The Development of Mindful-Based Dance Movement Therapy Intervention for Chronic Pain: A Pilot Study with Chronic Headache Patients

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IMD was responsible for the conception and design of the study, data collection, interventions implementation, data analysis and interpretation, and writing the manuscript. VK were responsible for the conception and design of the study, contributed to the data analysis, interpretation and manuscript development. IM contributed to the interpretation of the data and manuscript development. All authors have approved the final version of the manuscript.

Keywords

dance movement therapy, mindfulness, Chronic Pain, Anxiety, Depression

Abstract

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Chronic pain is of significant global concern. There is growing evidence that body-mind therapies and psychological approaches can contribute towards changing chronic pain perceptions. This is the first model described in the literature that combines a mindfulness-based approach with dance movement therapy, and explores potential psychological and pain-related changes for this client population. In this paper results from the pilot study are presented involving patients with chronic headache recruited in an outpatient rehabilitation setting.

Methods: In this pilot study 29 patients (n=29) with chronic headache were randomized to either an MBDMT group or a waiting list control group (TAU). The MBDMT group was offered ten sessions in a clinical outpatient rehabilitation setting for five weeks. Data were collected pre- and post-intervention and 16 weeks after the intervention finished. The Hospital Anxiety and Depression scale (HADS), Patient Health questionnaire (PHQ-9), Five Facets of Mindfulness questionnaire (FFMQ) and Numeric Pain rating scale (NRS) were used as outcome measures.

Results: The working model of MBDMT identifies nine therapeutic mechanisms (safe therapeutic environment, mindfulness skills, body awareness, relaxation / releasing, distancing and staying with discomfort, meaning making, self-regulation, acceptance and integration, creative process). Per-protocol analysis reveals statistically significant reduction of pain intensity and depression scores in favor of the MBDMT group and these improvements were maintained in follow-up assessment.

Conclusions: Results suggest that MBDMT is a feasible and promising therapy approach for chronic pain patients. The pilot study offered sufficient information and preliminary results in the desirable direction to enable the researchers to move to an RCT stage in order to establish the efficacy of the intervention.

Trial registration: the study was registered in the www.researchregistry.com registry (5483).

Contribution to the field

This paper reports results of the development of Mindful-Based Dance movement therapy (MBDMT) approach for chronic pain patient population. Mindfulness is recognized as important component in dance movement therapy (DMT), but there has not been model which explores and integrates therapeutic mechanisms of both approaches - DMT and mindfulness-based interventions. The paper presents model of the MBDMT and results from pilot study where MBDMT intervention was offered to chronic headache patients recruited in an outpatient rehabilitation setting. In study design grounded theory was used to develop MBDMT model and quantitative strategy of pilot randomized controlled study was used to examine the effectiveness of the model. The preliminary results suggest that MBDMT is effective in reducing pain intensity and depression symptoms in comparison with TAU group. Also, important information was gained regarding recruitment and follow-up processes, intervention acceptability and participant satisfaction, outcome measure acceptability and performance. The pilot study offered sufficient information and preliminary results to enable the researchers to move to an RCT stage.

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The Development of Mindful-Based Dance Movement Therapy Intervention for Chronic Pain: A Pilot Study with Chronic Headache Patients

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Abstract

Chronic pain is of significant global concern. There is growing evidence that body-mind therapies and psychological approaches can contribute towards changing chronic pain perceptions. This is the first model described in the literature that combines a mindfulness-based approach with dance movement therapy, and explores potential psychological and pain-related changes for this client population. In this paper results from the pilot study are presented involving patients with chronic headache recruited in an outpatient rehabilitation setting.

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1 Introduction

Chronic pain affects 20% of the worldwide population (Fayaz et al., 2016; Goldberg & McGee, 2011). 150 million Europeans suffer from moderate to severe chronic pain (Thematic Network on the Societal Impact of Pain, 2018)[1]. This debilitating condition affects persons' physical, emotional and social functioning, being a major source of suffering at the same time as it is a significant economic burden and challenge for health care systems (IASP, 2019)[2]. Since 2019 a significant change has been made in the classification of chronic pain as the World Health Organization has adopted the new edition of ICD-11. ICD-11 will be the first classification to include chronic pain as a health condition in its own right. This new classification differentiates chronic primary pain from chronic secondary pain, with the former referring to pain in one or more anatomical regions that persists or recurs for longer than three months. Furthermore, it recognizes that chronic primary pain is closely linked with significant emotional distress (anxiety, anger/frustration or depressed mood) and it interferes with the activities of daily life and participation in social roles in ways in which cannot be accounted for by another chronic pain condition (ICD-11, 2018)[3]. The new classification system is expected to promote research on the etiology and pathophysiology of these conditions and to improve access to multimodal care for all patients with chronic pain (Treede et al., 2019). Several emotional distress factors are regarded as mediators in the 'chronification' of pain, that is persistent pain with characteristic pain behavior and resistance to therapeutic intervention (Borsook et al., 2018). These factors include pain catastrophizing, anxiety, and fear of pain and helplessness (Keefe et al, 2004). Depression is also seen as a serious risk factor in the development of debilitating pain (Hülsebusch et al., 2016). The psychological characteristics of chronic pain patients can involve abuse and neglect experiences in childhood (Davis et al., 2005), counter-dependency traits and alexithymia (Ak et al., 2004), with depression working as a mediator between chronic pain and alexithymia (Saariaho et al., 2013). These psycho-emotional characteristics of chronic pain patients make this patient population quite a heterogenous group. The large-scale cross-sectional study of chronic pain patients identified four subgroups. They differ in aspects of pain intensity, duration and spreading, psychological strain and social distress including lack of social support. Research confirms that all three components – bio-psycho-social – are important in chronic pain, but different constellations of these components form subgroups with different needs in pain treatment and indicate the need to design "tailor-made" interventions (Bäckryd et al., 2018).

Epidemiology studies show that the prevalence of pain is higher in women: chronic primary headache, in particular, affects more women than men (Jiménez-Sánchez et al., 2012; Allais et al., 2020). Middle-age (40-59) has been reported as high-risk: people in this group appear to be less satisfied with their social life and are more often diagnosed with fibromyalgia. The older adult group reported higher life quality scores, higher levels of satisfaction with marital and social life, and better mood, but they face more comorbidities and longer periods of pain (Rustøen at al., 2005). Seniors also report lower levels of pain severity and pain interference and greater levels of perceived control over pain in comparison to younger people suffering from headaches (Lachapelle & Hadjistavropoulos, 2005).

[1] Thematic Network on the Societal Impact of Pain, 2018: https://ec.europa.eu/health/sites/health/files/policies/docs/ev_20181112_co07_en.pdf
[2] IASP, 2019: https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=8340&navItemNumber=643
[3] ICD-11, 2018: https://icd.who.int/browse11/l-m/en

Treatment strategies which are regarded as clinically effective, and cost-efficient, tend to be multidisciplinary and are based on the biopsychosocial model of pain (Gatchel et al., 2007), acknowledging psychological risk factors (Nicholas et al, 2011) and offering holistic approaches to multimodal pain management (Kress et al., 2015). The biopsychosocial model of pain recognizes that pain has three facets: cognitive-evaluative, sensory-discriminative, and affective-motivational aspects (Melzack, 1999). All of these need to be included in a treatment package. From a wide range of psychological therapies, Cognitive Behavioral therapy (CBT) and Acceptance and Commitment Therapy (ACT) present the strongest evidence for decreasing depression, pain-related anxiety and catastrophizing, and for increasing self-efficacy (Williams et al., 2012; Veehof et al., 2016). Also, studies on Mindfulness-Based Stress Reduction programme (MBSR) report decreasing pain intensity and disability (Cramer et al., 2012). MBSR was a programme created and introduced by John Kabat-Zinn, who defines mindfulness as: "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment to moment" (Kabat-Zinn, 2003, p.145). Mindfulness allows patients to relate to their physical and psychological symptoms in a different, more skillful way, with a positive effect on developing a realistic sense of control and appropriate strategies in becoming adaptive (Grossman et al., 2010; Kabat-Zinn et al., 1986). Other Mindfulness-Based Interventions (MBI) show positive impact on perceived pain control, pain acceptance and quality of life (Bawa et al., 2015). In MBIs the indirect effect on pain is due to an increased acceptance; this buffers the intensity of perceived pain as a stressful event (Shapiro et al., 2006). Analysis of the content of MBIs reveal meditation practice, exercises that support the change of habits, simple yoga exercises and psychoeducation as some of the main structural components of the intervention (Majore-Dūšele et al., 2018). Furthermore, monitoring attention and acceptance are the central mechanisms in mindfulness training programmes; these interact to improve stress, affect, and health outcomes (Lindsay & Creswell, 2017).

However, these interventions are limited in their capacity to approach the person as a whole, prioritizing often the cognitive domain as the route through which change may occur. They require considerable cognitive and linguistic skills from the client/patient and acknowledgment of psychological difficulties and mental health concerns in their physical symptoms. As chronic pain patients experience the physical nature of their symptoms, and may perceive their mental health concerns as stigma, they may refuse cognitive-based interventions (Payne & Brooks, 2018). With chronic pain being situated in the body, there is a danger that cognitive-based interventions are missing the opportunity to validate the physical suffering and work with the body in order to find therapeutic solutions. They also make limited use of the connection between the body and the mind as a means through which change may occur, ignoring the role movement can play as a holistic, creative, and thus therapeutic, tool. For a body-based condition such as chronic pain, there may be value in the development of a body-mind intervention with a holistic/creative character. Dance Movement Therapy (DMT) is one such intervention.

DMT is defined as "the therapeutic use of movement to further the emotional, cognitive, physical, spiritual and social integration of the individual. Somatic awareness and kinesthetic empathy, movement as creative self-expression and dance as non-verbal interaction, are the core components of DMT (European Association of Dance Movement Therapy 2013, p.1)[4].

[4] European Association of Dance Movement Therapy, 2013: https://www.eadmt.com/?action=article&id=22

There is growing evidence that Dance Movement Therapy (DMT), a creative body-mind form of psychotherapy, may have a positive psychological impact on the psychological states of patients with somatic concerns. Dance and movement, being key elements in the therapeutic alliance between patient and therapist, can provide the means for the self-expression and communication of unspoken concerns amongst this client population. The latest meta-analyses show that DMT is helpful in health-related psychological outcomes, improving wellbeing, mood, affect, quality of life, body image and interpersonal competence, and reducing clinical symptoms such as anxiety and depression for different patient groups (Koch et al., 2014; Koch et al., 2019; Meekums et al., 2015; Karkou et al., 2019). DMT has shown promising improvements in functioning for fibromyalgia patients (Bojner-Horwitz et al., 2003) and patients with medically unexplained symptoms (Payne & Brooks, 2020; Payne & Brooks, 2017; Payne & Brooks, 2016). However, until now, there has been limited research on the effectiveness of DMT with patients suffering chronic pain. One of the few studies with this client population comes from Shim (2015; Shim, et al., 2017) who found that the ten-week DMT process increased resilience, decreased 'kinesiophobia' (i.e. fear of movement) and showed a beneficial impact on pain intensity.

Regardless of the type of psychological therapy, there are arguments that the mechanisms of change in each therapeutic intervention need to be considered specifically for each client population (Kazdin, 2009; Burns, 2016). In pain treatment *mindfulness, acceptance* and *self-efficacy* are recognized mechanisms in pain regulation (Turner et al., 2016). In DMT work with chronic pain patients, increasing *self-compassion* has been set as a main principle of the work, which is facilitated through alternating between states of acceptance and inspiration (Erber, 2015). The BodyMind Approach® (TBMA) (an approach that has derived from DMT) has identified five key factors as responsible for successful self-management of patients with medically unexplained symptoms. These are: body with mind connections, importance of the facilitator, positive benefits, preparedness for change, self-acceptance and compassion (Payne & Brooks, 2020). The DMT model for building resilience in pain patients by Shim et al, (2017) recognizes the mechanisms of *activating self-efficacy, connecting to self, connecting to others, enhancing emotional intelligence,* and *reframing* as important. In earlier models of DMT for chronic pain patients (Shim, 2015), four therapeutic factors were identified: *kinesthetic awareness* (articulation, noticing, widening), *enactment* (mobilization & motivation, kinesthetic imagining, reinforcement & reframing), *expressivity* (externalizing & symbolization, emotional restoration and management, creativity & ability to play), and *making connections* (mind-body integration, meaning-making & identity reconstruction, interpersonal connection).

Despite the discussion in DMT literature that mindfulness is an important component of DMT (Koch et al., 2019), there has been no prior study that integrates these two approaches and explores potential psychological and pain-related changes for this client population. In this paper the development of the working model of the Mindful-Based DMT (MBDMT) is presented, along with results from the pilot study that has been completed, before conducting a large RCT that will examine the efficacy of MBDMT for chronic pain patient population.

The objectives of the pilot study were to: (1) establish recruitment and follow-up processes; (2) explore initial outcome results of MBDMT intervention; (3) examine intervention acceptability, participant adherence and (4) test adherence to the MBDMT protocol. This current paper will present and discuss how these objectives were met.

2 Methods

2.1. Recruitment procedure and participants

The present study recruited patients with chronic headache (tension-type headache and/or migraine with or without aura, diagnosed by neurologist). Patients with chronic headache were prioritized in this study because of easy access to this population in the first instance. Inclusion and exclusion criteria were established prior to the commencement of the study. Inclusion criteria for the study were: (1) primary headache lasting more than three months (headaches needed to be the primary cause for seeking medical help); (2) being between 20 and 55 years old; (3) increased depression and/or anxiety measures (PHQ-9 > 5; HADS > 7). Exclusion criteria were: (1) patients who had a disease based on an infectious process, autoimmune or metabolic pathology, traumatic injury, neoplastic process (primary tumor or metastasis) or internal organ pathology which can be connected with pain; (2) movement limitations not related to the diagnosis of chronic pain (eg cerebral palsy, spinal injuries, etc.); (3) pregnancy.

The recruitment strategy involved: (i) the neurologists of the rehabilitation setting who were informed at their quarterly meeting about the aims and structure of the intervention, and the inclusion and exclusion criteria of the pilot study; (ii) participation in the research and DMT groups was advertised through social media in a closed group of the headache patient's association. Interested participants allowed their neurologist to send contact information to the principal investigator (first author of this paper). Alternatively, they were given the option to contact the principle investigator themselves through email or SMS. The principal investigator made an initial phone call to each interested individual to inform them about the study, to answer any questions, and to gain verbal consent for participation in the study. Potential participants were informed about randomization, and were also informed that members of the control group could participate in the DMT group after the intervention group process was complete. Following this, all participants were sent by email written information about the study, the consent form and all measures for the baseline assessment. The recruitment process and all aspects of the study gained ethical approval by the Ethics Committee of Riga Stradins University (02/28/2019 Nr,6-3/2/43).

Over the ten weeks of the recruitment period (Aug-Nov 2019), 39 women (n=39) expressed interest in participating in the study; 19 were recommended for participation by their neurologists, while the other 20 were recruited through the headache patient's association. Although no prevalence or restrictions were identified in inclusion criteria regarding sex, only female participants came forward to participate in the study. After the baseline assessment, 29 patients (n=29) were eligible for inclusion. These patients were randomly assigned to the MBDMT intervention or the waiting list control group using the random number generator that produced two sets of 15 unique numbers from 1-30.

All participants in the study received treatment as usual (TAU), continuing in their rehabilitation outpatient setting. TAU for chronic headache patients was pharmacological treatment ordered by a neurologist along with physical and/or physiotherapy input (Table 1).

Figure 1 Recruitment flow diagram (insert here)

2.2. Outcome measures

Assessments were performed at baseline (T1), post treatment (T2; 2 months after baseline) and four months post-intervention (T3; 4-month follow-up).

Demographic information was collected through a self-completed questionnaire created by the researcher, which gathered information about the gender, age and pain characteristics - pain duration, pain etiology, and types of pain control strategies.

A numeric rating scale (NRS) was used as a scale for pain intensity measurement. This is an 11-point scale where the end points are the extremes of no pain (0) and worst possible pain (10). The NRS can be graphically or verbally presented, and can be self-assessed. This method of assessing pain is widely recommended as a core outcome measure in clinical trials of chronic pain treatment (Dworkin, et al., 2005; Farrar, et al., 2001).

The Hospital anxiety and depression scale (HADS; Zigmond & Snaith, 1983) evaluates the severity of anxiety and depression symptoms in non-psychiatric inpatients. It is composed of seven items that assess anxiety symptoms and seven for depression symptoms. Each item contains a scale of four points (from 0 to 3) with total scores ranging from 0 to 21 for anxiety and depression in three categorical levels: normal (0–7); borderline abnormal (8–10); abnormal (11–21). Higher scores mean greater severity. Psychometric properties for the Latvian version showed a good internal consistency (Cronbach's alpha 0.892) (Šmite & Ancāne, 2010). In the present study, the internal consistency at T1 was Cronbach's α = .82 for depression scale and α = .80 for anxiety scale; at T2 α = .79 and α = .82; at T3 α = .74 and α = .73.

The 9-items Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002) is a self-administered dual-purpose instrument that can establish provisional depressive disorder diagnoses as well as grade depressive symptom severity. Each of the nine items is scored 0 to 3, providing a severity score ranging from 0 to 27. Severity of depression was assessed by the PHQ-9 depression severity score and graded as none/minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27). In the present study, the internal consistency of T1 data was Cronbach's α =.79; T2 α =.74; T3 α =.70

The Five facets of mindfulness questionnaire (FFMQ; Baer et al., 2006) is composed of 39 items. Each item is rated on a 5-point Likert scale (1 = "never or very rarely true"; 5 = "very often or always true"). Five scales: "Observing" is the ability to notice or attend to internal and external experiences such as sensations, thoughts, or emotions. "Describing" means to label internal experiences with words. "Acting with awareness" refers to focusing on one's activities in the moment as opposed to behaving mechanically. "Non-judging of inner experience" means taking a non-evaluative stance toward thoughts and feelings and "non-reactivity to inner experience" refers to allowing thoughts and feelings to come and go, without getting caught up in or carried away by them. Higher scores on the FFMQ reflect greater mindfulness skills. The Latvian version of this scale has shown good reliability and internal consistency (Cronbach's alpha 0.9; Majors, 2013). In the present study, the internal consistency of T1 data was Cronbach's α =.89; T2 α =.86; T3 α =.91.

Intervention

The Mindful-Based Dance Movement Therapy (MBDMT) intervention model used in this study was grounded on the contribution of five expert informants. It involved nine therapeutic mechanisms/components of change, which were structured in a developmental process with each component supporting the next one.

1. *Safe therapeutic environment*. This is a common factor in any counselling or psychotherapy process. Its main characteristics are warm relationships built on empathy, support, validation and the acceptance of the patient as he/she is – emotionally, physically, and cognitively. These are also

known as the person-centered facilitative conditions (Lambert & Barley, 2001). The therapeutic environment is a safe holding space for the other factors in the therapy process.
2. *Mindfulness skills*. The patient will be supported to focus and regulate their attention to different realms of perception: their own sensations, emotions, thoughts and images, and to cultivate kindness, compassion and a non-judgemental attitude towards their self. The development of mindfulness skills will serve as gateway into the creative process.
3. *Body awareness*. The patient will pay attention toward their body sensations, not reacting negatively or emotionally but with an explorative interest. Attention toward interaction between sensation, emotions and thoughts, experience of body-mind connectivity.
4. *Relaxation / releasing.* Through creative activities, verbalization and sharing, the patient will express themselves safely and release physical tension. This will open them up for new experiences and perceptions of themselves and others.
5. *Distancing and staying with discomfort.* Instead of persisting with fear and avoidance reactions, the patient will use creative tools (props) and aesthetic distance to focus on pain. This will help them to explore their relationship with their symptoms, and to build tolerance and the ability to manage their discomfort.
6. *Meaning making.* The patient will be invited to respond to the question: 'Why is this happening to me?' In-depth exploration of symptoms in the context of one's personal life and possible insights into the cause-effect relationship of symptom development.
7. *Self-regulation.* The patient will practice self-management, recognizing and releasing physical tension and dealing with any emotionally intense feelings which may arise.
8. *Acceptance and integration.* As a result of the therapeutic process, the patient may gain a deeper understanding of themselves, as well as an acceptance of their physical and emotional state.
9. The *Creative process* permeates all of the above factors in the model, as they are delivered through creative activities. Imagery, symbolism and movement metaphors are core aspects of dance movement therapy.

The therapy model described above shows that MBDMT is a purposefully organized therapeutic process where, through the use of creative activities, the development of mindfulness skills, and an exploration of bidirectional processes, the relationship between body and mind is explored and self-management and self-regulation skills are learned (Majore-Dūšele et al., 2019).

Figure 2 Mindful-Based Dance Movement therapy intervention model (insert here)

The protocol of the MBDMT intervention is organized as a short-term focused therapeutic process taking into the account the short-term organization structure of rehabilitation settings in Latvia. It includes ten sessions, twice a week, for a five-week period. Each session lasts 90 minutes and follows a similar structure: (1) check-in and physical warm-up; (2) body-scan (sitting, lying, standing, or walking); (3) work with themes – safety, pleasure, personal borders, body-mind connection, relationship with pain, resources; (4) closure and homework.

Two therapeutic groups took place, with seven/eight participants in each group. Three participants were lost early in the process, leaving a group of twelve (n=12) from whom the data was derived. The groups were facilitated by a dance movement therapist in training (3rd year professional Masters student in arts therapies with specialization in dance movement). The facilitator had been licensed as a psychotherapist prior to training as a dance movement therapist, had more than five years practice working with mental health issues and adult groups, had previous mindfulness practice training (8 weeks programme), received training in delivering the MBDMT intervention (24 hrs) and had

supervision during the intervention period by a qualified supervisor. MBDMT intervention training included personal experience with the MBDMT model and facilitating skills training.

2.3. Analysis

Data were analyzed using the Statistical Package for Social Science – Version 23 (SPSS-23, IBM SPSS Statistics for Macintosh, Version 23.0. Armonk, NY, United States: IBM Corp.). Descriptive statistics were used to present the characteristics of the sample. The Kolmogorov-Smirnov test indicated that the distribution departed from normality and the small sample size limited the power of statistical analysis, so the Mann-Whitney *U* test was used to analyze baseline group differences of the interval data (ie socio-demographic and clinical characteristics), while the Pearson Chi-Square test or Fisher's Exact Test was used for categorical variables (localization and duration of pain and pain control strategies). The Mann-Whitney *U* test was also used to conduct a between-group comparison of the change in scores from baseline (T1) to the post treatment (T2) and follow up (T3) for all the outcome measures with $p < 0.05$ being the accepted level of statistical significance. Although medians (interquartile range) were used for the calculation of averages, also means and standard deviations were presented. Taking into account the small sample size of this pilot study, the statistical analysis was performed Per Protocol (PP) instead of performing Intention To Treat (ITT) analysis. PP included patients who completed the intervention according to the protocol only along with data collected from the control group. In all cases, missing data were not included in the calculation.

The Reliable Change Index (RCI; Jacobson & Truax, 1991) was calculated for PHQ-9, HADS and pain measures to assess the impact of the intervention at the individual level. RCI was used as an indicator of clinical significance of change because it allowed a determination of whether an individual change score (between pre-intervention and post-intervention assessment) was significantly greater than a difference that could have occurred due to random measurement error alone (Guhn et al., 2014). Cut-off points dividing clinical and non-clinical patient groups were ≥10 for PHQ-9 and ≥8 for HADS as the most frequently recommended ones in the literature (Manea et al., 2012; Hansson et al., 2009; Bjelland et al., 2002). Participants whose PHQ-9 and HADS scores were below the cut-off point at the pre-treatment measurement (T1) were excluded from the RCI calculation. RCI were calculated at 95% confidence. If a participant's RCI was below –1.96 and passed the cut-off point, the participant was classified as *recovered*. If the RCI was below –1.96 but did not passed the cut-off point, the participant was classified as *improved*. If the participant's RCI was between –1.96 and 1.96, the participant was classified as *unchanged*. If the participant's RCI was above 1.96, the participant was classified as *deteriorated*. For pain measures the RCI were calculated based on the minimal clinically important difference being 2-points on a 10-point rating scale as reported in previous studies (Hägg et al., 2003).

Power calculation was performed for the primary outcome measure – depression (PHQ-9), to detect the adequate sample size for future RCT.

3 Results

3.1. Recruitment and follow-up feasibility

During the 2.5-month enrollment period, 39 women expressed an interest in participating in the study and 29 met the eligibility criteria. Both recruitment strategies (i) by the neurologists and (ii) by headache patients' association were similarly effective, attracting 50% and 50% of study participants. As the study flow diagram shows (see Figure 1), post-treatment measures used immediately after the

intervention were completed by all the members of the control group and all those from the intervention group who attended for the whole duration of the programme. Three participants who did not complete therapy discontinued early in the study. Follow-up measures were completed by 100% of the intervention group completers and 71% (10/14) of the control group.

Sample characteristics

All the participants in the study were female and between 26 and 55 years of age (M = 36.7, SD=7.4). 56.7% of the patients had suffered from pain (headache, migraine) for more than ten years. 60% of the patients suffered from other types of pain in addition to headache and migraine. The participants in the intervention and control group were compared by demographic characteristics in order to establish whether there were differences between them at baseline. The participants in the intervention group were older (M = 40.9, SD= 6.9) than participants in the control group (M = 32.6, SD= 5.0). There were no differences between the two groups in the duration of pain experience and variabilities of pain type or pain control strategies (Table 1).

Table 1: Baseline participant demographic and clinical characteristics in intervention and control groups (insert here).

3.2. Treatment outcome results: changes in intervention group versus control group

Table 2 Means, standard deviation, medians of clinical outcome measures; between group comparison of the pre/post and pre/follow up change scores (per-protocol analysis) (insert here).

The means, standard deviation and medians of the outcome measures, as well as between group comparison of the baseline/post (T1/T2) and baseline/follow up (T1/T3) change scores are presented in Table 2 at three measurement points. Results indicate that, at baseline (T1), there were no statistically significant differences between groups in the measurements of pain, PHQ-9, HADS or FFMQ. For each of the scales with clinical cut-offs the selected population baseline mean was above the clinical cut-offs, PHQ-9 (M= 8.1, SD=4.3), HADS-A (M=9.8, SD= 4.1), HADS-D (M= 5.34, 3.8) respectively, indicating mild to moderate symptoms of anxiety and depression for both groups.

A Mann-Whitney *U* test was conducted to look for statistically significant differences in the reduction of pain, depression and anxiety scores across treatment conditions. The test identifies a significant difference in the change score (T1/T2) of perceived pain between the MBDMT group (Mdn = - 1) and control group (Mdn = .00), *U*= 128.5, *p* = .02. The change remained statistically significant in T1/T3 between the intervention group (Mdn = -1.5) and the control group (Mdn = .00), *U*= 81.5, *p* = .04.

The reduction of PHQ-9 scores indicates that there were changes in symptoms for the intervention group (Mdn = -2) which was different from the control group in a statistically significant way (Mdn = -1), *U* = 40.5, *p* = .02. in T1/T2 comparison. The difference was not statistically significant when T1/T3 was calculated, *U* = 35.5, *p* =.18.

On HADS measures the change score for anxiety and depression was greater than for the control group in both post intervention time points with reduced scores post intervention for the MBDMT intervention group, but this change did not reach statistical significance (HADS-A, T1/T2: Mdn = -2 vs Mdn =.00, *U* = 121.00, *p* = .06; T1/T3: Mdn = - 4 vs Mdn= -1, *U* = 78.5, *p* = .08; HADS-D,

T1/T2: Mdn = -1.5 vs Mdn = .00, $U = 118.5$, $p = .07$; T1/T3: Mdn = -1 vs Mdn= .00, $U = 76.5$, $p = .11$).

No significant differences between groups was found for Five Facets of Mindfulness scores as indicated in Table 2.

Table 3 Reliable change of intervention group using 95% CI for outcome measures pre-intervention to follow-up (insert here)

With reference to Table 3, 50% (6/12) of the intervention group participants experienced a reliable change in pain reduction of at least 2-points. For the other 50% their pain level stayed unchanged. For 92% (11/12) of participants, their anxiety level reached the clinical cut-off point at baseline for HADS-A, but follow up measures demonstrated reliable improvement for 73% (8/11) of the participants. 28% (3/11) of the participants' anxiety levels changed from clinical to non-clinical population valuables. Only four participants' depression levels reached clinical cut-off points at baseline by both measures PHQ-9 and HADS-D, but at follow up three of these patients (75%) demonstrated a reliable improvement with regard to depression, changing from the clinical to the non-clinical population. One patient, from the intervention group included in RCI calculations, demonstrated a significant increase in anxiety.

As this pilot study demonstrated statistically significant decrease in depression, the PHQ-9 measure of depression was used as a primary outcome of the intervention. Based upon the follow up data, using the means and standard deviation, sample size calculation for a larger RCT was performed. Calculation for continuous outcome superiority trial with 80% power at an alpha level of .05 suggestes that a total sample of 86 participants was needed to detect clinically important difference between means. To allow for attrition between end of trial and follow-up, the aim was to recruit 120 patients for an RCT.

3.3. Intervention acceptability, participant adherence and satisfaction

Of the 15 patients who began to participate in the MBDMT group, twelve completed the therapy course and attended at least eight sessions. The three participants who did not complete the treatment discontinued early in the study: one moved to a new residence, and two concluded after the first session that the intervention was not appropriate for them. Four patients completed all ten sessions, three patients nine sessions and five completed eight sessions.

3.4. Adherence relative to MBDMT protocol

Adherence to the treatment protocol from the dance movement therapist in training was evaluated through a selection of video recordings from the sessions, looking at different stages of the work (warm-up, working and closing stage). This was also discussed during regular supervision sessions. Substantial diversion from the protocol was not observed. The nine working mechanisms that informed the structure of the intervention were found to be logical and supportive of the development of the group therapy process. There was, however, some difficulty in the timing of the sessions: the therapist in training found that more time was needed at the beginning and end of the sessions to allow for the participants' verbal discussion.

On the whole, the treatment protocol was easy to follow and responsive to group dynamics offering alternative choices of techniques.

4 Discussion

This pilot study suggested that MBDMT was a useful intervention for reducing the pain, depression and anxiety symptoms of chronic pain patients participating in the study. Results indicate that offering a DMT group intervention in addition to the usual medical treatment of chronic pain improved the psychological aspects and reduced pain more than just medical treatment and physiotherapy. Viewing the results of the present study within the context of other DMT and mindfulness-based intervention studies, the study offers an interesting addition to the literature, especially with regards to pain reduction. Results from systematic reviews show that MBIs are inconsistent in terms of their effect on pain reduction. Results vary from medium to weak effectiveness, but do reveal a positive impact on perceived pain control with a moderate effect size (g = 0.58) (Cramer et al., 2012; Bawa et al., 2015). Note: the goal of MBIs is not to reduce the intensity of the pain but to improve the patient's functioning and reduce their general distress; being mindful has a therapeutic value in its own right (Reiner et al., 2013).

Results from this MBDMT study, however, do suggest a statistically significant reduction in pain intensity, in contrast with the mindfulness measure where no significant change was observed. While pain reduction is not the primary goal of the MBDMT intervention, the pain experience of the patient is validated and the relationship with pain is addressed in the work phase of the therapeutic process. For 50% of MBDMT participants pain reduction was at least two points on the NRS scale; this is considered to be a reliable and clinically important change (Farrar et al., 2001). These results are consistent with the earlier research in DMT for chronic pain patients, in which the theme of working with the meaning of pain was part of the therapeutic process, and the reduction in pain intensity was observed (Shim et al., 2017).

The MBDMT intervention preliminary results also suggest that reduction in depression and anxiety symptoms is possible at least for the small sample of participants with chronic pain involved in this study. Individual analysis of reliable change for the intervention group indicated reliable improvement in anxiety symptoms for 73% of patients. For those four patients with moderate and severe depression, improvement was clinically significant, allowing them to move to a non-clinical population. These results are consistent with previous research with a similar patient group with medically unexplained symptoms, including medically unexplained pain, where 65% of participants involved in a (TBMA) group demonstrated reliable improvement on depression or anxiety measures (Payne & Brooks, 2017; Payne et al., 2017). These results can also support results from a large-scale clinical trial on DMT and depression (Hyvönen et al., 2020) and meta-analyses on DMT for depression (Meekums et al., 2015; Karkou et al., 2019) Also, potentially they add to results from generic meta-analyses on DMT (Koch et al, 2019). The latter study argues that DMT can improve psychological conditions by decreasing depression and anxiety levels for patients with somatic concerns. Results from the current study suggest that this was also true for the participants of the MBDMT group.

Findings from this current study may be biased, due to the small sample size and the possibility of a type II error (low power to detect true effects). However, it is important to mention that the follow-up measurement (T3) took place two weeks after the beginning of the Covid-19 pandemic in Latvia (March 2020), and that an overall atmosphere of fear and uncertainty may have influenced the participants' psycho-emotional state. This, in turn, may have been reflected in the results of the follow-up anxiety, depression and also pain measures. Also, it is important to acknowledge that 60% of the study participants had comorbid pain states, which may also have influenced the study results. The comorbidity of other pain and mental states (depression and anxiety) are characteristic of women

with migraine diagnosis and has been reported in previous chronic pain studies (Allais et al., 2020; Xu et al., 2020), suggesting that mechanism of central sensitization may be a substrate or consequence of comorbidity (Ashina et al., 2018).

Patients found the experience of being in the MBDMT group to be useful. This was reflected in the acceptability of the intervention by the participants, which was evaluated as good; 80% of the participants assigned to the treatment group stayed in the process and attended at least eight out of ten therapy sessions. The literature suggests that other body-based interventions also show high completion rates. TBMA, for example, reported a completion rate of 95 percent (Payne & Brooks, 2017), and the resilience-building DMT approach for chronic pain patients was evaluated as helpful and supporting of a body-mind orientated approach by 68% of participants (Shim et al., 2017).

Still, in the current study, since two patients did not find the intervention appropriate for them and dropped out of the intervention group after the first therapy session, an assessment of the intervention's suitability is needed. Although statistical tests showed no significant difference in baseline measures between those dropping out and those completing the intervention, HADS anxiety scores indicate that there were some differences worthy of further analysis. The mean score of anxiety (9.95) for the group completing the intervention can be seen as borderline with the mean score of the dropout group (14.00) being a clear outlier. It is possible that the patients with the high anxiety scores perceived the creative group intervention of MBDMT as too unusual, and involvement in the therapeutic group as emotionally overwhelming. In a clinical context, an individual dance movement therapy approach could have been more suitable for these patients.

The evaluation of *acceptability of outcome measures* indicated that in comparison with HADS, PHQ-9 could show a higher sensitivity in assessing symptoms of depression for this patient group. The construction of the HADS relies on anhedonia, not on somatic symptoms, and it is sensitive to mild distress as it excludes symptoms of severe mental illness. PHQ-9 is constructed as a diagnostic tool for clinical depression and strongly correlates with mental and physical health difficulties (e.g. self-reported disability days and clinical visits) (Anderson et al., 2011) making it an appropriate tool for use within this study. Furthermore, PHQ-9 was evaluated by patients with unexplained medical conditions as a more appropriate measurement tool than CORE or HADS in a TBMA pilot study (Payne, personal communication, December 2020). Finally, chronic pain patients are often more interested in the physical representation of their difficulties than the emotional aspects. It therefore, appeared that PHQ-9 was a more suitable measure of depression for this study, as it captured changes in the somatic aspects of psycho-emotional distress.

Similary, the General Anxiety Disorder (GAD-7) scale was considered a good tool to assess the anxiety level for the chronic pain patient group. GAD-7 has good psychometric properties and is sensitive as a clinical outcome measure (National IAPT Programme Team, 2011). Both GAD-7 and PHQ-9 were also used as measurement tools for depression and anxiety in previous research with a similar population in The BodyMind Approach (Payne & Brooks, 2017; Payne & Brooks, 2016). It was therefore decided to use this tool along with PHQ-9 instead of HADS for the larger scale clinical trial following the pilot.

Somatic sensitivity may also be relevant to the mindfulness measure. In the present study the FFMQ was used to assess changes in mindfulness aspects. The FFMQ evaluates the components of dispositional mindfulness, i.e. the tendency to express mindful attitudes and behaviors in everyday life (observing experience, using language to describe experience, acting with awareness, being non-

reactive, and being non-judgmental). However, the FFMQ does not distinguish between attention directed to exteroception, interoception or thoughts (Hanley et al., 2017). Since body awareness is one of the basic components of the MBDMT intervention, a measurement that detects aspects of interoceptive body awareness may be more appropriate in future studies. The Multidimensional Assessment of Interoceptive Awareness (MAIA, Mehling et al., 2012) is one such example: it allows an assessment of awareness of the body's physiological condition alongside the evaluative interpretations arising in tandem with that awareness (Mehling, 2016). Mehling (2012) also states that the MAIA can be helpful in researching mind-body interventions, where the multidimensional assessment of body awareness can be used to understand which aspects of body awareness contribute to improvements in clinical outcomes. MAIA has been used as a body awareness assessment tool in previous research on use of DMT for chronic pain patients (Shim, 2015).

Mindfulness scores did not show statistically significant changes after the five-week-long MBDMT intervention. The most commonly used structure in MBI research is eight weeks, with a group session once a week and an emphasis on regular practice at home (Bawa et al., 2015). The present length of the MBDMT intervention may not be enough to develop sustainable mindfulness skills. The 'dosage' of this DMT intervention might have been insufficient to create quantitatively observable changes in mindfulness outcome measures. Another possible interpretation is that the working mechanisms of the MBDMT model were more closely connected with active therapeutic factors in DMT than with mindfulness interventions. To research this hypothesis future studies should involve qualitative and quantitative analysis of therapeutic mechanisms. Future research may also attempt to answer questions present in the DMT literature (Koch et al., 2019): what do DMT and mindfulness-based interventions have in common? Additional mindfulness principles that have been incorporated in DMT through the practice of authentic movement such as the concept of bodymindfulness (Payne & Brooks, 2019) or "bodyfulness" (Caldwell, 2014) can be further considered in future research studies.

At the time of writing, this is the first pilot clinical trial to explore a mindfulness-based model in DMT for the specific patient group. There are several publications available at the time of writing this paper: a published case analysis, in which the principles of mindfulness are used within the context of somatic psychotherapy and DMT as a pathway towards embodiment (Tantia, 2013); a research study, showing mindfulness skill training as one of the guiding principles of therapeutic intervention for patients with depression (Pylvänäinen et al., 2015); and therapy models that offer the perspective of mindfulness meditations, mindful movement practices, e.g. tai chi and yoga as an important aspect of the DMT intervention (Olmedo, 2020; Sanchez, 2012; Barton, 2011). The BodyMind Approach (TBMA)® created by Helen Payne (2009a,b) is an integrative approach underpinned by principles of experiential learning cycles, dance movement psychotherapy and mindfulness research, created and researched for patients with medically unexplained symptoms (Payne et al., 2020). However, the MBDMT is the first model in DMT to be adapted for chronic pain patients which employs aspects from other models in a unique way. The model uses mindfulness as an integral part of the therapeutic process, in which the methodology of mindfulness practice and the understanding of the working mechanisms are integrated within the creative process of DMT. The MBDMT model adopts a bi-directional body-mind approach, in which awareness of the body is used as a physical portal to consciousness (Eddy, 2016), and awareness of the mind is seen as a metacognitive state - ability to observe, explore and gain the understanding of the processes and relationships between mind and body, with both aspects (ie body awareness and meta-cognitive aspects) of mindfulness being equally important (Majore-Dusele & Karkou, 2018). In comparison with other mindfulness-based interventions, the advantage of the MBDMT is that mindfulness is put

into action through creative activity, and creative methods enable the participant to fully experience and to be able to observe the experience at the same time.

Limitations and future research directions

The first limitation of the study is the small sample size (n=29) that reduces the generalizability and statistical power of calculations, and questions the reliability of the quantitative findings. Qualitative data were used to complement the findings coming from quantitative data and to strengthen the conclusions regarding the study's feasibility and the impact of the intervention on specific self-reported measures completed by the participants. The use of self-reported scales is another limitation of this study. One of the clinical characteristics of the chronic pain patients includes alexithymia – a decreased ability to identify and describe emotional states and differentiate them from bodily sensations. This questions the participants' ability to evaluate their own psycho-emotional states properly. Although the validity and reliability of the self-report scales used were high, in future research both subjective and objective measures should be incorporated to increase the validity of the research findings. Another limitation is the fact that there were only female participants in the study, questioning the external validity of the study and suggesting a potential selection bias. Also, the length of the intervention (10 sessions), and the fact, that the therapeutic process was directed by a dance movement therapist in training, should be considered as possible limitations of the study and as factors with capacity to influence the results of the study.

In contrast, the strength of the study is based on the use of randomization and the presence of homogeneity of the study's sample. Further strengths can be assigned to the careful development of the intervention integrating the two practices.

Conclusions

The MBDMT is a feasible and promising intervention for chronic pain patients. The participants in the MBDMT group reported a significant decrease in pain intensity in comparison with the TAU control group in both post-intervention measures. A decrease in depression symptoms was significant in post-intervention measurement. Anxiety also changed in the expected direction for the MBDMT group. Although results did not reach statistical significance, there was reliable improvement for 73 per cent of the patients attending the intervention group. Scores on mindfulness measures changed in the expected direction for the MBDMT group, but did not reach statistical significance when compared with scores from the control group on the same measures.

Still, it was concluded that the pilot study offered sufficient information and preliminary results to enable the researchers to move to an RCT stage. It is expected that a larger sample, the inclusion of an active control, the replication of the group to more than one site delivered by more than one therapist, and the inclusion of additional somatic outcome measures, will strengthen this pilot study enabling generalizable findings on the effectiveness of this approach to people with chronic pain.

5 Ethics statement

This study gained approval by the Ethics Committee of Riga Stradins University with written informed consent from all subjects. All subjects gave written informed consent in accordance with the Declaration of Helsinki.

6 Author contributions

IMD was responsible for the conception and design of the study, data collection, interventions implementation, data analysis and interpretation, and writing the manuscript. VK were responsible for the conception and design of the study, contributed to the data analysis, interpretation and manuscript development. IM contributed to the interpretation of the data and manuscript development. All authors have approved the final version of the manuscript.

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9 Footnotes

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2. International Association for the Study of Pain, 2019: https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=8340&navItemNumber=643
3. ICD -11, 2018: https://icd.who.int/browse11/l-m/en
4. European Association of Dance Movement Therapy, EADMT Ethical Code, 2010: https://www.eadmt.com/?action=article&id=22

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Table 1 Baseline participant demographic and clinical characteristics in intervention and control groups

Characteristics	**Intervention group**	**Control group**	*p*
	(n=15)	**(n=14)**	
Age M (SD)	40,9 (6,97)	32,2 (4,98)	.001[a]
Localization of pain	**N (%)**	**N (%)**	
Headache, migraine	15(100)	14(100)	
Lower back pain	8(53.3)	5(35.7)	.340[b]
Musculoskeletal	7(46.7)	2(14.3)	.109[c]
Fibromyalgia	2(13.3)	1(6.7)	1.0[c]
Duration of pain			.431[c]
until 1 year	1(6.7)	2(14.3)	
1-3 years	2(13.3)	0(0)	
3-5 years	0(0)	1(7.1)	
5-10 years	2(13.3)	4(28.6)	
more than 10	10(66.7)	7(50.00)	

Pain control strategies			
Medication	14(93.3)	13(85.7)	.598[c]
Physiotherapy/massage	9(60.0)	5(35.7)	.191[b]
Daily exercise	3(20.0)	2(14.3)	1.0[c]
Physical procedures	5(33.3)	4(28.6)	1.0[c]
Relaxation/meditation	2(13.3)	1(7.1)	1.0[c]
[a] Mann-Whitney U test; [b] Pearson Chi-Square; [c] Fisher Exact test.			

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966 **Table 2** Means, standard deviation, medians of clinical outcome measures; between group comparison of the
967 pre/post and pre/follow up change scores.
968

Variables		**Intervention group (n=12)**		**Control group (n=14)**		**Mann-Whitney U / *p* - value**		
(Chronbah's α)	Time	Mean (SD)	Mdn (IQR)	Mean (SD)	Mdn (IQR)			
Pain (NRS)	T1	6.00 (1.28)	6 (2)	6.33 (1.22)	6 (3)	102.5 / .35		
	T2	4.83 (1.34)	5 (1)	6.22 (1.56)	6 (2)			
	T3	4.67 (1.44)	4 (2)	6.00 (1.23)	6 (2)			
	(Δ)T1 to T2	- 1.17 (.83)	- 1.00 (1.75)	-.11 (1.17)	.00 (1.5)		39.5 / .02*	
	(Δ)T1 toT3	- 1.33(.98)	-1.5 (1.75)	-.33 (1.0)	.00 (1.5)			26.5 / .04*
PHQ-9	T1	8.08 (4.64)	6 (5)	8.67 (4.53)	8 (6)	86.00 / .92		
(.80)	T2	4.58 (2.61)	4.5 (4)	8.33 (4.21)	9 (6)			
	T3	4.17 (1.75)	4.5 (2)	6.78 (3.03)	8 (6)			
	(Δ)T1 to T2	-3.5 (6.19)	-2.00 (3.00)	-.33 (2.96)	- 1 (2)		40.5 / .02*	
	(Δ)T1 to T3	-3.91 (4.12)	-2.5 (3.75)	-1.89 (3.59)	-2 (3.5)			35.5 / .18
HADS- Anx	T1	10.83 (4.39)	11.5 (6)	9.22 (3.89)	9 (5)	56.00 / .15		
(.82)	T2	8.08 (3.91)	7.5 (7)	8.56 (3.21)	9 (5)			
	T3	8.17 (2.72)	8.5 (3)	9.22 (3.93)	9 (6)			
	(Δ)T1 to T2	-2.75 (3.67)	-2 (3.75)	-.67 (2.24)	.00 (3)		121.0 / .06	
	(Δ)T1 to T3	-2.67 (3.31)	-4 (4.75)	.00 (3.46)	-1 (7)			78.5 / .08
HADS- Depr	T1	6.25 (3.72)	5 (5)	4.57 (3.81)	4.5 (5.8)	64.00/ .30		
(.80)	T2	4.75 (3.17)	5 (4)	4.22 (2.77)	4 (5)			
	T3	4.42 (2.61)	4 (3)	3.44 (2.83)	3 (6)			
	(Δ)T1 to T2	-1.5 (3.70)	-1.5 (3.75)	.44 (1.94)	.00 (6)		118.5 / .07	

	(Δ)T1 to T3	-1.83 (2.72)	-1 (4)	-.33 (2.00)	.00 (3)			76.5 / .11
FFMQ_full scale	T1	129.25 (20.04)	127 (32.3)	138.67 (15.35)	141 (49)	92.5/.67		
(.89)	T2	136.92 (17.05)	135 (15)	137.11 (9.21)	136 (10.5)			
	T3	134.75 (18.69)	136.5 (22.3)	137.11 (21.99)	141 (31.5)			
	(Δ)T1 to T2	-7.67 (22.69)	-2.5 (21.25)	1.55 (7.52)	2 (8.5)		108.5 / .21	
	(Δ)T1 to T3	-5.5 (16.63)	-4 (26)	1.55 (10.97)	2 (16.5)			65.00 / .43

*IG – intervention group; CG – control group; (Δ) was computed by subtracting pretest from posttest and pretest from follow up scores; positive values signify an increase and negative values a decrease in the dependent measure. Results from NRS – Numerous pain rating scale; PHQ-9 – Patient health questionnaire; HADS – Hospital anxiety and depression scale; FFMQ – Five facets of mindfulness questionnaire – full scales results. ***p< 0.05***

Table 3 Reliable change of intervention group using 95% CI for outcome measures pre-intervention to follow-up.

Outcome variables	**Recovered**	**Improved**	**Deteriorated**	**Unchanged**
Pain (NRS) n=12	**0%**	**50% (6/12)**	**0%**	**50% (6/12)**
PHQ-9 n= 5	**80% (4/5)**	**0%**	**0%**	**20% (1/5)**
HADS-D n=4	**75% (3/4)**	**25% (1/4)**	**0%**	**0%**
HADS-A n=11	**28% (3/11)**	**45% (5/11)**	**9% (1/11)**	**18% (2/11)**

Figure 1.TIFF

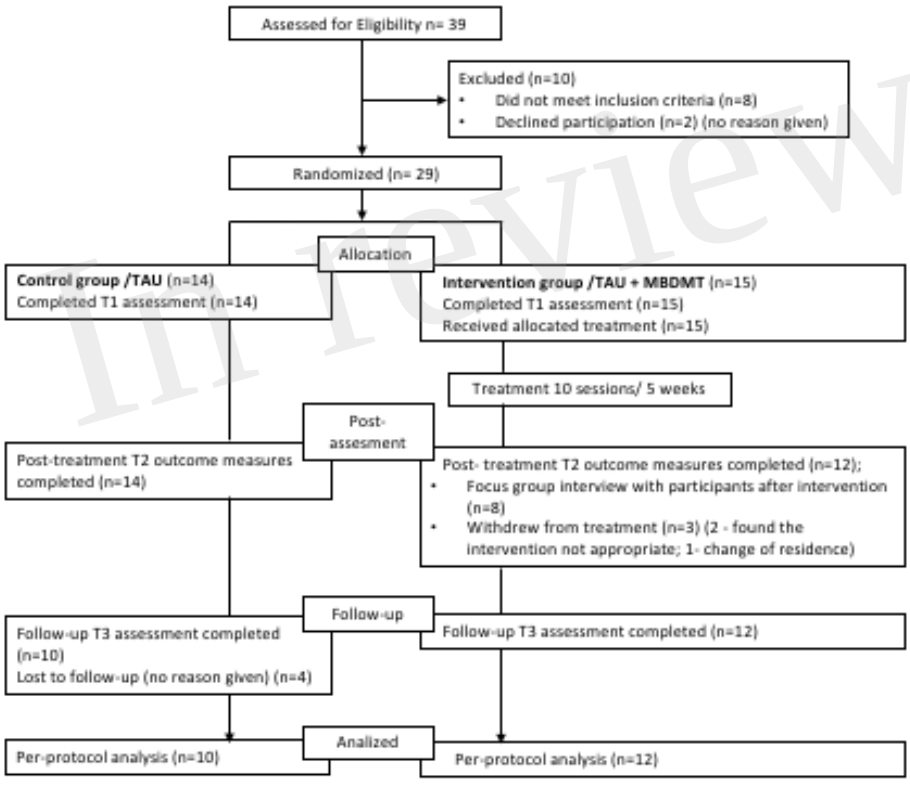

Figure 2.TIFF