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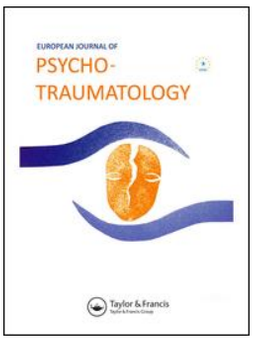

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CLINICAL RESEARCH ARTICLE

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Pre-treatment pain predicts outcomes in multimodal treatment for tortured and traumatized refugees: a pilot investigation

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ABSTRACT

Background: Chronic pain is a common comorbid complaint in traumatized refugees seeking treatment for posttraumatic stress disorder (PTSD) and depression. However, the effect of comorbid pain on treatment remains under investigated.

Objective: To investigate whether pre-treatment pain (severity/interference) predicts outcomes in a multimodal treatment targeting PTSD, depression, anxiety, somatic complaints, and health-related disability in refugees exposed to torture and organized violence. Additional predictors were gender, age, and number of treatment sessions.

Method: Participants were active cases at a specialist outpatient clinic for tortured refugees (n = 276; 170 men, 106 women) who were either on a treatment waitlist (mean length = 7.4 months, SD = 4.5), in treatment (mean length = 12.2 months, SD = 6.5), or who completed treatment and had (or were waiting for) a follow-up assessment. Participants completed symptom measures at referral, pre- and post-treatment, and 9-month follow-up. Multi-level mixed modelling was used to assess whether outcomes at post-treatment and 9-months were predicted by pain, gender, age, or the number of treatment sessions.

Results: Treatment yielded significant pre-to-post-treatment reductions in PTSD, depression, anxiety, and number of pain locations, but no reductions in pain severity/interference, or health-related disability, except for societal participation. Gains for PTSD, depression, and societal participation were maintained at the 9-month follow-up. Higher levels of pain interference (but not severity) predicted poorer outcomes (PTSD, depression, and anxiety). Age, gender and number of treatment sessions did not predict outcomes, except for a small negative effect of (older) age on PTSD.

Conclusions: A growing body of literature suggests that pain and PTSD symptoms interact in ways to increase the severity and impact of both disorders in refugee and non-refugee populations alike. The present study suggests interference from pain can lessen the effectiveness of standard multi-modal treatments for refugees.

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PALABRAS CLAVE
Tortura; TEPT; dolor; resultado del tratamiento; predictores

关键词
难民; 酷刑; 创伤后应激障碍; 疼痛; 治疗结果; 预测变量

El dolor previo al tratamiento predice el desenlace del tratamiento multimodal para refugiados torturados y traumatizados: una investigación piloto

Antecedentes: el dolor crónico es una queja comórbida común en refugiados traumatizados que buscan tratamiento para el trastorno de estrés postraumático (TEPT) y depresión. Sin embargo, el efecto del dolor comórbido en el tratamiento sigue siendo investigado.

Objetivo: investigar si el dolor previo al tratamiento (severidad/interferencia) predice los resultados en un tratamiento multimodal para el TEPT, depresión, ansiedad, quejas somáticas y discapacidad relacionada con la salud en refugiados expuestos a tortura y violencia organizada. Predictores adicionales fueron el sexo, edad y número de sesiones de tratamiento.

Método: los participantes fueron casos activos en una clínica ambulatoria especializada para refugiados torturados (n = 276; 170 hombres, 106 mujeres) que estaban en una lista de espera de tratamiento (duración media = 7,4 meses, DE = 4,5), en tratamiento (duración media = 12.2 meses, DE = 6.5), o quienes completaron tratamiento y tuvieron (o estaban esperando) una evaluación de seguimiento. Los participantes completaron las mediciones de síntomas en la derivación, antes y después del tratamiento, y en un Seguimiento a los 9 meses. Se utilizó un modelo mixto multinivel para evaluar si los resultados en el postratamiento y a los 9 meses eran predichos por dolor, sexo, edad o el número de sesiones de tratamiento.

Resultados: el tratamiento produjo reducciones significativas desde el pre al postratamiento en TEPT, depresión, ansiedad y número de localizaciones de dolor, pero no hubo reducciones en la severidad/interferencia del dolor o discapacidad relacionada con la salud, excepto por la participación social. Las ganancias para el TEPT, depresión y participación social se mantuvieron a los 9 meses de seguimiento. Los niveles más altos de interferencia del dolor (pero no la gravedad) predijeron resultados más pobres (TEPT, depresión

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y ansiedad). La edad, sexo y número de sesiones de tratamiento no predijeron los resultados, excepto por un pequeño efecto negativo de la edad (mayor) en TEPT.
Conclusiones: un creciente cuerpo de literatura sugiere que el dolor y los síntomas de TEPT interactúan de manera que aumentan la gravedad y el impacto de ambos trastornos en las poblaciones de refugiados y no refugiados por igual. El estudio presente sugiere que la interferencia del dolor puede disminuir la efectividad de los tratamientos multimodales estándar para refugiados.

前期疼痛可预测多模式治疗对遭受酷刑和创伤的难民的结果：一项预研究

背景：慢性疼痛是在寻求治疗创伤后应激障碍（PTSD）和抑郁症的受创伤难民中的常见合并症。但是，并发疼痛对治疗的影响仍在研究过程中。
目的：在遭受酷刑和有组织暴力的难民中，研究针对PTSD, 抑郁, 焦虑, 躯体不适和健康相关残疾的多模式治疗，治疗前的疼痛（严重程度/干扰性）是否可预测结果。其他预测因素包括性别, 年龄和治疗次数。
方法：参与者是在一家针对经历酷刑的难民的专科门诊诊所的常期病例（n = 276； 170名男性，106名女性）。这些难民或在治疗候补名单中（平均长度= 7.4个月，SD = 4.5），或在接受治疗（平均长度= 12.2个月，SD = 6.5），或完成治疗并已经（或正在等待）随访评估。参与者在转诊时， 治疗前和治疗后以及9个月的随访中完成了症状测量。使用多水平混合模型来评估是否通过疼痛, 性别, 年龄或治疗次数来预测治疗后和9个月的结果。
结果：治疗的效果使治疗后的PTSD， 抑郁症， 焦虑症和疼痛部位数量相比治疗前明显减少。但疼痛严重程度/干扰性或与健康相关的残疾（除社会参与外）均未减少。在9个月的随访中，创伤后应激障碍，抑郁症和社会参与的增加保持不变。较高水平的疼痛干扰（而非严重程度）预示较差的结果（PTSD，抑郁和焦虑）。年龄，性别和疗程数均不能预测结果，除了（老年）年龄对PTSD的有较小的负性效应。
结论：越来越多的文献表明，疼痛和PTSD症状相互作用增加了难民和非难民人群中两种疾病的严重程度和影响。本研究表明，疼痛带来的干扰会降低标准多模式治疗对难民的有效性。

1. Introduction

Refugees have high rates of mental and physical health problems, often associated with pre-migration experiences, particularly traumatic exposures, and the severe stress associated with migration and post-migration factors (Nickerson, Bryant, Silove, & Steel, 2011). The presence of mental health problems is associated with difficulties integrating into the new society (e.g. becoming language proficient and financially independent), which further contributes to overall levels of health-related disability among refugees (Schick et al., 2016). Evidence-based treatments, particularly for posttraumatic stress disorder (PTSD) and depression, have been adapted for use with refugees, either as trauma-focused monotherapies or multimodal interventions targeting mental, physical, and social difficulties (Drozdek, 2015). A recent meta-analysis found that the two most evaluated monotherapies are trauma-focused cognitive-behavioural therapy (CBT) and narrative exposure therapy (NET), both of which yield significant reductions in symptoms of PTSD (largely in comparison with no treatment controls) in resettled refugees (Nose et al., 2017).

There is evidence, albeit limited, that PTSD outcomes are poorer for refugees who enter treatment with concurrent difficulties including psychiatric and health-related conditions, employment/financial problems, offender status, and unresolved asylum claims (Haagen, Ter Heide, Mooren, Knipscheer, & Kleber, 2017; Porter & Haslam, 2005; Raghavan, Rasmussen, Rosenfeld, & Keller, 2013; Sonne et al., 2016; Stammel et al., 2017; Stenmark, Guzey, Elbert, & Holen, 2014). Among the co-occurring health complaints, chronic pain is one of the most common in refugees with PTSD and depression (Carinci, Mehta, & Christo, 2010; Harlacher, Nordin, & Polatin, 2016; Williams, Pena, & Rice, 2010). Studies have found that chronic pain in refugees has significant impacts on their daily functioning and quality of life, with these impacts being separable from those of PTSD and depression (Buhman et al., 2014; Carinci et al., 2010; Harlacher et al., 2016). However, little is known about the effects of pain on outcomes from either mono or multimodal therapies for refugees with PTSD and comorbid difficulties. The only available study on this topic found that higher levels of clinician-rated pain severity were associated with poorer patient-reported outcomes for depression but not PTSD in a multi-modal treatment for traumatized refugees (Sonne et al., 2016).

The Danish Institute Against Torture (DIGNITY) is a self-governing institution with a government-funded clinic that provides inter-disciplinary, multimodal treatment targeting PTSD, depression, health problems and social integration in refugees who are survivors of torture or other organized forms of violence. Previous studies carried out with patients from this clinic have reported on the relationship between PTSD, chronic pain, and quality of life (Carlsson, Mortensen, & Kastrup, 2006; Harlacher et al., 2016; Olsen, Montgomery, Bojholm, & Foldspang, 2007), and that pain severity accounted for 66% of the

variance in PTSD severity prior to treatment (Nordin & Perrin, 2019). In a preliminary fashion, the primary purpose of this study is to investigate the extent to which pre-treatment pain (severity and interference) predicts outcomes (PTSD, depression, and anxiety) in a multimodal treatment for refugees. The effects of gender, age, and the number of treatment sessions, area also evaluated as previous studies have identified these as outcome predictors in traumatized refugees (Drozdek, 2015; Lambert & Alhassoon, 2015; Stammel et al., 2017; Stenmark et al., 2014).

2. Method

2.1. Participants

Participants were refugees (N = 276; 170 men, 106 women) who were current patients (assessed and on a wait-list for treatment, in treatment, or who had completed treatment and had (or were waiting for) a follow-up assessment), at the DIGNITY clinic in Copenhagen, during the calendar years 2012, 2013, and 2014. The clinic is a highly specialized treatment programme for refugee survivors of torture or other organized violence, approved by the Danish Health Ministry. Participants had an average age of 44.8 years (SD = 9.4) and 8.7 years of education (SD = 5.2), with 51.3% being married. The majority (82%) had been subjected to torture with the remaining 18% subjected to other forms of organized violence. Traumatic exposures included being beaten (88%), witnessing others being tortured (87%), kept in isolation (84%), witnessing the murder of another human being (64%), and being subjected to some kind of sexual violence (39%). The participants came from Iraq (38%), Iran (15%), Lebanon (95), Bosnia (6%), and Afghanistan (5%). The remaining countries of origin included Somalia, Syria, Egypt, Russia, and Turkey. The participants arrived as refugees in Denmark during the 1980's (13.7%), 1990s (54.6%), 2000's (25.7%), and after 2010 (6%).

Inclusion criteria for the treatment program at DIGNITY and this study were: (1) ≥ 18 years; (2) came to Denmark as a refugee; (3) exposure to torture or organized violence; (4) permanent right to remain in Denmark; (5) the ability to self-finance transportation to the clinic; (6) the presence of primary psychiatric and somatic symptoms requiring treatment; (7) no current alcohol or drug-dependency; and (8) not currently suffering from psychosis. The Danish Data Protection Agency and the Danish Patient Safety Authority have approved this research.

2.2. Treatment program

Participants are referred by their general practitioner or psychiatrist and undergo a brief assessment involving a medical doctor and/or psychologist at the time of referral. The majority are then placed on a treatment waitlist and reassessed when treatment commences. For participants in the present study, the average waitlist time was 7.4 months (SD = 4.5). The average number of months in treatment was 12.2 (SD = 6.5), with an average of 72.8 treatment sessions (SD = 44.3; range = 17–208 sessions).

The treatment program follows a multidisciplinary approach, delivered by teams of four professionals (medical doctor, clinical psychologist, physiotherapist, and social counsellor), individualized according to patient needs. The program includes: (1) weekly, individual trauma-focused psychotherapy aimed at PTSD, anxiety, and depression (exposure-based interventions, behavioural activation) provided by a clinical psychologist; (2) weekly sessions with a physiotherapist involving coping with pain/somatic difficulties, initiating physical exercise routines (strengthening, stabilization, and flexibility), training in body awareness, and relaxation exercises; (3) sessions (as needed) with a physician focused on management of pain, sleep and psychotropic medications, and where necessary, screening and referral for other medical conditions (e.g. asthma, diabetes, arthritis); and (4) sessions (as needed) with a social counsellor addressing social difficulties and focusing on helping the client to become a more active and integrated agent in his/her social network and society. Sessions with the medical doctor and social counsellor are normally more frequent at the beginning of the program.

2.3. Measures

All participants complete standardized measures of mental and physical health (described below) at the time of referral (Time 0), just prior to treatment (Time 1), at post-treatment (Time 2), and again at a 9-month, post-treatment follow-up (Time 3). Wherever possible or necessary, the standardized questionnaires were in the preferred language of the patient. The measures used in the study were available in Danish, English, Bosnian, or Arabic-language versions. For 67% of the participants, a professional interpreter was present to assist the participant during the assessment and treatment. All interpreters were provided with training on the use of the self-report measures used in this study, including the intended meaning of individual items, and how to assess whether the patient understood the provided translation of each individual item.

Trauma and PTSD were assessed using Parts 1, 3 and 4 of the Harvard Trauma Questionnaire (HTQ) (Mollica et al., 1992) in a validated Danish (Bach, 2003), English/Arabic (Shoeb, Weinstein, & Mollica, 2007) or Bosnian (Oruc et al., 2008) version of the scale. Part 1 assesses (lifetime) exposure (yes/no) to 46

different types of traumatic events. Part 3 (5 items) assesses history of possible brain injury either through direct injury to the head or experiences that increase the risk of brain damage (e.g. suffocation, near-drowning, prolonged starvation). Part 4 (16 items) assesses the symptoms of PTSD as listed in the 4th revised edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). There is significant overlap between these symptoms and the diagnostic criteria for PTSD in the latest edition (11th) of the International Classification of Diseases (World Health Organization, 2018) and DSM-5 (American Psychiatric Association, 2013). For Part 4, respondents rate how much each PTSD symptom has bothered them over the past seven days (1 = Not at all, 4 = Extremely). A mean score at the item level is calculated for Part 4, with a cut-off of 2.5 suggestive of a current DSM-IV diagnosis of PTSD (Gerritsen et al., 2004; Lie, 2002; Mollica et al., 1992). Part 4 of the HTQ has been found to possess high levels of internal reliability (Cronbach α = .90) and construct and criterion validity (Mollica et al., 1992). The internal reliability coefficient for Part 4 of the HTQ in the present sample was Cronbach α = .76.

Anxiety and Depression were assessed using the 25-item Hopkins Symptom Checklist (HSCL-25) (Mollica, Wyshak, de Marneffe, Khuon, & Lavelle, 1987) in English, Arabic (Shoeb et al., 2007), Danish (Bach, 2003) and Bosnian versions (Oruc et al., 2008). Respondents rate how much each symptom has bothered them over the past seven days (1 = Not at all, 4 = Extremely). A total score is calculated based on the mean severity rating for all items, as well as subscale scores for anxiety (10 items) and depression (15 items). The clinical cut-off for both the depression and anxiety subscales is 1.75 (Lavik, Laake, Hauff, & Solberg, 1999; Mollica et al., 1987). The HSCL-25 possess high levels of internal consistency (Cronbach α = .80 – .90) and construct validity (Kaaya et al., 2002; Lhewa, Banu, Rosenfeld, & Keller, 2007). The HSCL-25 is valid for use with traumatized refugees (Kleijn, Hovens, & Rodenburg, 2001; Tinghog & Carstensen, 2010; Wind, van der Aa, de la Rie, & Knipscheer, 2017). Internal reliability coefficient for the HSCL-25 in this sample was high for both depression and anxiety (Cronbach α = .87 and .88).

Health-Related Disability was assessed using the 36-item WHO Disability Assessment Schedule (WHODAS 2.0) (Ustun et al., 2010) in Danish (Üstün, Kostanjsek, Chatterji, & Rehm, 2010), Arabic (Badr & Abd El Aziz, 2007; Badr & Mourad, 2009) and English versions (Chisolm, Abrams, McArdle, Wilson, & Doyle, 2005). The WHODAS 2.0 assesses the impact of physical and psychiatric difficulties across six domains of functioning (6 items per domain): understanding and communicating; mobility; self-care; getting along with others; life activities; and participation in society. For each item, respondents rate the degree of difficulty in that area of functioning over the past 30 days (1 = None, 5 = Extreme or Cannot Do). An overall disability score is calculated using an algorithm that differentially weights individual items and their severity levels, and converts the total score to a 0–100 scale, with higher scores denoting greater disability. Normative data are available but there are no widely agreed clinical cut-offs for the WHODAS (Konecky, Meyer, Marx, Kimbrel, & Morissette, 2014). A recent study of US combat veterans applying for PTSD-related disability benefits suggested scores ≥ 40 reflect clinically significant levels of functional impairment (Marx et al., 2015). A score ≥ 40 would place the respondent in the top 10% of those reporting health-related disability according to published norms for the WHODAS 2.0 (Üstün et al., 2010). The WHODAS 2.0 has been found to possess high levels of internal consistency (Cronbach's α = 0.86), to be valid for use in different cultures, and for people with physical and mental health problems (Üstün et al., 2010). The internal reliability coefficient for the WHODAS 2.0 (total score) was Cronbach α = .97.

Number of Pain Locations (Margolis, Tait, & Krause, 1986) was assessed using a pain drawing where patients mark their pain on a pre-printed body diagram.

Pain Severity and *Pain Interference* were assessed using the 9-item, short-form version of the Brief Pain Inventory (BPI) (Cleeland & Ryan, 1994) in English (Keller et al., 2004), Arabic (Ballout, Noureddine, Huijer, & Kanazi, 2011), and a Danish translation of a validated Norwegian version (Klepstad et al., 2002). Item 1 asks whether the person has experienced any pain over the past week. They are then presented with a two-dimensional representation of the human body (front and rear projections), and asked to shade in areas where they experience pain, making it possible to assess the total number of shaded areas. The next four items assess the worst, least, average, and current pain interference (0 = No Pain, 10 = Worst Pain Imaginable). Two items assess medication use and the degree of relief from pain when using the medication (0% = No relief, 100% = Complete relief). Item 9 asks the respondent to rate interference from pain (0 = No interference, 10 = Complete interference) in seven different areas of life (general activity, mood, mobility, work, relations with others, sleep, and enjoyment of life). Pain severity (4 items) and pain interference (7 items) scores are the mean of the 0–10 ratings for their respective items. The BPI has been found to possess high levels of internal consistency for both pain severity and pain interference (Cronbach α = .85 and .88), and to be valid for use in medical and psychiatric populations across cultures (Cleeland & Ryan, 1994; Mendoza, Mayne,

Rublee, & Cleeland, 2006; Tan, Jensen, Thornby, & Shanti, 2004; Turk et al., 2003). The internal reliability coefficients for the pain severity and pain interference scales in the current sample were Cronbach α = .91 and .93.

2.4. Statistical analysis

The analyses are based on all available data for the 273 refugees who were active clinic cases during the study period (2012–2014), 98 of whom completed both a pre- and post-treatment assessment during this time. Table 1 present number of participants for whom data was available at each assessment point. The difference between this number and the overall sample (N = 273) reflects a combination of censored (i.e. the assessment occurred outside the period of study) and missing data. Data from assessments (referral, pre-treatment, post-treatment, and 9-month follow-up) that occurred outside the study period (censored) are by definition missing completely at random. In consultation with a statistician, change scores were estimated for all participants registered in clinic during the study period, even if data were available only from one assessment, to maximize the available N, and to reduce the risk of biased parameter estimates in the multi-level model of change (discussed below). The percentage of missing data at the item level on the available self-report questionnaires at referral, pre-, post-treatment, and follow-up was low (between 0–2.9%), except for the WHODAS 2.0 where two subscales had 10.3% and 15% items missing (on the sub-scales self-care and getting along with people). At the item level on completed questionnaires, data were found to be missing completely at random (MCAR) (Little et al., 2012). For the purposes of analysing descriptive data, missing items were imputed using the Expectation Maximization Algorithm (Schafer & Graham, 2002).

The SPSS Linear Mixed Models (MLM) procedure was used to analyse the data according to the methods described in (Heck, Thomas, & Tabata, 2014). Unlike traditional models for repeated measures, multilevel models can effectively manage unequal numbers of observations and missing data in the repeated measure (Kwok et al., 2008). Data were analysed using a 2-level, mixed multi-level model design, with Level 1 = time (repeated measurements) and Level 2 = participants. We used a compound symmetry covariance structure, and a two-sided alpha ($p < .05$) to define statistical significance for all analyses. The precise p value was adjusted for the number of comparisons (Bonferroni correction).

The models were analysed in two ways. First, we predicted the change in time on the dependent variable (DV) from pre- to post treatment and pre-treatment to follow-up. Referral time (Time 0) was coded as zero to control for any changes that might have occurred between referral and the start of treatment. However, no changes on any of the outcome measures were observed between referral and re-assessment at the start of treatment, and the analyses were re-run with the start of treatment (Time 1) coded as 0. This model enabled us to examine change in the outcome measures from the start of treatment. Outcomes on the standardized symptom measures at follow-up (Time 3) and post-treatment (Time 2) were compared to scores on the same measures at pre-treatment (Time 1). Effect sizes were calculated using Cohen's d (Cohen, 1988). Next, we investigated whether age, gender, number of treatment sessions, pain severity, and pain interference (measured at pre-treatment) predicted scores at post-treatment on the outcome measures. All statistical analyses carried out using SPSS for Mac 23.0.

3. Results

Table 1 provides descriptive statistics for the participants at the four assessment points on the outcome measures: PTSD, depression, anxiety, pain, participation/disability, pain catastrophizing and trauma related beliefs. Table 2, provides the results of the MLM for these outcome variables. As can be seen in Table 2, a statistically significant effect is found for

Table 1. Means, standard deviations, for measures of PTSD, depression, anxiety, pain, pain catastrophizing, trauma-related beliefs, and disability/participation.

	Pre-Waitlist				Pre-Treatment				Post-Treatment				Follow-Up			
Measure	N	M	SD	% above cut-off	N	M	SD	% above cut-off	N	M	SD	% above cut-off	N	M	SD	% above cut-off
PTSD Symptoms (HTQ)	104	3.2	0.5	90	161	3.2	0.5	91	167	2.9	0.6	80	85	2.9	0.6	80
Depression (HSCL)	105	3.0	0.5	99	161	3.1	0.6	97	170	2.8	0.7	88	84	2.9	0.6	95
Anxiety (HSCL)	105	3.0	0.6	99	161	3.1	0.6	98	171	2.8	0.6	92	84	2.9	0.6	95
No. of Pain Locations	102	18.1	10.6	-	173	19.5	10.8	-	157	16.8	11.1	-	81	18.9	10.3	-
Pain Severity (BPI)	102	6.2	2.3	-	172	6.4	2.0	-	150	6.0	2.0	-	78	6.3	1.9	-
Pain Interference (BPI)	102	6.8	2.6	-	167	7.1	2.2	-	150	6.7	2.5	-	78	7.1	2.4	-
Pain Catastrophizing (CSQ-CAT)	90	26.3	8.4	-	116	26.5	9.3	-	74	25.5	9.9	-	48	25.6	8.7	-
Trauma-Related Beliefs (PTCI)	92	175.7	30.5	-	116	174.4	33.0	-	74	171.3	37.8	-	51	172.9	33.2	-
Health-Related Disability (WHODAS 2.0)	100	66.3	18.0	-	155	68.6	16.9	-	156	65.5	19.5	-	79	63.5	19.9	-

Table 2. Results multi-level mixed model assessing the effects of treatment on PTSD, depression, anxiety, pain and disability/participation.

Parameter	B	(SE)	d
PTSD (HTQ)			
Intercept	3.16***	(.04)	-
Time Pre- to Post Treatment	−.27***	(.04)	.55
Time Pre Treatment to Follow up	−.23***	(.06)	.47
Depression (HSCL-25)			
Intercept	3.07***	(.05)	-
Time Pre- to Post Treatment	−.25***	(.05)	.43
Time Pre Treatment to Follow up	−.18**	(.06)	.32
Anxiety (HSCL-25)			
Intercept	3.06***	(.05)	-
Time Pre- to Post Treatment	−.24***	(.05)	.41
Time Pre Treatment to Follow up	−.13	(.06)	-
Pain Severity (BPI)			
Intercept	6.37**'	(.15)	-
Time Pre- to Post Treatment	−.35	(.17)	-
Time Pre Treatment to Follow up	−.12	(.22)	-
Pain Interference (BPI)			
Intercept	7.13***	(.17)	-
Time Pre- to Post Treatment	−.43	(.2)	-
Time Pre Treatment to Follow up	−.08	(.26)	-
No. of Pain Locations			
Intercept	19.51***	(.78)	
Time Pre- to Post Treatment	−2.78**	(.82)	.25
Disability/Participation (WHODAS-2)			
Intercept	68.67***	(1.39)	-
Time Pre- to Post Treatment	−2.7	(1.37)	-
Time Pre Treatment to Follow up	−4.18	(1.77)	-
Time Pre Treatment to Follow up	−.64	(1.08)	

p-value adjusted for multiple comparison with Bonferroni
*p < 0.05, **p < 0.01, ***p < 0.001

Table 3. Results multi-level mixed model, assessing whether gender, age, number of treatment sessions, and pain predicts pre-to-post treatment changes in PTSD, depression, and anxiety.

Parameter	B	(SE)
PTSD (HTQ)		
Intercept	1.96***	(.26)
Time Pre- to Post Treatment	−.28***	(.05)
Gender	−.05	(.08)
No. of treatment sessions	.00	(.00)
Age	.01*	(.00)
BPI Severity pre-treatment	.00	(.03)
BPI Interference pre-treatment	.12***	(.03)
Depression (HSCL-25)		
Intercept	2.12***	(.32)
Time Pre- to Post Treatment	−.2**	(.06)
Gender	−.1	(.1)
No. of treatment sessions	.00	(.00)
Age	.01	(.01)
BPI Severity pre-treatment	−.03	(.03)
BPI Interference pre-treatment	.14***	(.03)
Anxiety (HSCL-25)		
Intercept	2.11***	(.31)
Time Pre- to Post Treatment	−.23***	(.06)
Gender	−.18	(.10)
No. of treatment sessions	−.00	(.00)
Age	.01	(.01)
BPI Severity pre-treatment	.12	(.03)
BPI Interference pre-treatment	.12***	(.03)

p-value adjusted for multiple comparison with Bonferroni
*p < 0.05, **p < 0.01, ***p < 0.001

time for total scores on the outcome variables, indicating moderate to small, pre-to-post-treatment reductions in PTSD (d = .55), depression (d = .43), anxiety (d = .41), and number of pain locations (d = .25), with no changes for pain severity, pain interference, or overall health-related disability/participation. Significant reductions were observed between pre-treatment and 9-month follow-up for PTSD (d = .47) and depression (d = .32) only. Not reported in Table 2, significant pre-to-post-treatment (d = .28), and post-treatment to follow-up (d = .30) effects were observed for the WHODAS 2.0 subscale measuring participation in society (D6). No significant changes on any of the outcome variables were observed for the Time 0 (initial referral) to Time 1 (pre-treatment) interval (waitlist period).

Table 3 provides the results of the multi-level, mixed model analysis assessing whether outcomes (PTSD, depression, and anxiety) were predicted by gender, age, number of treatment sessions, pain severity, and pain interference as assessed at pre-treatment (Time 1). As there were no significant pre-to-post treatment changes in overall levels of health-related disability (WHODAS 2.0), this variable was excluded from the predictor analyses. As can be seen in Table 3, higher levels of pain-related interference at pre-treatment was associated with poorer outcomes in treatment as indexed by total scores on the measures of PTSD, depression, and anxiety. A small association was found such that older patients responded less well to treatment in relation to PTSD. Otherwise, age, gender, and number of treatment sessions was unrelated to outcomes.

4. Discussion

The primary aim of this study was to assess whether pre-treatment levels of pain were associated with outcome in a multidisciplinary, multimodal treatment program targeting PTSD, depression, anxiety, somatic complaints, and social difficulties, designed specifically for traumatized and tortured refugees. The treatment program yielded moderate effect size reductions in PTSD, depression, and anxiety, and small effects for the number of pain locations. No improvements in pain severity, pain interference, or health-related disability, except for a single domain of functioning (participation in society), were observed. Improvements were maintained at the 9-month follow-up for PTSD, depression, and participation in society, but not for anxiety or any of the pain indices. No improvements on any of the outcome measures occurred for participants while on the waitlist for treatment. Multilevel modelling suggested that participants with higher levels of pain interference at pre-treatment experienced a poorer response to treatment in respect of PTSD, depression, and anxiety. Older participants experienced slightly poorer responses to treatment as indexed by PTSD symptoms. Otherwise, age, gender, and the number of treatment sessions were unrelated to outcome.

To our knowledge, this is only the second study to assess whether chronic pain influences outcomes in

multimodal treatments targeting PTSD, depression, anxiety, and somatic difficulties in tortured refugees. The earlier study by Sonne et al. (2016), also of a multimodal treatment for tortured refugees resettled in Denmark, found pain severity predicted outcomes as indexed by depression but not PTSD or anxiety. In the present study, it was interference from pain and not pain severity (or pain locations) that predicted a poorer treatment response, and in relation to PTSD and anxiety as well as depression. The different findings for pain severity may be a function of the way this variable was assessed, either via a medical doctor using a single-item scale as in Sonne et al. (2016), or with a four-item, patient-report scale in this study.

Setting aside how pain is assessed, the present study adds to a small but growing body of literature suggesting that traumatized refugees with PTSD and comorbid pain are more symptomatic overall and function less well on a day-to-basis (Rometsch-Ogioun El Sount et al., 2019). It has been suggested that pain that arises directly from the trauma to which the current PTSD symptoms are connected, can act as a traumatic reminder and exacerbate the severity and impact of the PTSD symptoms (Asmundson, Coons, Taylor, & Katz, 2002; Sharp & Harvey, 2001). Pain arising from another context might not exert the same level of influence on PTSD symptoms. It is also possible that pain is just another marker for overall symptom load or illness burden, and thus it is not surprising that pain predicts outcomes in treatments targeting PTSD and depression in refugees. Alternatively, dysfunctional responses to pain that have built up over months or years (e.g. behavioural restriction, avoidance, self-medication, rumination, catastrophizing) may make it harder for the person to engage in interventions that require confrontations with traumatic reminders, behavioural activation to improve mood, and modification of negative, trauma-related beliefs. If true, adding interventions that are specific to dysfunctional pain responses, or that target transdiagnostic processes like experiential avoidance, to current multimodal interventions for refugees may improve outcomes for PTSD, depression, pain, and overall functioning.

Finally, a secondary aim of this study was to evaluate the relationship between gender, age, the number of treatment sessions and outcome. Gender and the number of treatment sessions did not predict outcome. Older age was associated with slightly worse outcomes as indexed by PTSD, but had no effect on depression or anxiety. It is important to note that previous studies evaluating socio-demographic predictors of treatment outcome in refugees with PTSD have obtained very mixed (including null) findings, and where positive findings exist, the relationship to outcomes is weak (Lambert & Alhassoon, 2015; Stammel et al., 2017; Stenmark et al., 2014). A similar pattern of mixed findings (and weak relationships) for socio-demographic factors and outcomes from trauma-focused monotherapies for PTSD is found in non-refugee populations (Haagen, Smid, Knipscheer, & Kleber, 2015). In contrast to the findings from a recent meta-analysis of trauma-focused therapies for refugees (Lambert & Alhassoon, 2015), Haagen et al. (2015) found that the number of trauma-focused sessions (range from 1 to 47), and not the total number of psychotherapy sessions, predicted treatment outcome. Only data on the total number of sessions across all treatment modalities (trauma-focused psychotherapy, physiotherapy, medical consultations, and social interventions) was available for this study, and we are not able to separate out the effect of individual treatment components (or medication usage) on outcomes.

It is important to note that the average number of treatment sessions received by refugees in the present study (72.8, SD = 44.3; range = 17–208 sessions) far exceeds those in trials of evidence-based, trauma-focused mono-therapies for PTSD. However, multi-disciplinary, multimodal treatment programs for refugees typically target comorbid conditions psychiatric, health complaints, and social integration issues in addition to PTSD. Nevertheless, it may be possible to decrease the length of these multicomponent programs for refugees, and at the same time improve their efficacy. There is a need for studies that can assess the relationship between outcome and the length (dosage) and content/focus of the various components delivered in multimodal treatments for refugees.

4.1. Strengths and limitations

The present study benefits from a large sample size, a long pre-treatment baseline, standardized measures of symptoms and functioning, and a moderately long follow-up period. The treatment program included standard, evidence-based interventions for PTSD, depression, anxiety, and to a lesser extent pain. Nevertheless, the present findings are preliminary in nature and must be viewed in the context of certain methodological limitations. First, the study did not include a control or comparison group, or random assignment to treatment. Predictors were examined in relation to the overall effect of a single treatment program. Second, we lacked sufficient information, or the design necessary, to assess whether the predictors or outcomes were related to particular intervention components or with medication usage. Finally, the participants were tortured and traumatized refugees resettled in Denmark, and the present findings may

not generalize to refugees in other countries, or to other trauma groups.

4.2. Ethical standards

Data are kept in the accordance with Danish law about personal data protection and the study was reported to the Danish Data Protection Agency. The study was approved by the Danish Patient Safety Authority and according to the Danish National Committee on Health Research Ethics, no further ethics approvals was required for this study.

Disclosure statement

No potential conflict of interest was reported by the authors.

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