample with and without elevated levels of symptomatology (n = 158)												
Total PTSD Symptoms (HTQ)	2.43 (.75)	60	2.25 (.71)	48	2.09 (.69)	98	1.88 (.59)	83	1	4.01	.30	.047
PTSD Re-Experiencing Symptoms (HTQ)	2.50 (.91)	59	2.27 (.81)	48	2.10 (.84)	98	1.82 (.70)	83	1	6.23	.05	.014
PTSD Arousal Symptoms (HTQ)	2.60 (.85)	60	2.47 (.92)	47	2.26 (.81)	98	1.88 (.69)	83	1	13.10	.09	.000
PTSD Avoidance Symptoms (HTQ)	2.30 (.74)	59	2.10 (.65)	47	1.96 (.68)	97	1.90 (.61)	83	1	.04	.00	.846
Cultural Idioms of PTSD Symptoms (HTQ)	2.60 (.88)	59	2.43 (.91)	48	2.14 (.82)	98	1.91 (.77)	83	1	3.21	.03	.075
Depression Symptoms (PHQ-9)	9.95 (7.01)	60	10.83 (6.77)	48	7.14 (6.10)	97	7.64 (6.08)	83	1	2.35	.02	.128
Anxiety Symptoms (BAI)	18.20 (15.82)	41	21.68 (17.45)	31	16.70 (14.93)	66	13.69 (13.61)	58	1	11.08	.08	.001
Well-Being (BIT)	2.69 (1.13)	60	2.75 (1.16)	48	3.05 (1.12)	95	3.19 (1.21)	83	1	1.72	.01	.192

Note: HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); PHQ-9 = Patient Health Questionnaire (Spitzer et al., 1999); BAI

= Beck's Anxiety Inventory (Beck et al., 1988); BIT = Brief Inventory of Thriving (Su et al., 2014)

Table 4:*Continuous Mental Health Outcomes by Group and ANCOVAs among intervention completers (n = 101)*

	Waitlist-Control				MBTR-R						ANCOVA							
	Pre- Intervention		Post- Intervention		Pre- Intervention		Post- Intervention		5-weeks Follow-Up		Post-Intervention				5-weeks Follow-Up			
	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)	N	df	F	η^2	<i>p</i>	df	F	η^2	<i>p</i>
Total PTSD	2.44	48	2.25	48	2.12	53	1.86	53	1.84	51	1	4.65	.05	.034	1	4.23	.04	.043
Symptoms (HTQ)	(.77)		(.71)		(.75)		(.57)		(.58)									
PTSD Re- Experiencing Symptoms (HTQ)	2.52 (.91)	47	2.27 (.81)	48	2.09 (.89)	53	1.82 (.67)	53	1.75 (.63)	51	1	4.45	.04	.038	1	6.25	.06	.014
PTSD Arousal Symptoms (HTQ)	2.60 (.88)	48	2.47 (.92)	47	2.32 (.89)	53	1.86 (.67)	53	1.90 (.69)	51	1	13.86	.13	.000	1	9.90	.10	.002
PTSD Avoidance Symptoms (HTQ)	2.33 (.74)	47	2.10 (.65)	47	1.99 (.75)	53	1.88 (.60)	53	1.85 (.58)	51	1	.21	.00	.646	1	.35	.00	.558
Cultural Idioms of PTSD Symptoms (HTQ)	2.63 (.91)	47	2.43 (.91)	48	2.14 (.89)	53	1.85 (.69)	53	1.83 (.77)	51	1	5.61	.06	.020	1	4.40	.05	.039
Depression Symptoms (PHQ-9)	10.13 (6.95)	48	10.83 (6.77)	48	7.45 (6.22)	53	7.45 (5.74)	53	7.28 (6.15)	47	1	2.94	.03	.089	1	4.57	0.5	.035

Anxiety Symptoms	18.20	41	21.68	31	19.05	38	15.76	38	15.42	36	1	8.37	.08	.005	1	2.38	.06	.033
(BAI)	(15.81)		(17.45)		(15.53)		(13.86)		(14.94)									
Well-Being (BIT)	2.67	48	2.75	48	3.02	53	3.21	53	3.17	50	1	1.45	.02	.232	1	1.12	.01	.294
	(1.14)		(1.58)		(1.17)		(1.23)		(1.28)									

Note: HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); PHQ-9 = Patient Health Questionnaire (Spitzer et al., 1999); BAI

= Beck's Anxiety Inventory (Beck et al., 1988); BIT = Brief Inventory of Thriving (Su et al., 2014)

Table 5

Moderated Regression Analyses for Continuous Mental Health Outcomes among Intervention Completers with Elevated Levels of Symptoms
(n = 92)

	Post-Intervention				Follow-Up Intervention			
	β	SE	t	p	β	SE	t	p
Total PTSD Symptoms								
Total PTSD Symptoms (HTQ) x Gender	-.28	.24	-1.15	.25	-.41	.26	-1.55	.13
Total PTSD Symptoms (HTQ) x Age	.03	.02	1.10	.27	.03	.02	1.28	.21
Total PTSD Symptoms (HTQ) x Education	-.20	.17	-1.16	.25	-.12	.19	-.63	.53
Total PTSD Symptoms (HTQ) x Post-Migration Living Difficulties (PMLD)	.002	.04	.05	.96	.02	.04	.48	.63
Total PTSD Symptoms (HTQ) x Trauma History (HTQ)	.02	.03	.54	.59	.02	.04	.41	.68
PTSD Re-Experiencing Symptoms								
PTSD Re-Experiencing Symptoms (HTQ) x Gender	-.22	.31	-.72	.47	-.67	.29	-2.25	.03
PTSD Re-Experiencing Symptoms (HTQ) x Age	.07	.03	.21	.83	.02	.03	.77	.44
PTSD Re-Experiencing Symptoms (HTQ) x Education	-.48	.22	-2.18	.03	-.29	.22	-1.31	.19

PTSD Re-Experiencing Symptoms (HTQ) x Post-Migration Living Difficulties (PMLD)	-.02	.06	-.36	.72	.05	.05	.91	.36
PTSD Re-Experiencing Symptoms (HTQ) x Trauma History (HTQ)	-.03	.04	-.61	.55	.02	.04	.48	.64
PTSD Arousal Symptoms								
PTSD Arousal Symptoms (HTQ) x Gender	-.29	.34	-.86	.39	-.31	.35	-.87	.38
PTSD Arousal Symptoms (HTQ) x Age	.03	.03	.86	.39	.06	.03	1.59	.12
PTSD Arousal Symptoms (HTQ) x Education	-.15	.24	-.64	.53	-.06	.25	-.25	.81
PTSD Arousal Symptoms (HTQ) x PMLD	-.04	.06	-.68	.50	.01	.06	.15	.88
PTSD Arousal Symptoms (HTQ) x Trauma History (HTQ)	.05	.05	1.20	.24	.02	.05	.36	.72
PTSD Avoidance Symptoms								
PTSD Avoidance Symptoms (HTQ) x Gender	-.14	.27	-.49	.62	-.20	.28	-.73	.47
PTSD Avoidance Symptoms (HTQ) x Age	.03	.03	1.27	.21	.02	.03	.78	.44
PTSD Avoidance Symptoms (HTQ) x Education	-.18	.19	-.92	.36	-.11	.19	-.62	.54
PTSD Avoidance Symptoms (HTQ) x Post-Migration Living Difficulties (PMLD)	.07	.05	1.38	.17	.03	.05	.57	.57
PTSD Avoidance Symptoms (HTQ) x Trauma History (HTQ)	.05	.04	1.38	.17	.05	.04	1.32	.19
Cultural Idioms of PTSD Symptoms								

Cultural Idioms of PTSD Symptoms (HTQ) x Gender	-.40	.31	-1.27	.21	-.20	.35	-.57	.57
Cultural Idioms of PTSD Symptoms (HTQ) x Age	.03	.03	.87	.39	.02	.04	.66	.51
Cultural Idioms of PTSD Symptoms (HTQ) x Education	-.15	.23	-.66	.51	-.13	.25	-.52	.60
Cultural Idioms of PTSD Symptoms (HTQ) x Post-Migration Living Difficulties (PMLD)	.03	.06	.61	.55	.12	.05	2.24	.03
Cultural Idioms of PTSD Symptoms (HTQ) x Trauma History (HTQ)	.02	.04	.56	.58	.02	.05	.31	.75
Depression Symptoms								
Depression Symptoms (PHQ-9) x Gender	-4.13	2.81	-1.47	.15	-4.27	3.37	-1.27	.21
Depression Symptoms (PHQ-9) x Age	.27	.28	.95	.35	.29	.34	.85	.40
Depression Symptoms (PHQ-9) x Education	.15	2.16	.07	.94	-1.19	2.52	-.47	.64
Depression Symptoms (PHQ-9) x Post-Migration Living Difficulties (PMLD)	.04	.51	.07	.94	.45	.60	.75	.46
Depression Symptoms (PHQ-9) x Trauma History (HTQ)	.06	.41	.14	.89	.59	.47	1.25	.22
Anxiety Symptoms								
Anxiety Symptoms (BAI) x Gender	-.22	.37	-.58	.57	-.83	.46	-1.79	.08
Anxiety Symptoms (BAI) x Age	.06	.04	1.61	.11	.06	.05	1.21	.23
Anxiety Symptoms (BAI) x Education	-.08	.26	-.28	.77	.22	.34	.64	.53

Anxiety Symptoms (BAI) x Post-Migration Living Difficulties (PMLD)	.06	.22	.27	.79	.06	.25	2.35	.02
Anxiety Symptoms (BAI) x Trauma History (HTQ)	-.05	.05	-1.09	.28	-.01	.06	-.01	.99
Levels of Well-Being								
Levels of Well-Being (BIT) x Gender	.34	.49	.71	.48	.55	.49	1.11	.27
Levels of Well-Being (BIT) x Age	.06	.05	1.07	.29	.04	.06	.76	.45
Levels of Well-Being (BIT) x Education	.03	.37	.09	.93	.21	.36	.58	.57
Levels of Well-Being (BIT) x Post-Migration Living Difficulties (PMLD)	-.01	.29	-.04	.96	-.15	.30	-.50	.62
Levels of Well-Being (BIT) x Trauma History (HTQ)	.07	.06	1.18	.24	-.01	.06	-.13	.89

Note: Because we examined multiple candidate moderators per outcome, we applied a Bonferroni correction to correct for multiple repeated statistical tests per outcome and reduce inflation of type I error (Dunn, 1961; Field, 2009); HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); PMLD = Post-Migration Living Difficulties Scale (Silove et al., 1997); PHQ-9 = Patient Health Questionnaire (Spitzer et al., 1999); BAI = Beck's Anxiety Inventory (Beck et al., 1988); BIT = Brief Inventory of Thriving (Su et al., 2014)

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