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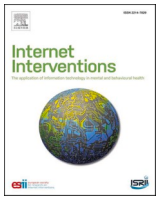

Increasing access to pain management: Feasibility of a self-compassion psychoeducational website using a minimally monitored delivery model☆

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ABSTRACT

Self-compassion has been associated with several positive pain-related outcomes. However, little is known about the impact of targeting self-compassion on pain management. This study assesses the feasibility of a self-compassion psychoeducation website among adults with chronic pain using a minimally monitored delivery model. Participants (N = 26) were recruited online and a single group pre-test and post-test design with a 3-month follow-up was used. The intervention was a 6-week program comprised of a video, writing exercises, guided meditations and automated emails. Feasibility outcome measures were grouped into the following categories: study engagement (ease of recruitment, attrition, adherence, satisfaction), pain vulnerability variables (intensity, interference, catastrophizing, mood) and protective pain variables (self-compassion, resilience and acceptance). Challenges pertaining to uptake were encountered. Attrition was higher ($n = 11/26$; 42%) and adherence to the full treatment protocol lower ($n = 6/26$; 23%) than expected. Treatment satisfaction was high with nearly all study completers (93%) reporting that they would recommend the program to a friend. Intent-to-treat mixed effects models showed a significant and large increase of self-compassion ($d = 0.92$) and a significant impact on several outcome variables (*ds* from 0.24 to 1.15) with most gains either maintained or increased at follow-up. The recruitment strategy may have negatively impacted participant engagement. Methodological modifications are proposed to improve the feasibility of the program. Minimally monitored web-based programs targeting self-compassion may benefit adults with chronic pain who may have limited access to traditional psychological services or who prefer online-based interventions.

1. Introduction

An estimated 20% of the worldwide population is affected by chronic pain (Goldberg and McGee, 2011; Health Canada, 2019; Steingrímsdóttir et al., 2017). The long-term nature of chronic pain and the resultant functional and emotional impact make it a challenging condition to manage (Turk et al., 2011). Psychological research has historically focused on factors that increase vulnerability to pain and disability. More recently, the protective role of positive factors, such as self-compassion, has received increasing attention. The self-compassion construct is commonly characterised as comprising three bipolar dimensions: self-kindness vs self-judgment, mindfulness vs avoidance and rumination and common humanity vs isolation (Neff, 2003). Previous pain studies have demonstrated that patients with higher levels of self-compassion showed lower levels of distress, pain-related disability and pain catastrophizing, decreased experiential avoidance, and increased pain acceptance (Costa and Pinto-Gouveia, 2011, 2013; Edwards et al., 2019; Wren et al., 2012). It has been postulated that self-compassion may improve pain management via enhanced emotion regulation (Wren et al., 2012) and coping (Sirois et al., 2015).

In light of its established impact on affect regulation, self-compassion has been considered the foundation of several therapies (Wilson et al., 2019) and a number of interventions have been developed to specifically target and enhance self-compassion. A recent meta-analysis of 27 randomized controlled trials (RCTs) provides support for the efficacy of these interventions to increase self-compassion and reduce anxiety, depression and rumination (Ferrari et al., 2019). The 8-week *Mindful Self-Compassion* training program is one of the first self-compassion-based programs developed. Designed for nonclinical populations, it involves an 8-week or a five-day intensive group format plus a 4-hour

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retreat and aims to build the resources of mindfulness and self-compassion using experiential exercises, discussions, and homework assignments (MSC; Neff and Germer, 2013). In addition to compassion and mindfulness practices, therapeutic goals include using self-compassion in everyday life, developing a compassionate inner voice and working with difficult emotions and relationships. An RCT conducted among 52 participants yielded significantly greater improvements in self-compassion, mindfulness, and well-being than a waitlist control group, with gains maintained at a 12-month follow-up (Neff and Germer, 2013).

A systematic review of 15 studies showed that compassion-related therapies were effective at increasing self-compassion among individuals with chronic physical health conditions (Kılıç et al., 2021). However, data on the impact of self-compassion training among chronic pain patients is limited. Two pilot studies conducted among this population yielded promising results (Carson et al., 2005; Parry and Malpus, 2017). In the Carson et al. (2005) investigation, an 8-week program was assessed among 43 low back pain participants randomly assigned to either standard care or a Loving Kindness intervention. Loving Kindness meditation is a component of the MSC program (Neff and Germer, 2013). Findings revealed a significant reduction in pain, anger and emotional distress in the Loving Kindness group but not in the standard care group. Improvements in self-compassion, pain-related anxiety, depression and pain acceptance were also reported following an 8-week Compassion for Pain Groups program deployed in a small sample of individuals presenting with various pain conditions (N = 8; Parry and Malpus, 2017). More recently, the MSC program (not adapted for pain) was compared to cognitive behavioral therapy (CBT) for pain management in an RCT conducted among 123 chronic pain patients (Torrijos-Zarcero et al., 2021). Both interventions, which were offered as an adjuvant to usual care, produced significant benefits. Specifically, MSC led to significantly greater improvements in self-compassion, pain acceptance, pain interference and anxiety. Both between-group and within-group effect sizes were small to moderate; no follow-up was conducted.

Support for self-compassion training also comes from studies of acceptance- and mindfulness-based interventions for pain as self-compassion includes both of these elements. Interventions that typically involve learning to manage internal experiences such as pain without trying to control them have yielded outcomes comparable to CBT with small to moderate effect sizes (e.g., Baranoff et al., 2016). Similarly, a systematic review and meta-analysis has shown mindful meditation to be associated with decreases in depressive symptoms and improvements in quality of life among individuals with persistent pain (Hilton et al., 2017).

Online treatment delivery may be particularly relevant for chronic pain patients as the Canadian Pain Task Force reports that the median wait time for chronic pain management services is about five months while access to a multidisciplinary team can take up to four years (Canadian Pain Task Force, 2019). Many individuals also have difficulty accessing pain services due to factors such as age, geographical location and/or a lack of trained therapists, all of which contributes to the under-treatment of pain (McGeary et al., 2012; van Beugen et al., 2014). A number of Internet-based pain programs are available though most of them are based on CBT (for a review, see Bernardy et al., 2019). A few mindfulness or acceptance and commitment therapy (ACT) programs are also available (e.g., Trompetter et al., 2015). The results support their efficacy on pain outcomes, negative mood and quality of life.

To date, the few studies that have evaluated the impact of Internet-based programs specifically targeting self-compassion have supported their use among the general population (Finlay-Jones et al., 2017; Halamová et al., 2018a; Krieger et al., 2016; Sommers-Spijkerman et al., 2018). To our knowledge, only one study of pain patients was conducted (Ziemer et al., 2015). Ninety-three chronic pain patients were randomized to either a self-compassion or a self-efficacy 20-minute writing task performed online over three consecutive weeks. In the self-compassionate writing condition, participants were instructed "*to think about what you would say to a friend in your position, or what a friend would say to you about your experiences with pain*". They were also instructed to "*to make sure the writing provides you with what you need in order to feel understood and not alone in your experiences with pain*" (p. 145; Ziemer et al., 2015). Although there was no significant change in self-compassion in either group, when the groups were combined, increased self-compassion predicted decreased illness intrusiveness and depressive symptoms and increased pain acceptance. Similar findings were obtained when using chronic pain self-efficacy as a predictor of outcome. The authors concluded that both positive writing interventions were helpful and that writing about self-efficacy likely contained elements of self-compassion such as mindfulness. These results are encouraging considering the limited scope and brief duration of the self-compassionate intervention and the fact that no contact with a clinician was provided.

The present study aims to explore the feasibility of a public psychoeducational website on self-compassion (www.self-compassion.org; Neff, 2021) when administered to adults experiencing chronic pain using a minimally monitored delivery model. This term, coined by Robichaud et al. (2020), refers to a model that includes several monitoring strategies such as a pre-screening, a pre-treatment telephone interview, monitoring of progress and safety, and weekly automated emails offering instructions, reminders, validation and support. Studies using a minimally monitored delivery model have reported lower attrition and higher adherence rates (e.g., Dear et al., 2015, 2018; Titov et al., 2013) than fully automated/unguided or open access programs when examined in treatments for anxiety and depression (e.g., Christensen et al., 2004; Morgan et al., 2017). Preliminary findings using a minimally monitored delivery model of the Neff (2021) self-compassion website also revealed significant improvements in self-compassion among the general population (Talbot et al., 2017).

Feasibility outcome measures assessed in the present study were grouped into the following categories: study engagement (ease of recruitment, attrition, adherence, satisfaction), positive/protective variables (self-compassion, resilience, acceptance) and negative/vulnerability variables (pain intensity, pain interference, pain catastrophizing, negative mood). It was hypothesized that the majority of participants would complete the program and report high levels of satisfaction with the intervention. It was also hypothesized that the program would produce significant improvements in self-compassion and both protective and vulnerability variables. The impact of the program on depression and anxiety was evaluated on an exploratory basis.

2. Method

2.1. Ethics

The study was approved by the Human Research Ethics Committee of the Université de Moncton (New Brunswick, Canada), file number 1718-026. All participants provided informed consent electronically.

2.2. Participants

A sample of 26 participants was recruited within New Brunswick, Canada, using various media (posters, newspapers, emails, Google, Facebook, Kijiji, etc.). Recruitment was conducted in 2018 in three phases over four months (April and May, mid June to mid July and October). Durant the first phase, paid newspaper ads and free advertising methods were used. Ads were also posted at a nongovernmental pain clinic, but pain-related governmental and nongovernmental agencies are very limited in New Brunswick. Only four participants were included in the study. For the next two phases, a marketing agency was hired and launched a Facebook advertising campaign using sponsored posts (boosted posts) including a few words, an image, and a link to the study website. This proved to be helpful in terms of reaching out to people with chronic pain as 65 people completed the application form and were found

eligible. The application form was completed through a secure website to assess the following eligibility criteria (www.etherapies.ca): (1) resident of New Brunswick; (2) at least 18 years of age; (3) regular access to the Internet; (4) adequate understanding of English, (5) self-reported chronic pain (i.e., at least 3 days a week for six months or more) and (6) if taking psychotropic medication, no change of the medication at least one month prior to the study and no anticipated changes for the duration of the study. Exclusion criteria included: (1) currently receiving cognitive-behavioral therapy at the time of the study; (2) terminal illness defined as a life-limiting disease, with a prognosis of months or less (Hui et al., 2014); (3) evidence of psychosis or (4) presence of severe symptoms of depression or suicidal ideation (score ≥ 20 or a score > 2 on item 9 [suicidal ideation] of the PHQ-9).

Applicants who did not meet eligibility criteria received an email thanking them for their interest in the study and were provided a list of pain management and mental health resources in New Brunswick. Applicants showing severe depression or suicidal thoughts were encouraged to contact their family physician and were sent a list of resources including contact information for emergency services. Of the 69 applicants who met the eligibility criteria, 26 provided consent to participate, completed pre-treatment questionnaires and were included in the analyses (see Fig. 1). Sociodemographic and mental health characteristics of the sample are presented in Table 1. The mean age of participants was 57.5 years ($SD = 11.1$; range = 36 to 76), the majority were women ($n = 23$; 88.5%) and nearly 40% of the sample were retired ($n = 10$; 38.5%). The mean duration of pain was 13.8 years, and the most reported pain condition was arthritis ($n = 9$; 34.6%) followed by fibromyalgia ($n = 7$; 27%). About a third of participants ($n = 8$; 31%) indicated that they had more than one pain condition and most reported multiple pain locations ($n = 21$; 80.9%). At pre-treatment, participants' average pain intensity over the last six months was reported as 52.0 on a 0 (no pain) to 100 (worst pain imaginable) numeric rating scale, which is considered in the moderate range ($SD = 22.8$; range = 25 to 88) and is similar to what has been reported in other pain studies using this type of measure (e.g., Mun et al., 2019). Nearly two thirds of participants ($n = 16$; 61%) reported having previously received a diagnosis of a mental disorder as well as having previously received mental health services ($n = 16$; 61%). Participants received a $20 Amazon gift card as a gesture of appreciation for their participation.

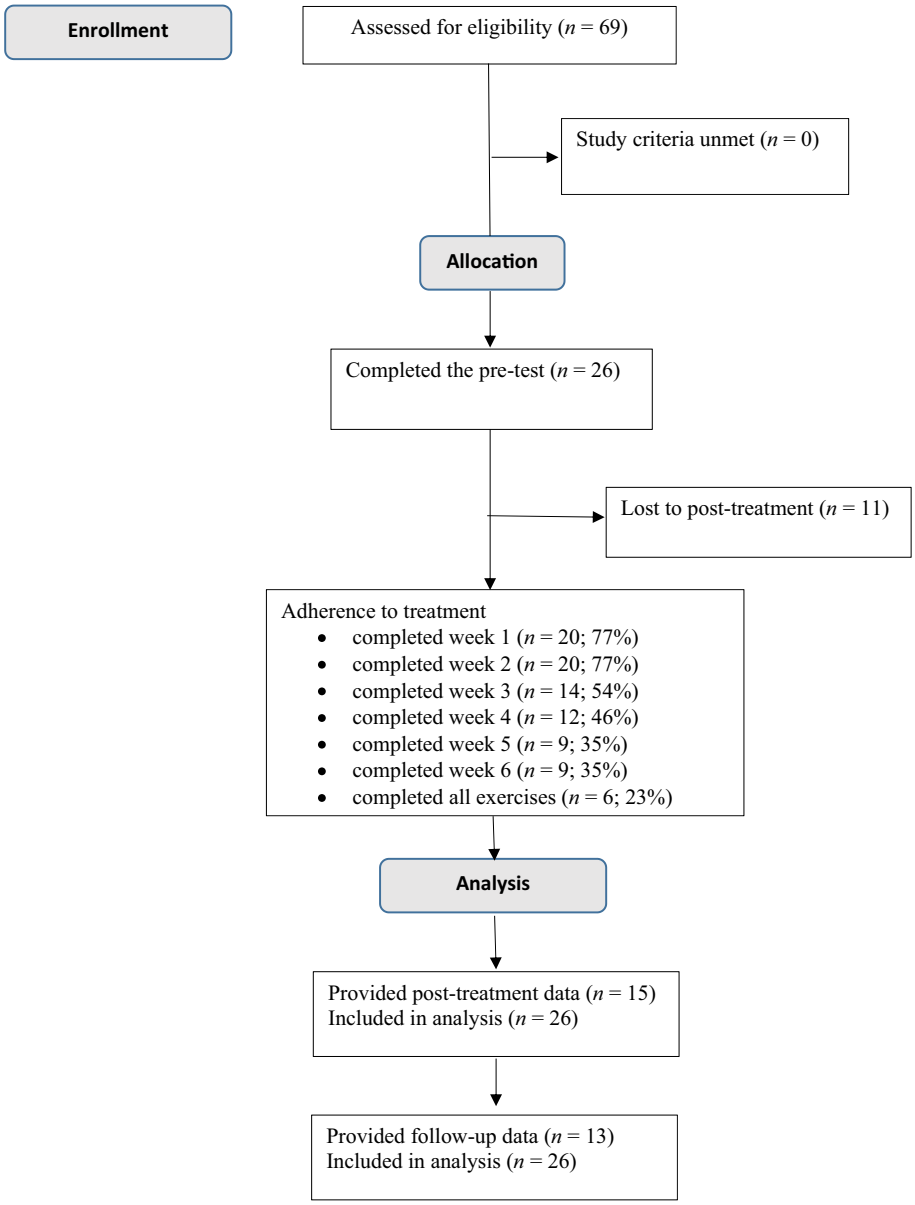

Fig. 1. Flowchart of participants.

Table 1
Participant sociodemographic and mental health characteristics (N = 26).

Variable	*n*	%
Gender		
Female	23	88.5
Male	3	11.5
Education		
High school	4	15.4
Trade school	1	3.8
College	10	38.5
University (undergraduate)	7	26.9
University (graduate)	3	11.5
Employment		
Full time work	7	26.9
Part time work	3	11.5
Leave of absence	2	7.7
At home	2	7.7
Retired	10	38.5
Unemployed	1	3.8
Income		
Less than $25,000	2	7.7
$25,000 to $49,999	10	38.5
$50,000 to $74,999	6	23.1
$75,000 to $99,999	2	7.7
$100,000 to $124,999	2	7.7
$125,000 to $149,999	0	0
$150,000 or more	1	3.8
Marital status		
Married	14	53.5
Civil union	1	3.8
Single	4	15.4
Separated	4	15.4
Divorced	1	3.8
Widow(er)	1	3.8
Previously diagnosed with a mental health disorder	16	61.5
Previously received mental health services	16	61.5
Taking medication for anxiety or depression	3	11.5

2.3. Design

A single group open trial with a 3-month follow-up was used. Self-reported outcome measures were completed online at pretreatment, post-treatment and at 3-months post-treatment. Treatment satisfaction was assessed at post-treatment.

2.4. Feasibility outcome measures

2.4.1. Study engagement

2.4.1.1. Ease of recruitment. The recruitment of 20 to 25 participants over a period of 3 to 4 months was estimated to be feasible using low-cost or free traditional advertising methods targeting English speaking residents of New Brunswick self-reporting chronic pain as well as recruitment at a non-governmental pain clinic.

2.4.1.2. Treatment adherence. The percentage of participants who completed the program within six weeks was used to measure adherence. Weekly completion was defined as having submitted the writing task assigned for that week. Participants also reported on a weekly basis how often and for how long they practiced meditation.

2.4.1.3. Study attrition. The percentage of participants who did not complete the post-test was used to evaluate attrition.

2.4.1.4. Treatment satisfaction. Treatment acceptability was assessed using an 8-item treatment satisfaction questionnaire that included four multiple choice questions and four opened-ended questions that allowed participants to describe their experience in their own words (adapted from Titov et al., 2013): (1) "Overall, how satisfied are you with the program?" (Satisfied/Mostly satisfied/Somewhat satisfied/Unsatisfied), (2) "How would you rate the quality of the material?" (Excellent/Good/Not good or bad/Unsatisfactory), (3) "Was the program worth your time?" (yes or no), and (4) "Would you recommend the program to a friend who has difficulties accepting his or her chronic pain?" (yes or no). Four opened-ended feedback questions were also used so the participants could describe their thoughts on the program, what they perceived as most and least helpful and provide suggestions. Participants were contacted by phone after providing satisfaction ratings to review their feedback and discuss any suggestions.

2.4.2. Initial treatment effectiveness

Cronbach's alphas were calculated for each measure from the current data and are provided below.

2.4.2.1. Positive/protective variables

2.4.2.1.1. Self-Compassion Scale – Short Form (SCS-SF; Raes et al., 2011). The SCS-SF is a 12-item scale measuring established dimensions of self-compassion: self-kindness, common humanity, mindfulness. A higher total score represents higher levels of self-compassion ($\alpha = 0.87$).

2.4.2.1.2. Pain Resilience Scale (PRS; Slepian et al., 2016). The PRS is comprised of 14 items rated on a scale from 0 (not at all) to 5 (all the time) that assesses participants perceived ability to engage in two related resilience dimensions when experiencing pain: Cognitive/Affective Positivity (i.e., perceived ability to regulate emotions and cognition) and Behavioral Perseverance (i.e., behavioral and motivational tenacity in the face of intense or prolonged pain). The total score was used with higher scores suggesting higher levels of pain resilience ($\alpha = 0.88$).

2.4.2.1.3. Chronic Pain Acceptance Questionnaire-8 (CPAQ-8; Baranoff et al., 2014). The CPAQ-8 includes eight items evaluating Activity Engagement and Pain Willingness (i.e., a willingness to experience pain without needing to avoid or control it). Higher scores indicate better pain acceptance ($\alpha = 0.66$).

2.4.2.2. Negative/vulnerability variables

2.4.2.2.1. Numerical Rating Scale of Pain Intensity (NRSPI; Haefeli and Elfering, 2006). Average pain intensity six months before treatment (T1), over the course of the treatment (T2) and over the 3-month follow-up (T3) was rated using a scale ranging from 0 (no pain) to 100 (worst pain imaginable). Numerical pain ratings have been shown to be sensitive to treatment change (Farrar et al., 2001).

2.4.2.2.2. Pain Catastrophizing Scale (PCS; Sullivan et al., 1995). The PCS is a 13-item measure of negative cognitive–affective responses to anticipated or actual pain. Higher total scores indicate higher levels of catastrophizing ($\alpha = 0.91$).

2.4.2.2.3. Illness Intrusiveness Rating Scale (IIRS; Devins, 2010). The IIRS is a 13-item scale measuring the negative impact of physical illness across various life domains (i.e. health, recreational activities, financial situation, relationship self-expression, etc.). In the present study, the term "illness" was replaced by chronic pain. Items were rated on a 7-point scale (1 = Not very much; 7 = Very much) and summed with higher scores suggesting higher levels of pain interference ($\alpha = 0.92$).

2.4.2.2.4. Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006). The GAD is comprised of 7 items assessing symptoms and severity of anxiety; higher total scores represent higher levels of anxiety ($\alpha = 0.78$).

2.4.2.2.5. Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001). The PHQ-9 includes 9 items assessing depressive symptoms based on the DSM-IV diagnostic criteria of major depression. Higher scores indicate higher levels of depression scores ($\alpha = 0.87$).

2.5. Self-compassion program

A 6-week program was constructed by directing participants to certain sections/exercises found on Neff's psychoeducational website at the time of the study in 2018. For the present study, selected

components included a video defining self-compassion, four self-compassionate writing exercises (exercises 1, 3, 5 and 6) and guided meditation to be performed weekly. Participant interaction with Neff's psychoeducational website passed through the secure etherapies platform (www.etherapies.ca), which included weekly instructions and provided all links to exercises located on Neff's website. Participants were instructed to complete the writing exercises in relation to their chronic pain over a 30-minute period. For example, participants were instructed to write about how they would treat a friend struggling with chronic pain vs how they would treat themselves or to write about their critical self-talk during a pain-related event and to reply to their self-critical voice with self-compassion. The software Moodle was used to administer the online questionnaires and for participants to complete and submit their writing exercises to ensure procedural adherence. A description of the weekly exercises and instructions is provided in Table 2.

2.6. Minimally monitored delivery model

No guidance from a clinician was provided. The minimally monitored delivery model consisted of pre- and post-treatment telephone interviews to review study procedures, motivate participants at the beginning of the program and obtain their feedback post-treatment. Participants received weekly automated emails (adapted from Titov et al., 2013[1]) sent at pre-determined times through an encrypted email account. They were brief, personalized and written in a warm and supportive manner: (1) to give instructions to participants; (2) to send reminders in the event of uncompleted exercises or questionnaires (3) to reinforce progress; (4) to reinforce practice; (5) to remind participants to be kind and patient toward themselves as they are learning to become more self-compassionate. Based on the protocol used by Titov et al. (2011), participants' levels of depression were monitored at the beginning of each writing session using the PHQ-9. To ensure participant safety, the study protocol mandated that a direct contact with the primary researcher would be initiated if participants' scores on the PHQ-9 were ≥20 or if they answered "3" on item 9 (suicidal ideation). Fortunately, this scenario did not occur.

Table 2
Content of weekly writing sessions from the website www.self-coompassion.org.

Week	Content
1	Participants were instructed: 1) To watch the psychoeducational video on self-compassion 2) To write in a quiet and private setting, to keep track of time and to write without paying attention to grammar, spelling. 3) To complete Exercise 1: How would you treat a friend? (question 1) thinking of what they would typically do or say to a friend feeling bad, struggling with chronic pain.
2	Exercise 1: How would you treat a friend? (questions 2–4). Participants were instructed to write about what they do or say to themselves when struggling with chronic pain; to reflect on how they treat themselves compared to how they treat others; and to write down what might change if they were to treat themselves the same way.
3	Exercise 3: Exploring self-compassion through writing. Participants were instructed to think about aspects of chronic pain that make them feel bad or inadequate and to write a letter to themselves from the perspective of an unconditionally loving imaginary friend or family member, thinking about how this friend would address the pain-related feelings of inadequacy.
4	Exercise 5: Changing your critical self-talk. Participants were instructed: 1) To explore their critical self-talk by writing on a recent pain-related event during which they were harsh and unkind toward themselves. 2) To rewrite their text by responding to their self-critical voice with self-compassion rather than negative self-judgment. 3) To reframe their negative observation in a positive way while engaging in supportive self-talk.
5	Exercise 6: Self-compassion journal. Participants were instructed: 1) To write about a recent difficult situation related to their pain. 2) To process the event in a more self-compassionate way using mindfulness, a sense of common humanity, and kindness. 3) Once completed, to write words of comfort and support to themselves.
6	Participants were instructed: 1) To complete Week 1 writing task a second time. 2) To compare and reflect on the differences in their text between Week 1 and their last week.

[1] Adapted with the permission of N. Titov and B. F. Dear.

2.7. Statistical analyses

Chi-square tests and *t*-tests were used to assess differences between study completers and non completers on sociodemographic and pain-related characteristics. Intent-to-treat mixed effect models were conducted to compare scores on outcome variables at T1 (pre-test), T2 (post-test) and T3 (3-month follow-up) using SPSS, version 27. Comprised of fixed and random effects, such models allow for dependence between the observations such as in within-subject designs and offer unbiased estimates of missing data under the assumption that data are missing at random (Brauer and Curtin, 2018; Tabachnick and Fidell, 2013).

3. Results

3.1. Study engagement

3.1.1. Ease of recruitment

Recruitment was more challenging than expected. A Facebook marketing campaign yielded a sufficient number of potential participants to meet the feasibility criterion of recruiting 20–25 participants over 3–4 months. However, uptake was lower than anticipated. Of the 69 eligible applicants, only 26 opted to enroll in the study ($n = 26/69$; 38%).

3.1.2. Attrition

As shown in Fig. 1, slightly more than half of the participants completed the post-test (58%). Of the participants who dropped out ($n = 11/26$; 42%), most did at Week 4 ($n = 6/11$; 55%). Chi-square tests revealed no significant differences between study completers ($n = 15$) and non completers ($n = 11$) on sociodemographic characteristics including occupation, marital status, income and education (all ps = ns). *t*-Tests revealed no significant differences at pre-treatment on pain intensity ($t = 0.81$, $p > 0.05$), protective factors (SCS; $t = 0.57$ $p > 0.05$, PRS; $t = -0.41$, $p > 0.05$, CPAQ; $t = 0.17$, $p > 0.05$), vulnerability factors (IIRS; $t = -0.22$, $p > 0.05$, PCS; $t = 0.62$, $p > 0.05$), anxiety ($t = -1.47$, $p > 0.05$) or depression ($t = 0.03$, $p > 0.05$).

3.1.3. Treatment adherence

All participants emailed their completed writing exercises and, with a few exceptions, followed the instructions and wrote about their pain experiences. About a quarter of the participants ($n = 6/26$; 23%) completed all writing exercises while nearly half ($n = 12/26$; 46%) of them completed four to six writing exercises. Most study completers finished 4 to 6 sessions ($n = 12/15$; 80%). Chi-square tests and t-tests between participants who completed four to six writing sessions and those who did not revealed no significant differences with respect to age, occupation, education or income (all ps = ns). Interestingly, a significant difference was observed for marital status ($\chi^2_{(6,\ N=26)} = 12.87$, $p < 0.05$), with participants in a relationship (married or civil union) showing higher levels of adherence. *t*-Tests revealed no significant differences at pre-treatment on pain intensity ($t = 0.85$, $p > 0.05$), protective pain factors (SCS; $t = 1.41$ $p > 0.05$, PRS; $t = 0.09$, $p > 0.05$, CPAQ; $t = 0.26$, $p > 0.05$), vulnerability pain factors (IIRS; $t = -1.27$, $p > 0.05$, PCS; $t = -0.36$, $p > 0.05$), anxiety ($t = -1.31$, $p > 0.05$) or depression ($t = -1.41$, $p > 0.05$). About two thirds of the participants ($n = 18/26$;

69%) used the self-compassion guided meditations at least once with 20% of the study completers ($n = 3/15$) reported doing so on a weekly basis.

3.1.4. Treatment satisfaction

Treatment satisfaction was high with 93% of the study completers reporting that they would recommend the program to a friend. Eighty-seven percent ($n = 13/15$) reported being satisfied or mostly satisfied. Most study completers ($n = 12/15$, 80%) reported during the post-treatment telephone interview that the self-compassionate writing exercises helped them realize they were treating themselves more harshly than how they would treat a close friend. Overall, most participants ($n = 12/15$; 80%) enjoyed the writing exercises. However, several reported that the writing exercises ($n = 9/15$; 60%) or guided meditations ($n = 6/15$; 40%) were too long. Of the participants who reported enjoying the guided meditation exercises, 62.5% ($n = 5/8$) had a history of meditation practice. A few study completers ($n = 3/15$; 20%) reported redundancy between exercises – particularly for Week 4. When asked about what motivated them to follow an online program, 67% ($n = 10/15$) mentioned the ease of accessibility and convenience of doing it from home. About half of the study completers ($n = 7/15$; 47%) mentioned that they were willing to try "just about anything" to facilitate their pain management. About a quarter of the participants ($n = 4/15$; 27%) reported that their least favourite part of the program was completing weekly assessments of mood.

3.2. Initial treatment effectiveness

Normality of data and potential outliers were examined using the Shapiro-Wilk test of normality. One outlier, clearly an error, was found on the measure of pain intensity at T1 (value of 0) and replaced with the group mean. Missing data on all outcome measures were imputed after Little's tests indicated they were missing at random ($\chi 2\ (21) = 12.96$, $p = 0.91$), which is an assumption to be met for the multiple imputation to be used (Soley-Bori, 2013). Fifty percent of cases were incomplete, so 50 iterations were specified as recommended by Manly and Wells (2015). During the imputation phase, sociodemographic information (age, gender, level of education, income, marital status and pain intensity) and the outcome measures were included at the pre-test, post-test and 3-month follow-up. A random intercept and fixed slope were chosen for all models as it provided the best fit to the data. Means, estimated means and effect sizes can be found in Table 3. Pairwise comparisons are based on estimated means given the similarity of the findings with observed data (Manly and Wells, 2015).

3.2.1. Positive/Protective variables

Mixed-effect models revealed a significant time effect on the SCS-SF (complete case $F_{2,\ 29.77} = 18.513$; $p < 0.001$). The results were consistent across 50 multiple imputations with all p-values < 0.001. Pairwise comparisons showed that SCS scores increased significantly from T1 to T2 (all $ps < 0.001$), with no clear indication of significance from T2 to T3 across imputations. Large effect sizes were found between T1 and T2 as well as between T2 and T3. A significant time effect was also observed on the PRS (complete case $F_{2,\ 28.80} = 5.80$, $p = 0.007$), which was consistent across the 50 imputations (all $ps < 0.01$). Pairwise comparisons revealed a significant increase from T1 to T2 (all $ps < 0.01$) with gains maintained at T3 (all $ps < 0.05$). Effect sizes were moderate from T1 to T2 (d = 0.55) and T1 to T3 ($d = 0.71$). A significant time effect was found on the CPAQ-8 (complete case $F_{2,\ 30.05} = 5.38$, $p = 0.01$). p-Values were consistent over 50 imputations (all $ps < 0.05$). Pairwise comparisons revealed no consistent significant effect across imputations between T1 and T2 with no significant change from T2 to T3 (all $ps > 0.05$). However, significant improvement was found from T1 to T3 (all $ps < 0.05$) and a moderate effect size.

3.2.2. Negative/vulnerability variables

As shown in Table 3, a significant change in pain was found over time (complete case $F_{2,\ 23.83} = 7.15$, $p = 0.004$). The results were consistent across 50 multiple imputations with all p-values < 0.01. Pairwise comparisons revealed a significant decrease from T1 to T2 (all $ps < 0.01$), followed by a significant increase from T2 to T3 (all $ps < 0.05$). Large effect sizes were found from T1 to T2 and T2 to T3, though the latter was not in the expected direction. A significant time effect was observed on the PCS (complete case $F_{2,\ 28.99} = 11.16$, $p < 0.001$). p-Values were consistent over 50 imputations ($p < 0.001$). A significant improvement was found from T1 to T2 (all $ps < 0.01$) as well as from T2 to T3 (all $ps < 0.05$). A moderate and large effect sizes were found, respectively. No significant time effect was observed on the IIRS (complete case $F_{2,\ 21.26} = 0.13$, $p = 0.881$), which was consistent across imputations. Significant changes were observed on the GAD-7 and PHQ-9 (complete cases, $F_{2,\ 32.97} = 7.26$, $p < 0.001$; $F_{2,\ 28.45} = 10.54$, $p < 0.001$). The significance of the changes was consistent over 50 imputations for both outcome measures (all $ps < 0.001$). Pairwise comparisons revealed significant improvements on the GAD-7 and PHQ-9 between T1 and T2. p-Values were consistent over 50 iterations (all $ps < 0.01$). Gains were maintained at T3 (all $ps > 0.05$). Moderate effect sizes were obtained for the GAD-7 and PHQ-9 between T1 and T2 ($d = 0.54$ and $d = 0.66$, respectively).

4. Discussion

Following the promising results obtained among the general population (Talbot et al., 2017), the present trial aimed to assess the feasibility of delivering a psychological program for chronic pain using a psychoeducational website. Feasibility outcomes included ease of recruitment, attrition, treatment adherence, acceptability and an initial assessment of effectiveness. Based on the criteria reported by Thabane et al. (2010) to assess feasibility outcomes, the program is judged to be feasible, but with recommended modifications to the protocol. Challenges with uptake, attrition, and adherence, were identified. However, most hypotheses pertaining to program effectiveness were supported. Statistically significant improvements were found on self-compassion

Table 3
Means, estimated means, standard deviation and effect sizes (Cohen's d).

Variable	Observed mean (SD)			Estimated mean (SD)			Effect sizes (based on estimated means)		
	T1	T2	T3	T1	T2	T3	Between T1 and T2	Between T1 and T3	Between T2 and T3
SCS-SF	35.8 (9.9)	43.1 (7.2)	46.5 (10.0)	35.8 (7.4)	43.1 (5.9)	46.5 (7.4)	0.92	1.45	0.81
PRS	29.2 (9.0)	33.9 (7.7)	35.1 (8.1)	29.2 (8.8)	33.9 (6.4)	34.9 (6.2)	0.55	0.71	0.16
CPAQ-8	23.0 (5.5)	25.0 (6.6)	26.2 (7.3)	23.0 (5.4)	25.0 (5.4)	26.3 (5.6)	0.43	0.60	0.37
PCS	19.5 (10.7)	13.9 (5.7)	9.6 (8.0)	19.5 (10.5)	13.9 (4.6)	9.6 (6.1)	0.58	1.06	1.23
IIRS	46.6 (18.7)	43.7 (19.0)	45.1 (23.4)	46.7 (18.4)	43.5 (14.6)	45.1 (15.5)	0.24	0.09	0.12
PHQ-9	10.7 (6.8)	6.8 (5.0)	5.7 (5.4)	10.7 (6.7)	6.8 (4.1)	5.7 (4.4)	0.66	0.83	0.26
GAD-7	7.4 (4.9)	4.9 (3.4)	3.2 (2.7)	7.4 (4.8)	4.9 (2.9)	3.2 (2.4)	0.54	1.01	0.63
Pain	52.0 (22.3)	43.5 (22.9)	47.5 (20.7)	52.0 (20.9)	39.8 (28.2)	47.5 (35.6)	1.15	0.17	0.24

Note. SCS-SF = Self-Compassion Scale – Short Form; PRS = Pain Resilience Scale; CPAQ = Chronic Pain Acceptance Questionnaire-8; PCS = Pain Catastrophizing Scale; IIRS = Illness Intrusiveness Rating Scale; PHQ-9 = Patient Health Questionnaire 9-Item; GAD-7 = Generalized Anxiety Disorder 7-Item Scale.

and most pain-related outcome variables with moderate to large effect sizes. In addition, gains were either maintained or increased at follow-up for nearly all outcome measures. Overall, this study provided valuable information that can facilitate improvements in a future version of this type of intervention.

4.1. Study engagement

Recruitment using traditional methods of advertising was challenging. Facebook paid advertising helped in recruiting interested individuals who filled out the application form. Of those deemed eligible to participate, only 38% ($n = 26/69$) enrolled in the study. A potential explanation may be the use of Facebook paid advertisement. Limited data are available on the efficacy and efficiency of such a recruitment strategy in health research compared with more traditional methods. A randomized controlled study on a smoking cessation program offered valuable information in this regard (Frandsen et al., 2016). Findings revealed that traditional media was more cost effective in terms of enrollment and completion of the study. Since Facebook advertisements pop up in user newsfeeds and that the interested individuals must click on the advertisement there and then or it disappears, the authors hypothesized that this method of advertising may attract people who have not given much thought about participating, but on the spur of the moment decide to fill out the application form. The authors concluded that social media advertising may be more effective in generating interest than attracting conscientious recruits. In support of this hypothesis, higher levels of conscientiousness have been found to significantly predicted greater uptake of a self-guided online program for depression and anxiety (Gulliver et al., 2021). Further research is needed on the most effective methods of recruitment in the field of Internet health research. The use of an assertive recruitment approach or "opt out" strategy, consisting of sending invitation letters to potential patients, and asking them to reply if they do not wish to be contacted by telephone by the research team to get more information, appears promising (Junghans et al., 2005). Assessing conscientiousness or motivation to participate as part of study eligibility might also optimise the screening process.

The attrition rate in the present study, while elevated ($n = 11/26$; 42%), falls at the superior end of the range of rates reported for minimally monitored or guided Internet-based online self-compassion interventions in nonclinical samples (17% to 55%; Eriksson et al., 2018; Finlay-Jones et al., 2017; Halamová et al., 2018a; Krieger et al., 2016; Sommers-Spijkerman et al., 2018). A lower attrition rate was found in Ziemer et al.'s (2015) study among chronic pain patients (22%), but the online writing program was half the duration of the current program and, perhaps more importantly, yielded no significant increase in self-compassion. No significant pre-treatment differences in the present investigation were found between study completers and non completers. However, the small sample size may have limited the power to detect such differences. Several participants dropped out at Week 4 ($n = 6/11$; 55%). A few study completers ($n = 3/15$; 20%) perceived program redundancy between the writing tasks, which may have contributed to attrition. Placing greater emphasis on the importance of practice when learning to change one's self-talk may have been helpful. It is also interesting to note that, at Week 4, there is a change in the nature of the writing task from letter writing to journaling which involves writing about a recent specific pain-related event and replacing critical self-talk with more self-compassionate, supportive self-talk. This change may have required greater ability to reflect on one's thoughts and feelings or psychological mindedness on the part of participants (Hall, 1992). Psychological mindedness has been associated with continuation in several studies (Barrett et al., 2009) and motivation, which also relates to continuation (Reis and Brown, 2006, cited in Barrett et al., 2009). To encourage psychological mindedness in the context of journaling, writing prompts could be provided for each of the three components of self-compassion to help people to change their critical self-talk for a more compassionate one (Dreisoerner et al., 2021; Neff & Germer, 2018). For example, a prompt such as "list ways in which other people have experienced similar pain-related events" could be used to promote common humanity. Assessing psychological mindedness as part of the screening may also better identify individuals most likely to engage with this type of intervention.

Adherence to the full treatment protocol was modest ($n = 6/26$; 23%), but nearly half of the participants completed four to six writing exercises. Higher rates were reported among nonclinical samples for other brief minimally monitored Internet-based programs (45% to 65%; Halamová et al., 2018a, 2018b; Shapira and Mongrain, 2010). In these studies, as in the present study, remuneration or prize draws were offered to participants, but writing exercises were performed over one to two weeks. In a feasibility study of an 8-week online adapted Mindfulness-based Compassionate Living program provided with the guidance of a psychologist on request, data on adherence was reported for study completers only (Krieger et al., 2016). On average, completers initiated work on 4.9 modules out of 7. In the current study, 80% ($n = 12/15$) of study completers completed 4 to 6 sessions, which is comparable.

Higher levels of adherence have been reported for more structured Internet-based programs on self-compassion (Krieger et al., 2016), ACT or CBT (e.g., Dear et al., 2015; Trompetter et al., 2015). These programs are of a longer duration and typically require a higher weekly investment in time of up to 3 h or more (Trompetter et al., 2015). The adherence rates found in the present study seem to fall in between these more structured programs and open access sites for which adherence rates as low as 1% have been reported (Christensen et al., 2009). Preference-based trials are needed to examine how people's preferred level of engagement in terms of time commitment can impact adherence and outcomes. Interestingly, in the present study, treatment completers were more likely to be in a relationship or married than treatment non completers. The assistance of a coach or clinician may be helpful or preferred for people who are not in a relationship, but it is not clear from the findings of this study that it would be the case and this finding is based on a small number of participants. Given a notable drop in adherence at Week 3, the inclusion of such a contact at that time may be useful in facilitating adherence regardless of marital status. However, other improvements suggested in this study are designed to promote participant engagement which, if successful, may eliminate the need for clinician contact (Dear et al., 2015).

Treatment satisfaction was high in the present study. Over 90% of the study completers ($n = 14/15$) reported that they would recommend the program to a friend. However, based on participant feedback, minor adaptations and additional content are suggested to improve adherence. It may be beneficial to build increased flexibility to allow for more individually tailored approaches to the exercises in terms of choice (writing exercises vs guided meditations) and length. For example, a range of time of 20 to 30 min might be recommended for the writing exercises. Participants were provided information on self-compassion in Week 1 in the form of a 3-minute video available on the website. However, since the psychoeducational website is not targeting pain specifically, providing a psychoeducation module in Week 1 including a rational for the self-compassion exercises in relation with pain may be helpful, including the physiology of self-compassion (Parry and Malpus, 2017). The provision of additional instructions and guidance for the practice of meditation may also be helpful to people with no previous experience (Krieger et al., 2016). Several of these improvements are consistent with a model that examines the interaction between patient and treatment factors to explain experiences of non-adherence to Internet psychotherapy (Johansson et al., 2015). Among treatment factors, a lack of program flexibility was identified as a reason to not adhere when interfering with patient factors such as daily routine or individual capacities.

4.2. Positive/protective variables

Preliminary effectiveness findings suggest that a pain-specific program built on the public psychoeducational website self-compassion.org may significantly increase self-compassion among people with chronic pain and do so with large effect sizes that are comparable to results obtained in a non-clinical population using a face-to-face delivery format of the MSC program (Neff and Germer, 2013). The present results are also comparable to preliminary findings obtained when the effectiveness of the psychoeducational website was assessed in the general population using a similar delivery model (Talbot et al., 2017). Greater improvement was found in the present study when compared to two previous studies using self-compassion interventions among pain patients (Torrijos-Zarcero et al., 2021; Ziemer et al., 2015). The short duration of the program (Ziemer et al., 2015) and/or the fact that their sample presented with a high rate of psychopathology, a history of unsuccessful treatment in specialized units and high rates of disability (Torrijos-Zarcero et al., 2021) may have played a role in the more modest outcomes reported in these investigations. Self-compassion scores continued to increase when assessed three months post-treatment suggesting that participants likely continued to put into practice what they had learned and highlighting the importance of such practice (Finlay-Jones et al., 2017; Krieger et al., 2016). While continued practice was encouraged during the follow-up, it would be helpful in future studies to document such practice.

A significant and moderate increase in pain resilience was found and was maintained at follow-up. This is significant as pain resilience has been shown to predict quality of life among chronic pain patients (Ankawi et al., 2017; France et al., 2020). In a qualitative review of resilience in pain groups, patients successfully exhibited resilience by establishing social connections and demonstrating pain acceptance and positive affect (Rolbiecki et al., 2017). Increasing self-compassion likely allows participants to develop a sense of common humanity and social engagement (as opposed to isolation) which may contribute to pain resilience.

Internet-based ACT programs have been successful in increasing pain acceptance (Baranoff et al., 2016; Buhrman et al., 2013; Trompetter et al., 2015). In the present study, a significant increase in pain acceptance was also observed, but only from pre-treatment to follow-up. More time and experience with success may be necessary for a notable change to occur in pain acceptance when using a brief web-based program. The fact that few participants practiced meditation may have played a role as well as mindful meditation has been found to significantly increase pain acceptance compared to a wait list control (la Cour and Petersen, 2015). Nevertheless, programs centered on self-compassion may increase acceptance with the added benefits of a sense of common humanity and reduced rumination (Ferrari et al., 2019) both of which have been shown to relate to resilience and reduced pain catastrophizing (Arnow et al., 2011; Rolbiecki et al., 2017).

4.3. Negative variables

As previously reported in studies of online interventions based on self-compassionate writing, ACT and CBT among pain patients (Carson et al., 2005; Mehta et al., 2019; Trompetter et al., 2015; Ziemer et al., 2015), a significant decrease in pain was found post-treatment in the present study. However, it was not maintained at follow-up even though self-compassion continued to improve during that time. This may reflect the fact that self-compassion does not aim to reduce physical pain but rather seeks to reduce ineffective or maladaptive responses to it (Scott and McCracken, 2015). Self-compassion scores have been found to show stronger relationships to measures pertaining to emotional and social functioning, pain acceptance and engagement in value-based activities, than to measures of physical function and coping strategies that aim to reduce pain intensity (Edwards et al., 2019).

A significant decrease in pain catastrophizing was observed at post-treatment and follow-up. Similar findings have been reported for Internet-based ACT (Trompetter et al., 2015), but not for Internet-based CBT (see Mehta et al., 2019, for more). Mindfulness, acceptance and reduced rumination are components of self-compassion that run counter to pain catastrophizing - a well-established and robust predictor of pain-related disability (Arnow et al., 2011). Online programs like the present intervention may be an efficient way to combine the practices of mindfulness and self-compassion to impact vulnerability factors involved in the experience of pain. Known vulnerability factors also include anxiety and depression, both of which significantly improved by the post-treatment assessment with gains maintained at follow-up. These gains are comparable to gains reported for Internet-based CBT among pain patients (Mehta et al., 2019).

Unlike previous findings on Internet-based self-compassionate writing, ACT or face to face MSC (Torrijos-Zarcero et al., 2021; Trompetter et al., 2015; Ziemer et al., 2015), significant changes in pain intrusiveness were not observed. However, a small effect size was found in the desired direction post-treatment, which is comparable to the effect reported by Torrijos-Zarcero et al. (2021). In that investigation, however, improvements in intrusiveness were not maintained at follow-up. Given that increased self-compassion reduces rumination, avoidance and isolation - factors identified as relating to pain intrusiveness (Devins, 2010; Neff, 2003) - additional research is necessary to better understand the role that self-compassion may play on pain intrusiveness.

4.4. Limitations

Despite the positive outcomes obtained in the present study, several limitations need to be acknowledged. As a feasibility study, the sample was small, and a control group not included. The possibility thus remains that the improvements found on several outcome variables relate to factors other than the intervention including the regression toward the mean. Like other pain studies (e.g., Ziemer et al., 2015), most participants were women, and other participant characteristics, such as the ethnicity or the proportion of clients residing in rural areas, were not assessed which could limit generalizability. When compared to previous pain research (e.g., Katz et al., 2015), lower levels of anxiety and depression were found at pre-treatment thereby also impacting the generalizability of the findings to individuals experiencing more severe mood disruption. As mentioned before, recruiting using Facebook sponsored posts may have negatively impacted the representativeness of the sample as well. In terms of treatment satisfaction, only study completers provided feedback so the acceptability of the program may be overestimated - particularly considering the relatively modest treatment adherence. As the writing process may result in some distress, it may be important to track any such negative event for future safety planning. It should be noted that no deterioration of symptoms was observed in the present study nor were there any negative or adverse events reported by the participants during the program or at the post-treatment telephone interview. It is unclear if similar outcomes would be obtained if participants would not have been instructed to complete the writing exercises in relation with their pain. Torrijos-Zarcero et al. (2021) did not adapt the MSC program for pain. The effect sizes in the present study appear to be larger. This remains to be further studied.

5. Conclusion

The present feasibility study assessed a minimally monitored online self-compassion program for chronic pain that involved accessing selected components of a publicly available and well-established self-compassion psychoeducation website and making them pain relevant. Although uptake and adherence were low, and attrition elevated, this may not relate to the program itself but rather to the recruitment strategy that was used. Satisfaction among study completers was high and findings on preliminary treatment effectiveness suggest that self-compassion may positively impact protective and vulnerability pain-related factors. Considering the overall results on feasibility outcomes,

further research on such programs appears worth pursuing, albeit with learned methodological enhancements. Optimal recruitment strategies need to be determined and improvements in participant screening, program flexibility and content are recommended to increase participant engagement. The development of efficacious web-based self-compassion programs has considerable potential to benefit adults with chronic pain who have limited access to psychological help or prefer online-based interventions. The use of a minimally monitored model of delivery may be a scalable and cost-efficient strategy to support the utilization of public online psychoeducational resources as part of a stepped care model of care for adults with chronic pain.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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