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Post-migration treatment targets associated with reductions in depression and PTSD among survivors of torture seeking asylum in the USA

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ABSTRACT

Mental health research among asylum seekers and refugees has largely focused on effects of pre-migration trauma on post-migration wellbeing. While emerging literature highlights the importance of post-migration factors, we do not yet understand how addressing these factors may influence change in psychological distress. This study uses archival clinical data to identify post-migration correlates of reductions in distress among torture survivors, after accounting for pre-migration trauma. Depression (Patient Health Questionnaire-9) and Post Traumatic Stress Disorder (PTSD; Harvard Trauma Questionnaire) were measured among torture survivors following 6 months of interdisciplinary treatment (N = 323). Relationships between pre-, post-migration factors, and changes in symptom levels from intake to six months follow-up, were evaluated using regression analyses. Average levels of depression and PTSD significantly reduced after six months of treatment. Higher exposure to pre-migration trauma, female gender, and change to a more secure visa status were associated with reduced distress. Accessing more social services and not reporting chronic pain were associated with reduced PTSD. Stable housing and employment significantly moderated the relationship between lower chronic pain and reduced PTSD. Although effect sizes were small, results emphasize the importance of post-migration factors on wellbeing among torture survivors and are a first step towards identifying key treatment targets.

1. Introduction

Research among survivors of torture and trauma, including both refugees and asylum seekers, finds that they suffer significantly more psychological distress than the general population (Browne et al., 2017; Fazel et al., 2005; McFarlane and Kaplan, 2012; Silove et al., 1998). Although treatments for the psychological sequelae of pre-migration trauma among refugees and asylum seekers is effective (Alfadhli and Drury, 2016; Miller and Rasmussen, 2017), the effect sizes of trauma-focused interventions are variable, and results regarding the long-term maintenance of gains following interventions are mixed (McFarlane and Kaplan, 2012; Patel et al., 2014). The lack of consistent effect sizes from intervention evaluations could be due to the influence of factors other than pre-migration trauma. For example, the impact of post-migration stressors, such as unstable accommodation (Porter and Haslam, 2005), poor socio-economic conditions (Bogic et al., 2015) and insecure immigration status on wellbeing are also significant (Li et al., 2016; Raghavan et al., 2013). Indeed, a recent study suggests that post-migration resettlement stressors were the strongest correlates of mental health problems among 2399 refugees resettled in Australia (Chen et al., 2017). However, a dearth of research specifically measures how addressing post-migration stressors among asylum seekers and refugees can improve wellbeing (Miller and Rasmussen, 2017). Hence, the following study aims to assess the impact of post-migration wellbeing on psychological distress, after accounting for pre-migration trauma, among survivors of torture seeking asylum in the USA.

Accounting for pre-migration trauma is important, as exposure to pre- and migration related stressors (Kirmayer et al., 2011), such as sexual abuse (Lerner et al., 2015); torture (Ibrahim and Hassan, 2017) and displacement (Porter and Haslam, 2005), are associated with significant psychological distress. For example, a recent review found that pre-migration stressors are consistently associated with significant psychological distress, even five years after resettlement (Bogic et al., 2015). Furthermore, trauma exposure can have a cumulative, negative effect on mental health, where more exposure to trauma, and more perceived distress during the event, is often related to worse symptom

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severity (Alpak et al., 2015; Keller et al., 2006; Letica-Crepulja et al., 2011; Steel et al., 2009). Therefore, once the effect of the differing levels of pre-migration trauma exposure on psychological distress has been considered, the impact of post-migration factors can be measured and monitored.

Post-migration stressors, such as poor living conditions in countries of resettlement (Asgary and Segar, 2011; Schweitzer et al., 2011), have been found to significantly impact the wellbeing of asylum seekers and refugees (Miller and Rasmussen, 2017). Among these stressors, unstable housing was associated with worse global functioning among survivors of torture resettled in the USA (Song et al., 2015). Further, a meta-analysis of 25 studies into asylum seeker and refugee populations found that living in institutional accommodation was consistently linked with worse psychological outcomes compared to permanent private accommodation (Porter and Haslam, 2005). In addition, three recent reviews found that poor post-migration socio-economic conditions, such as facing obstacles to employment (Johnson and Thompson, 2008); are associated with poor psychological functioning among refugees and asylum seekers (Bogic et al., 2015; Li et al., 2016). For example, among male survivors of torture resettled in Denmark (Carlsson et al., 2006) and Iraqi refugees resettled in the Netherlands (Laban et al., 2005), individuals without stable employment reported higher rates of psychopathology; and having employment was related to lower symptom severity among survivors of the Balkan wars (Priebe et al., 2013).

Conversely, no relationship was found between being employed and reduced psychological distress among 90 undocumented migrants in Norway (Myhrvold and Småstuen, 2017). This could be due to the potentially exploitative nature of the employment, and any other negative effects of insecure visa status among undocumented individuals who did not have legal protection (Myhrvold and Småstuen, 2017). Furthermore, a change from insecure to secure immigration status among asylum seekers in the USA (Raghavan et al., 2013) and Ireland (Ryan et al., 2008), was found to be the strongest correlate of improvement in psychological distress. Additionally, among Mandaean refugees resettled in Australia, improved living conditions mediated the relationship between changes to a more secure visa status and reduced psychological distress (Nickerson et al., 2011). However, in the Mandean population, reduced living difficulties did not explain the link between obtaining a more secure visa status and improved mental health related quality of life (Nickerson et al., 2011). Therefore, it could be that post-migration factors other than those related to immigration status and living conditions plays a role in reducing psychological distress. Thus, more potential post-migration stressors should be studied.

Another post-migration factor associated with distress among refugees and asylum-seekers, and particularly survivors of torture, is chronic pain (de C Williams and Baird, 2016; Teodorescu et al., 2015). For example, among refugees in Norway, chronic pain was significantly and positively associated with PTSD (Teodorescu et al., 2015). Therefore, experiencing chronic pain could be a post-migration stressor associated with PTSD. However, the direction of the relationship between chronic pain and PTSD is unclear, as chronic pain may also be a health factor secondary to PTSD, or indeed to general post-migration distress. Another possibility is that chronic pain is both a predictor and a consequence of PTSD in the post-migration environment via a negative synergistic cycle. Still, whatever the direction of the relationship; since chronic pain is an addressable treatment target among refugees suffering from PTSD, the potential effects of treating chronic pain on post-migration distress should be studied. That is, given the association between chronic pain and PTSD reported in the literature (Teodorescu et al., 2015), if reducing chronic pain can improve post-migration wellbeing, then this knowledge could inform efficient targeting of interventions. Thus, if a relationship between chronic pain and PTSD is found in this sample (after accounting for pre-migration trauma exposure and change to a more secure immigration status), then this association will be more deeply explored via indirect relationships with other post-migration psychosocial factors.

Finally, recent reviews have found that more perceived social support was linked to lower psychological distress among refugees and asylum seekers (Ryan et al., 2008; Siriwardhana et al., 2014). Therefore, an additional post-migration stressor could be a lack of social support (Siriwardhana et al., 2014). For example, among Somali and Oromo refugees in the USA, increases in perceived social support predicted more positive functioning (Robertson et al., 2016), and among male survivors of torture in Denmark, fewer social contacts predicted lower health-related quality of life (Carlsson et al., 2006).

Overall, evidence regarding the psychological impact of pre-migration trauma and post-migration health, social, economic and asylum related difficulties is compelling (Bogic et al., 2015; Li et al., 2016). However, problems with the current state of literature, including small, restricted samples (Carlsson et al., 2006; Tufan et al., 2013); correlational (Ibrahim and Hassan, 2017) and cross-sectional (Alpak et al., 2015; Laban et al., 2005; Song et al., 2015) studies; impede our ability to infer causality around symptom reduction post interventions. Furthermore, cultural differences around interpreting and expressing mental health problems, plus the heterogeneity of cultures and measures of psychological distress used across studies limits the generalizability and clinical utility of results (Bogic et al., 2015; Li et al., 2016; Patel et al., 2014).

The present study will address some of these gaps, in an attempt to identify the strongest post-migration associates of symptom reduction. The issue of cross-sectional designs which limit our ability to infer causality will be addressed by using archival clinical data in a longitudinal design to measure change in symptom severity. The use of cross-culturally validated measures of psychological distress with a large, clinical sample of survivors of torture seeking asylum in the USA, would also support the validity, generalizability and clinical utility of results. There has also been a call to implement and evaluate more interdisciplinary interventions that target post-migration psychosocial issues such as housing, employment, legal status, and psychological wellbeing (Carinci et al., 2010; Carswell et al., 2011; Patel et al., 2014). While emerging evidence from interdisciplinary clinical settings shows promising reductions in post-treatment symptom severity (Raghavan et al., 2013), more research is needed to specifically evaluate the impact of addressing post-migration stressors on psychological distress (Miller and Rasmussen, 2017; Siriwardhana et al., 2014). For example, a previous study in the same clinic (Raghavan et al., 2013) examined the effects of engaging in services on symptom severity, and found that change to a more secure immigration status was the strongest correlate of symptom reduction. However, pre-migration trauma exposure was not accounted for. The current study will build on previous results with a larger sample size, while also controlling for pre-migration trauma.

In summary, since post-migration stressors are commonly associated with symptom severity among asylum seekers and refugees (Bogic et al., 2015); the present study aims to explore if addressing these stressors is associated with reduced psychological distress at an interdisciplinary clinic for survivors of torture. This study will also measure the effects of addressing psychosocial indicators of wellbeing, routinely measured by the clinic. We will explore the impact of the presence of stable housing, employment, perceived social support, and chronic pain on changes in symptom severity after 6 months of treatment; while controlling for pre-migration trauma exposure and change to a more secure immigration status. In addition, if the hypothesized relationship between chronic pain and psychological distress is found in this sample, we aim to further explore this association. We will determine whether other psychosocial treatment targets which are associated with chronic pain may moderate its relationship with psychological distress. In summary, we aim to pinpoint which factors have the strongest association with a reduction in psychological distress, in an effort to identify early treatment targets, and help reduce distress more efficiently among survivors of torture seeking asylum.

2. Methods

2.1. Participants

Data for this study were drawn from an archival database of clients at an interdisciplinary treatment center for survivors of torture, which offers medical, legal, mental health and social services. De-identified data from clients who entered the program from March 2011 and had completed their 6 month follow-up interview by April 2017, were included. The study was approved by the Institutional Review Boards of New York University School of Medicine (10-00653). Because data were being analyzed retrospectively from routine care, the collection of informed consent was waived by the IRB. During this time period, Guinea, Tibet, Ivory Coast, Cameroon, and Burkina Faso were the top five most commonly represented countries. As part of routine assessments for the purposes of treatment planning, clients at this center are invited to complete measures of depression and posttraumatic stress during an intake and a 6-month follow-up interview. Interviews were conducted in clients' preferred languages, with the use of telephone interpreters as required. For the purposes of this study, individuals were selected only if they had completed full measures of either depression or posttraumatic stress at intake and 6-month follow-up during the specified time period. This is because valid total and change scores cannot be calculated for incomplete data on the measures used. Excluded individuals (n = 20) did not differ on pre-migration trauma exposure compared to those included in analyses, however, mean age among those who were excluded (M = 16.6) was significantly lower than those who were included (M = 37.5, t = 8.25 (341), $p < .01$). Further, there were more females (70%) than males among excluded individuals (χ^2 = 9.10 (1), $p < .01$). Therefore, age and gender were included as covariates in analyses predicting symptom change.

Individuals who fit selection criteria included 323 clients, comprising 206 (63.8%) males and 117 (36.2%) females. Ages ranged from 20 to 70 years old (M: 37.92, SD: 9.03). At intake, 20.4% of participants had not yet applied for asylum in the USA; 42.7% had applied for asylum; and 4.6% had already been granted asylum/refugee status/ US citizenship. Remaining individuals (32.2%) were either residing in the US on other visas (23.8% e.g. student visas) or had unknown visa status (8.4%). At follow-up, 16.4% had not yet applied for asylum, 63.5% had applied for asylum, 9.3% had been granted asylum or had a secure immigration status, and the remaining 10.8% of individuals had other visas (3.7% e.g. student visa), or had unknown status (7.1%).

2.2. Measures

De-identified data on client demographics (age, gender, and immigration status), trauma exposure (number of reported traumatic events (not event categories); 0–5), treatment information (number of mental health, legal and social services encounters) and the psychosocial treatment targets measured during the 6-month follow-up interview (housing, employment, perceived social support, and chronic pain) were analyzed. This information was gathered as part of routine data collection during service encounters.

2.2.1. Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a 9-item self-report questionnaire designed to measure depression severity, with scores ranging from 0 (no depression) to 27 (severe depression) (Kroenke et al., 2001). Participants are asked how often during the past 2 weeks they have been bothered by [e.g.] "feeling down, depressed or hopeless", and responses are made on a 4-point Likert scale ranging from "not at all" (0) to "nearly every day" (3) (Kroenke et al., 2001). The PHQ-9 has good internal consistency in the current clinical sample (α = .83 at intake, α = .84 at follow-up), in other clinical samples (α = .90) (Lowe, 2004); and good criterion and construct validity (Kroenke et al., 2001) in clinical populations. Further, the PHQ-9 has good construct validity in the general population (Martin et al., 2006), and good sensitivity and specificity in a clinical sample (Lowe, 2004). Finally, it has construct validity when detecting and monitoring depression in racially and ethnically diverse clinical populations (Huang et al., 2006), and good cross-cultural validity (Lotrakul et al., 2008); making it a useful tool to measure psychological distress in the current sample.

2.2.2. Harvard Trauma Questionnaire (HTQ)

The 16-item sub-section (Part 4) of the Harvard Trauma Questionnaire is used to assess the severity of symptoms of Posttraumatic Stress Disorder (PTSD) (de Fouchier et al., 2012; Mollica et al., 1992). Participants indicate how much they were distressed by symptoms such as 'recurrent nightmares', 'trouble sleeping' and 'difficulty concentrating' in the past week on a 4-point Likert scale ranging from 'Not at all' (1) to 'Extremely'(4) (Renner et al., 2006). To score the HTQ, the sum of scores for each item is divided by 16, and any result above 2.5 is indicative of clinically significant PTSD (Lhewa et al., 2007). The HTQ has good internal consistency in this current clinical sample (α = .88. at intake, α = .87 at follow-up); among torture survivors from Sub-Saharan Africa (α = .95) (de Fouchier et al., 2012); and amongst asylum seekers from Chechnya (α = .91), Afghanistan (α = .90) and West Africa (α = 0.87) (Renner et al., 2006). The HTQ also has good cross-cultural equivalency between Cambodian and Vietnamese immigrants in the USA (Choi et al., 2006); and satisfactory cross-cultural validity among racially and ethnically diverse populations such as among south-east Asian, Afghan and Chechen refugees (Mollica et al., 1992; Renner et al., 2006).

2.3. Data analyses

Analyses aimed to explore predictors of change in PTSD and depression scores using psychosocial treatment targets measured at the 6-month follow-up assessment (presence of stable housing, presence of employment, presence of chronic pain, clients' perception of having emotional support and organizational support; see Table 1). Analyses were conducted using the SPSS (version 22) software package, and

Table 1
Two linear regressions showing associations between treatment variables with change (**Δ**) in depression, and change (**Δ**) in PTSD scores from intake to 6-month follow-up (FU).

	Δ PTSD (HTQ)	Δ Depression (PHQ9)
Variables (Follow up)	*B* (SE), *β*	*B* (SE), *β*
Constant	*−5.71* (5.97)	*−1.85* (3.93)
Housing (stable/unstable)	*0.95*(1.58), *0.04*	*1.94* (1.03), *0.13*
Employment (yes/no)	*−0.26* (1.36), *−0.14*	*−1.60* (0.90), *−0.12*
Chronic pain (yes/no)	***−2.79* (1.26)***, ***−0.15***	***−1.84* (0.85)***, ***−0.14***
Emotional support (yes/no)	*0.25* (1.58), *0.01*	*−0.16* (1.03), *−0.10*
Organizational support (yes/no)	*−1.73* (1.62), *−0.07*	*−2.20* (1.12), *−0.12*
Age	*−0.03* (0.07), *−0.03*	*−0.01* (0.05), *−0.02*
Gender (m = 1, f = 2)	***3.09* (1.40)***, ***0.15***	***1.89* (0.92)***, ***0.14***
Pre-migration trauma exposure (0–5)	***1.49* (0.49)***, ***0.21***	*0.62* (0.32), *0.13*
Psychological service encounters	*0.07* (0.90), *0.06*	*−0.02* (0.06), *−0.02*
Legal service encounters	*0.30* (0.30), *0.07*	*0.29* (0.21), *0.10*
Social service encounters	***0.25* (0.11)***, ***0.16***	*0.01* (0.08), *0.01*
Change in immigration status	***3.96* (1.73)***, ***0.15***	***3.10* (1.11)***, ***0.18***
[Effect size]	Adjusted R^2 = 0.09	Adjusted R^2 = 0.07

Note.
* $p < .05$

controlled for client demographics (age, gender, and change to a more secure immigration status from intake to follow-up), pre-migration trauma exposure (number of reported traumatic events up to a maximum of five events) and number of psychological, legal and social service encounters. Levels of pre-migration trauma exposure were quantified as the number of pre-migration traumatic events reported by clients, due to the consistently found dose-effect relationship between cumulative trauma exposure and higher levels of PTSD symptoms (Mollica et al., 1998; Neuner et al., 2004; Steel et al., 2009; Wilker et al., 2017). Associations between psychosocial treatment targets with changes in depression (PHQ-9) and PTSD (HTQ) scores were explored using multivariable linear regressions (Field, 2005). Change in depression was defined as intake PHQ-9 total scores minus follow-up PHQ-9 total scores, as was change in PTSD (HTQ total at intake minus HTQ total at follow-up). Finally, moderated regressions were tested using the PROCESS Macro (Hayes, 2013) in SPSS (version 22). The PROCESS Macro uses a bootstrapping procedure to estimate moderating effects, where resampling was carried out 10,000 times, and where confidence intervals which do not include zero indicate a significant moderation effect (Hayes, 2013). Bootstrapping is a resampling strategy which re-conceptualizes the sample as a pseudo-population representing the wider population from which the sample is drawn (Preacher et al., 2007). The distribution of sample statistics can then be generated by calculating values in multiple (in this case 10,000) re-samples of the data (Preacher et al., 2007).

3. Results

The HTQ and PHQ-9 were found to have good internal consistency (intake: $\alpha = .88$, $\alpha = .83$; follow-up: $\alpha = .87$, $\alpha = .84$ respectively) in the current clinical sample. PHQ-9 total scores at intake ranged from 0 to 26 ($M = 13.60$, SD = 6.29), and HTQ total scores at intake ranged from 16 to 61 ($M = 40.20$, SD = 9.85), where 51.4% of the sample met criteria for PTSD based on the HTQ cut-off. PHQ-9 total scores at follow-up ranged from 0 to 26 ($M = 8.52$, SD = 5.76), and HTQ total scores at follow-up ranged from 16 to 64 ($M = 32.88$, SD = 8.79), where 23.8% of the sample met criteria for PTSD. The reduction in mean total depression scores ($t = 14.28$ (314), $p < .01$) and mean total PTSD scores ($t = 13.25$ (294), $p < .01$) from intake to follow-up were statistically significant. PHQ-9 change scores (intake minus follow-up) ranged from −26 to 24 ($M = 5.10$, SD = 6.34), and HTQ change scores ranged from −18 to 37 ($M = 7.36$, SD = 9.54). Females reported more severe symptoms of depression and PTSD at intake (depression: $t = -3.15$ (313), $p < .01$, PTSD: $t = -3.82$ (306), $p < .01$) and follow-up (depression: $t = -2.31$ (341), $p < .05$, PTSD: $t = -2.77$ (324), $p < .01$). Further, there was a weak negative correlation between age and PTSD scores at follow-up ($r = -0.12$, $p < .05$); and weak negative correlations between age and depression scores at intake ($r = -0.16$, $p < .01$) and follow-up ($r = -0.17$, $p < .01$). Finally, during the first 6 months of their intervention at the clinic, clients in this sample accessed between 1 and 17 legal service encounters ($M = 2.80$, SD = 2.13); 1 and 38 social service encounters ($M = 8.49$, SD = 5.86), and between 1 and 50 psychological service encounters ($M = 6.84$, SD = 7.46).

Firstly, Table 1 suggests that higher exposure to pre-migration trauma exposure was associated with a greater reduction in PTSD symptom severity from intake to follow-up. Higher pre-migration trauma exposure was also significantly associated with higher intake PTSD scores ($B = 1.23$ (SE = 0.42), $\beta = 0.17$, $p < .01$). Second, results suggest that a change to a more secure immigration status from intake to follow-up, was associated with greater reductions in both PTSD and depression severity. Further, females were more likely than males to report improvements in depression and PTSD symptoms after 6 months of receiving services, and reporting chronic pain at 6-month follow-up assessment was associated with less improvement in PTSD and depression. Finally, accessing more social services over 6 months was associated with a greater reduction in PTSD symptom severity. Still, while the effect of these variables on reductions in depression and PTSD symptoms were statistically significant, the effect sizes associated with their contribution to change in distress were small (PTSD: $R^2 = 0.09$, Depression: $R^2 = 0.07$).

Notably, among individuals who reported experiencing chronic pain at the 6-month follow-up assessment (N = 170), lower chronic pain was associated with both having stable housing ($B = -0.89$ (SE = 0.44), $p < .05$, $\beta = -0.16$) and with being employed ($B = -0.83$ (SE = 0.37), $p < .05$, $\beta = -0.17$). Stable housing at follow-up was also associated with increased odds of being employed (ExpB = 2.16 ($B = 0.77$, SE = 0.27) CI95 % = 1.28–3.65, $p < .01$). Yet, neither housing nor employment were directly associated with reduced PTSD or depression severity. Therefore, housing and employment may have had an *indirect* association with improvement in PTSD and/or depression among individuals reporting lower chronic pain after 6 months of treatment.

To test the hypothesis that the presence of stable housing and/or employment influenced the relationship between lower chronic pain and changes in PTSD and depression; scores at follow-up, among individuals who reported chronic pain, were explored using moderated regressions. Regression models tested whether the presence of stable housing and/or employment moderated the relationship between lower chronic pain at follow-up, and improvement in PTSD and depression symptoms at follow-up (FU). The following models (Figs. 1, 2 and 3) were explored using the process macro in SPSS (Hayes, 2013).

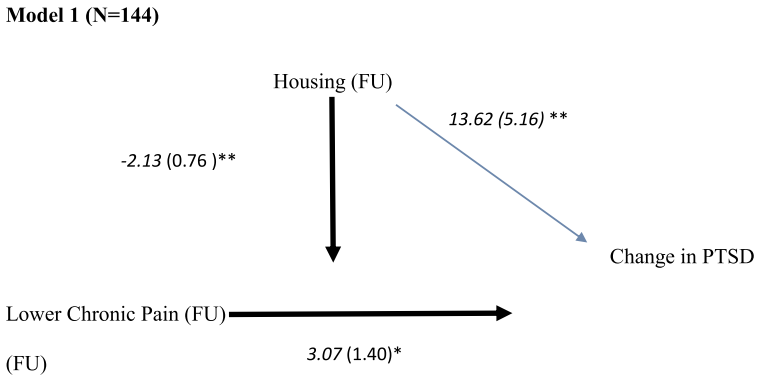

Fig. 1. Does the presence of stable housing influence the effect of lower chronic pain on PTSD symptoms at follow up (FU)?
Note: *$p < .05$, **$p < .01$.

3.1. PTSD

The interaction term between stable housing and chronic pain explained a significant increase in variance in change in PTSD scores ($\Delta R^2 = 0.05$, F (1, 140) = 7.90, $p < .01$). Unstandardized conditional effects were computed for each of 10,000 bootstrapped samples. The bootstrapped unstandardized conditional effect of chronic pain (FU) on change in PTSD (FU) in the presence of stable housing was −1.18 ($t = -3.52$, SE = 0.34, $p < .01$), and the 95% confidence interval ranged from −1.85 to −0.52, indicating a significant moderation. Therefore, among individuals reporting chronic pain at 6-month follow-up, lower chronic pain was associated with more improvement in PTSD in the presence of stable housing, with a small effect size ($\Delta R^2 = 0.05$).

The interaction term between employment and chronic pain did not explain a significant increase in variance in change in PTSD scores ($\Delta R^2 = 0.01$, F (1141) = 1.80, p = .18), indicating a non-significant moderation. The presence of stable employment did not influence the effect of lower chronic pain on improvement in PTSD (Fig. 2).

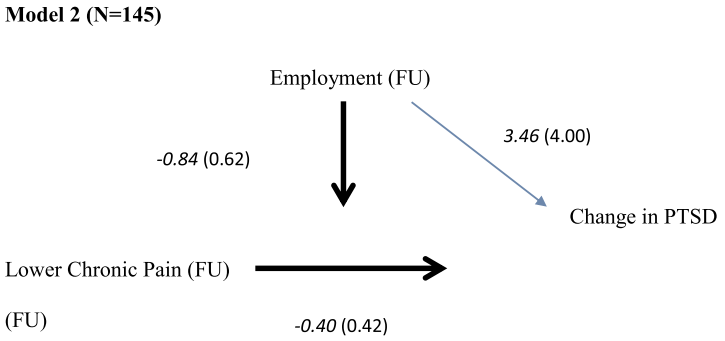

Fig. 2. Does the presence of stable employment influence the effect of lower chronic pain on PTSD symptoms at follow up (FU)?.

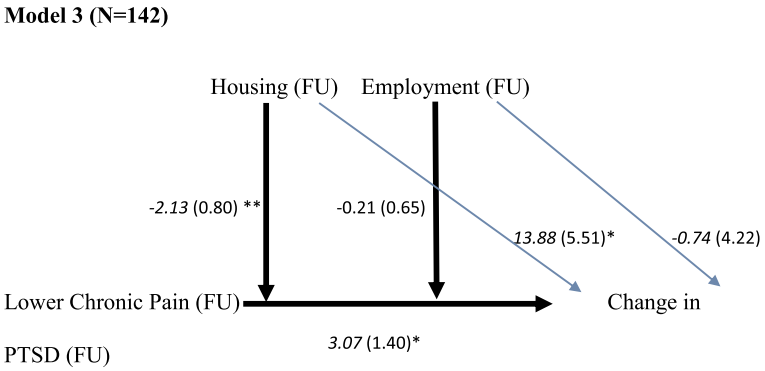

Fig. 3. Does the presence of both stable housing and employment influence the effect of lower chronic pain on PTSD symptoms at follow up (FU)?
Note: *$p < .05$, **$p < .01$.

The interaction term between housing and chronic pain when stable housing and employment were entered as moderators simultaneously, explained a significant increase in variance in change in PTSD scores ($\Delta R^2 = 0.05$, F (1136) = 6.99, $p < .01$). Unstandardized conditional effects were computed for each of 10,000 bootstrapped samples. The bootstrapped unstandardized conditional effect of chronic pain (FU) on change in PTSD (FU) in the presence of both stable housing and employment was −1.38 ($t = -3.04$, SE = 0.45, $p < .01$), and the 95% confidence interval ranged from −2.27 to −0.48, indicating a significant moderation with a small effect size ($\Delta R^2 = 0.05$).

The conditional effect of chronic pain on improvement in PTSD in the presence of *both* stable housing and employment (−1.38) was higher than the conditional effect of chronic pain (FU) in the presence of stable housing, but *not* employment (−1.18 ($t = -3.52$, SE = 0.34, $p < .01$, 95% CI = −1.85 to −0.52) when both housing and employment were added simultaneously as potential moderators. Thus, while stable housing alone was a significant moderator (Model 1) and employment was not a significant moderator (Model 2); the effect of lower chronic pain on improvement in PTSD was highest in the presence of *both* stable housing and employment at follow-up (Model 3).

3.2. Depression

Neither stable housing nor employment significantly moderated the effects of lower chronic pain on change in depression after 6 months of treatment.

4. Discussion

This study measured the impact of addressing post-migration stressors on the psychological wellbeing of survivors of torture seeking asylum in the USA. Firstly, after six months of accessing inter-disciplinary services, the proportion of individuals in this sample who met criteria for PTSD reduced from 51.4% at intake to 23.8% at follow-up; and mean depression scores reduced from 13.60 (SD = 6.29) to 8.52 (SD = 5.76). Significant reductions in psychological distress after three and six months of treatment have been reported previously among torture survivors (McColl et al., 2010; Raghavan et al., 2013), and results of this study further suggest that interdisciplinary care in this population can be effective.

Indeed, while this study explored changes in depression and PTSD, accessing more *social* services was significantly associated with reductions in PTSD symptoms. This suggests that psychological distress associated with trauma exposure may be alleviated by social services, where these services were not necessarily trauma focused. Social workers at this clinic provide case management and general mental

health counselling, and would have addressed post-migration living difficulties such as accessing housing and employment. However, detailed information about social service providers and client contact (e.g. encounter-related quality of care indicators, such as appropriate use of interpreters), was not available to researchers. Nevertheless, the association between more social services and reduced PTSD adds strength to the emerging literature highlighting the importance of addressing post-migration living difficulties among asylum seekers and refugees (Li et al., 2016; Porter and Haslam, 2005; Wright et al., 2017). Notably, it is important to ask why accessing more psychological services was not directly associated with changes in psychological distress. It could be that six months was too short a time frame to detect effects of psychological services. For example, for some clients, psychological interventions may have focused more on building rapport, as survivors of torture may take longer to trust unknown clinicians with their experiences; especially since one of the aims of torture is to reduce interpersonal trust (Nickerson et al., 2014). However, details about psychological interventions were not available to researchers. Only de-identified data about the type of service, and number of services accessed by clients were recorded, for ethical and privacy reasons in this clinical facility.

To summarize, the fact that depression and PTSD did reduce, suggests some positive impact of the overall intervention. However, future research may benefit from detailed information about psychological services (e.g. were interventions directly targeting PTSD and depression?), in a manner which maintains privacy.

Other factors associated with reductions in distress include change to a more secure immigration status. This finding supports existing literature linking secure immigration status with more positive well-being (Nickerson et al., 2011; Silove et al., 2007). Moreover, after accounting for change to a more secure immigration status and pre-migration trauma exposure, women were more likely than men to report improvements in both depression and PTSD symptoms. Similar results were found in a study conducted with 54 treatment seeking refugees in Norway, where females were more likely than males to report improvement in PTSD symptoms post-treatment (Stenmark et al., 2014). This gender difference in reduced psychological distress is also consistent with reviews that suggest female gender is associated with worse psychological distress among asylum seekers and refugees (Johnson and Thompson, 2008; Porter and Haslam, 2005). It could be that individuals with higher initial distress levels were more likely to show detectable improvement after six months of treatment. For example, among individuals in this sample, more pre-migration trauma exposure was significantly associated with higher initial PTSD intake scores, *and* more improvements in PTSD symptoms at follow-up. However, given that there were more females than males with incomplete measures, and that female gender was associated with higher psychological distress at both intake and follow-up, it could be that females with higher symptom severity were less likely to complete the measures. Moreover, among war survivors in Croatia, males reported higher rates of PTSD (Letica-Crepulja et al., 2011), and among Syrian–Kurdish refugees in Iraq, no gender differences were associated with post-traumatic stress (Ibrahim and Hassan, 2017). Further, some clients at the clinic sought asylum in the USA due to being persecuted for their gender identity in their countries of origin. Data on gender identity is not routinely recorded, and was not included in the analyses of this study. Therefore, given the lack of information about gender identity, and the mixed findings regarding gender and psychological distress among refugees and asylum seekers in general; we suggest that future research should account for any impact of gender identity on change in distress, and so this discussion will focus on the impact of addressing other post-migration factors, such as housing, employment and chronic pain.

Results suggest that either not reporting chronic pain at follow-up, or reporting lower levels of chronic pain at follow-up, were associated with greater improvements in depression and PTSD. Links between chronic pain and psychological distress (e.g. PTSD) have often been found among asylum seekers and refugees (de C Williams and Baird, 2016; Taylor et al., 2013), and the effect of lower chronic pain on reduced PTSD symptoms suggests that treating chronic pain and finding stable housing should be early treatment targets. Indeed, it could be that chronic pain is a manifestation of PTSD itself, where the presence of stable housing has a reductive influence on PTSD, and that the lower chronic pain reported at follow-up, reflects lower levels of PTSD symptoms. PTSD scores and chronic pain scores at follow-up in this clinical sample were positively correlated ($r = .35$, $p < .01$) suggesting that they are related. Future research may therefore benefit from disentangling chronic pain from other PTSD symptoms. Nonetheless, it has been argued that interventions for chronic pain should be integrated with mental health services for survivors of torture (Teodorescu et al., 2015), whether the underlying cause is physical or psychosomatic, (de C Williams and Baird, 2016). Since a major aim of this study was to identify early treatment targets, if addressing chronic pain helps reduce PTSD symptoms, then being aware of this and indirect effects of stable housing is useful knowledge. Apart from chronic pain, no other psychosocial treatment target was directly associated with change in PTSD severity. Post-hoc analyses suggested that having stable housing and employment at follow-up were directly associated with each other and lower reported chronic pain at follow-up, and were indirectly associated with reductions in PTSD symptoms. These findings could be related to the association between accessing more social services and reductions in symptoms, where social workers provide help with finding stable housing and employment. Therefore, while there was no current theoretical rationale behind the post-hoc analyses, these results may contribute to a future theoretical model based on empirical findings. Hence, after accounting for pre-migration trauma exposure and change to a more secure immigration status; among the psychosocial treatment targets measured at 6-month follow-up, treating chronic pain, and finding stable housing and employment were still associated with improvement in psychological distress. This highlights the importance of addressing post-migration stressors such as chronic pain, and resettlement factors such as housing and employment insecurity, on the wellbeing of survivors of torture.

On the other hand, strong conclusions about the contribution of social services, housing, employment, and chronic pain to change in PTSD and depression cannot be drawn. Even after accounting for trauma exposure and post-migration factors monitored at six month follow-up, both models predicting improvement in psychological distress accounted for small amounts of variance in change in distress (see Table 1). Small effect sizes could be due to the lack of information about psychological treatment—i.e. whether clients received specific treatment for PTSD or depression during their first 6 months. Since the dependent variable was change in psychological distress, it is possible that including the type of psychological intervention as a predictor, may have increased the amount of variance accounted for by the models. However, this information was not available to authors. Further, variables which were not measured during structured intake and follow-up interviews may have also contributed to psychological distress. For example, among refugees resettled in Australia, intrusive fear for family members in countries of origin was associated with psychological distress after accounting for both trauma exposure and living difficulties (Nickerson et al., 2010). Additionally, emotion regulation skills were found to mediate the relationship between post-migration living difficulties and trauma, with psychopathology severity (Nickerson et al., 2015). Future research should therefore account for more treatment, contextual and individual factors when predicting symptom reduction in this population.

Small effect sizes could also be due to measuring change in symptom severity 6 months apart, as it may not be the optimal way to detect or predict it. Specifically, among adults receiving treatment for PTSD, it was found that patients improved at different rates, where some patients reported more rapidly remitting symptoms than others (Galatzer-Levy et al., 2013). Further, studies into psychotherapy

efficacy suggest that individuals with the best outcomes are more likely to report rapidly remitting distress during the early stages of treatment (Lutz et al., 2014). To capture these early differences in change trajectories, symptoms need to be monitored more often than once every six months (Kashyap et al., 2015; Lutz et al., 2009; Restifo et al., 2015). Future studies could measure symptom severity more often during treatment among asylum seeker and refugee populations. This may capture fluctuations in symptom severity, any rapidly remitting distress, and allow the identification of post-migration variables associated with the most positive trajectories of change. Still, resource-related barriers to repeated measurements of symptom severity, in a public outpatient facility for torture survivors, would have to be overcome for such a study to be conducted.

4.1. Limitations

Limitations to the clinical utility of this study include the small effect sizes of the contribution of variables including change in immigration status, trauma exposure, gender, chronic pain and the indirect relationships between housing and employment to reductions in psychological distress; together with the lack of information about psychological treatment. Further, effects of housing and employment on PTSD severity only applied to individuals reporting chronic pain at follow-up (52.6% of the sample). In addition, since this study used archival clinical data, analyses were limited to variables already measured during routine intake and follow-up interviews. Individual factors which may have an impact on psychological distress over and above post-migration stressors such as emotion regulation (Nickerson et al., 2015), and intrusive fear for family back home (Nickerson et al., 2010) were therefore not included in these analyses. Further, interactions between individual patient factors, such as the need for interpreters, reasons for accessing services and service providers' characteristics may also have had an impact on reductions in symptoms, but could not be measured due to the use of retrospective data. Another limitation is that pre-migration trauma exposure was measured as the number of reported traumatic events, with a maximum of five. Therefore, if individuals experienced more than five traumatic events, any event after the fifth, was not recorded or analyzed. Further, each traumatic event was measured as "equally traumatic", while studies suggest that some interpersonal trauma can have worse psychological sequelae (Arnetz et al., 2014; Steel et al., 2009). Future studies should therefore take into account the degree to which each event was perceived as traumatic by each individual. The variation in types and number of services accessed may have also influenced results, together with the finding that clients excluded from analyses had a younger mean age than those included. While correlations were weak, it could be that younger people may have been less likely to complete measures. Finally, six months may not be long enough to capture symptom improvement in an environment where immigration processes take a long time—and change to a more secure immigration status was significantly associated with reduced distress in this sample.

4.2. Conclusions

Notwithstanding the limitations described above, after accounting for pre-migration trauma and post-migration factors often found to be strongly associated with symptom reduction, such as change to a more secure immigration status; the direct effects of chronic pain, and the indirect effects of stable housing and employment were still significant. Furthermore, accessing more social services had a direct association with reduced PTSD symptoms. Implications for treatment among survivors of torture in the post-migration environment therefore point to the importance of interdisciplinary intervention. Results suggest that addressing resettlement stressors such as finding stable housing and employment through social services, together with addressing the psychological sequalae of trauma, which may include chronic pain, could significantly improve wellbeing.

Overall, these results validate the emerging focus on post-migration resettlement stressors, and merit further consideration. Results of this study serve as a starting point for improving wellbeing among asylum seekers and refugees in resettlement countries. Future studies could aim to measure change in symptom severity more often, over a longer period of time, while accounting for the type of psychological services being provided, and as many post-migration factors as possible. This would help identify which factors have the strongest influence on reducing psychological distress during and after treatment; and would lead to more targeted interdisciplinary treatment programs to better improve wellbeing among asylum seekers and refugees in resettlement contexts.

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Supplementary materials

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