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Research Article

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Participant factors and baseline pain manifestations as predictors of pain outcomes following telehealth group-based pain management programs

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Abstract

Objectives: *Telehealth pain management has become instrumental in managing patents with chronic pain (CP) since the onset of the COVID-19 pandemic. Little is known, however, about which patient's best respond to these telehealth interventions. The primary aim of this study was to investigate patients' demographic and clinical characteristics that predict the efficacy of telehealth Group-Based Pain Management Programs (GPMPs) based on change in various pain outcome measures from pre-to-post-intervention.*

Methods: *The research included five separate telehealth GPMP groups each consisting of patients from different countries with various musculoskeletal CP conditions. Each group met once a week for 3 hours via zoom software and ran over a course of 6 weeks in which CP self-management techniques were taught. Pain outcome measures were taken at baseline and after the final telehealth GPMP. Regression analyses as well as other statistical procedures were used to determine the predictive nature of the patient's demographic and clinical variables.*

Results: *Baseline emotional wellbeing demonstrated statistically significant associations ($p<0.05$) with baseline outcome measures. The primary pain outcome measures including the Pain Self-Efficacy Questionnaire, the Pain Catastrophizing Scale-Total and the Tampa Scale of Kinesiophobia, all showed large effect sizes; $d=0.90$, $d=0.75$ and $d=0.77$ respectively. Changes in the primary pain outcome measures` scores all showed statistically significant relationships ($p<0.05$) with their individual baseline scores.*

Conclusion: *Telehealth GPMPs have an important clinical role to play in the management of patients with CP. Understanding patients` clinical and demographic characteristics appears to be an important factor in predicting changes in pain manifestations.*

Keywords: Chronic musculoskeletal pain, Clinical predictive factors, Demographic predictive factors, Group-based pain management programs, Telehealth

Introduction

Within the United States of America (USA), the Centre's for Disease Control and Prevention (CDC), estimates of chronic pain (CP) amongst U.S adults range from 11% to 40%, with surmountable population subgroup discrepancy [1]. Evidently, when exploring patients with CP, their age and patients` variances in population groups including different countries of origin, ethnicities, cultures and more, is important to consider when analyzing the results of any pain management programs including telehealth group-based pain management programs (GPMPs). Based on the recent and current COVID-19 pandemic, and the necessity for social distancing, telehealth has become an essential and integral component of healthcare delivery. Besides restrictions to in-person care as a result of the COVID-19 pandemic, common geographical barriers and access to healthcare consultations with pain specialists for patients living in in the community is often difficult; pain specialists are generally concentrated in urban areas [2,3]. Ultimately "TelePain bridges physical distances through the use of video, web and telephone conferencing technologies to increase access to chronic pain management" and improving patients' quality of life (QOL) [2].

With specific reference to pain management programs carried out through group-based interventions, research has demonstrated specific demographics and clinical variables that potentially have an impact on the outcome of such treatment. Several studies suggest that demographic factors like race/ethnicity (country of origin), age, and gender may affect how individuals perceive the pain experience of others [4-7]. Further clinical characteristics of pain such as duration and severity of the pain, area of the body

affected and number of body parts affected, have been found to be predictors for ongoing pain, especially in women versus older men [8].

Several reviews have investigated how gender (role) and sex (biological) are associated with the manner in which 'men' versus 'women' experience pain [9-14]. It has been shown that men are more likely to report or even experience pain than women [11], however women are more prone to reporting pain in numerous locations on the body, and pursue treatment for their pain than men [12,15,16]. Overall, women seem to have lower pain thresholds and pain tolerance levels, different sensitivities to pain treatments and greater maladaptive pain coping skills and are therefore more likely to experience greater pain intensity and reduced function associated with their pain [10,17-20]. In a study assessing a pain management clinic that included comprehensive group pain management programs, women attended the clinic in far greater numbers, however had less visible pathology than men [21]. Importantly, it is still crucial to note that apparent physical or anatomical pathology is not an indicator for CP [21]. The CP experience is based on neurophysiological malfunctioning and thus the women may still have experienced greater pain symptomology than men. Therefore, with reference to the current telehealth GPMP study, investigating whether there were associations and predictive qualities between gender and pain outcomes following intervention was of interest.

Patient demographics and clinical characteristics have been found to be correlated with reported reduced QOL and greater pain severity [22]. Included in these clinical characteristics is Emotional Well-Being (EWB) at baseline. It has been suggested that emotional distress and disturbed emotional processing, may influence the outcome of pain management treatment [23,24]. In a study that examined comprehensive GPMPs, 77% of the patients had significant associated psychological and/or psychiatric comorbidities [21]. Therefore, understanding the association between EWB and pain outcomes following GPMPs that are implemented through telehealth, as in the current research, was a useful task to complete. The above relationships as evaluated in the present research, aids in further understanding these relationships and potentially assists in gaining more insight into predictors underlying post- treatment pain outcomes following such intervention.

Available literature suggests that older people have a higher frequency of CP than younger groups of patients [25]. The older an individual becomes, the more likelihood of increasing multimorbidity and thus, the more advanced a patients age, the more possible it is that he or she has encountered noxious stimuli or injury that can potentially trigger the onset of CP [12]. Examining pain in older adults can be more difficult as older individuals are commonly more restrained in wanting to converse about their pain experience and pain intensity levels [26]. A reason behind this may be a conglomeration of factors, however one of the main issues may be the idea that individuals who have lived longer with pain and been to multiple healthcare professionals regarding the pain, might be fatigued in terms of discussing their pain. Furthermore, age-related disease mechanisms such as cognitive deterioration and dementia, may add to the notion that older patients tend not to discuss their pain, which in turn makes identifying and managing their pain, a more challenging task for clinicians [26]. Therefore, understanding age in relation to pain management is a much-needed investigation, and potentially even more so with the implementation of the telehealth format that has become increasingly used in healthcare based on the COVID-19 pandemic. As such, the current research using telehealth, aimed to examine age as a variable that may be associated and predictive of pain outcome measures following GPMPs that are conducted using the telehealth format.

An investigation into the relationship between demographic and psychosocial factors with pain manifestations and pain intensity was relatively recently conducted [27]. This particular study found that there was a significant association between pain intensity and level of education, and income and pain-related disability [27]. Individuals who have low level of education, perceived income inequalities, and large levels of neighborhood/location deficiency, are more likely to experience CP than those in opposition who have high levels of education, less perceived income inequality and who live in more prosperous areas, including more affluent countries [28]. It has been further shown that individuals who are socio- economically disadvantaged, are not only more likely to experience CP than people who are more well off economically, but they are also more likely to experience greater pain intensity and greater magnitude of pain-related disabilities [29-31]. There has been shown to be complex ethnic and nationality variations in prevalence and outcomes of pain-related pathologies, although most of the mechanisms behind these differences remain inadequately comprehended [12,32,33]. Of importance the prevalence of CP and its impact on function and other pain outcome variables, has been found to be greater in developing countries than in developed countries [34]. Besides higher levels of symptoms, it has been demonstrated in interdisciplinary group CP programs that lower levels of education and being in racial-ethnic minority groups displayed less efficacious long-term treatment responses [35]. This is of particular relevance to the present study in which patients from various countries/nationalities around the world participated in the telehealth GPMPs.

Although there has been a recent study that looked at predictor variables relating to the format and structure of GPMPs, there is still limited research that has investigated the association and predictive value of participant demographic and clinical variables that may influence the outcomes of GPMPs [36]. The current study examined patients` demographic, clinical and pre-intervention pain manifestation variables that act as potential components towards the efficacy behind the outcomes of telehealth GPMPs. EWB, as an overall key contributor to the pain experience, should be assessed as a possible prognostic factor regarding pain manifestations following pain management programs. Therefore, gaining insight into patient's demographic and clinical characteristics, such as those described in this introductory section, were key elements

within this research in terms of exploring how these factors may act as potential predictor variables on overall pain outcomes following telehealth GPMPs. In addition, baseline CP manifestations such as pain intensity, pain self-efficacy, pain catastrophizing, pain kinesiophobia and overall QOL were all examined as potential predictors of magnitude of change in pain outcome measures following the present study`s telehealth GPMPs.

Materials and Methods

Patient Recruitment

The target population for this study was patients with chronic musculoskeletal pain (localized anywhere in the body or widespread). Due to this research aiming to examine telehealth (Zoom Software-Zoom Video Communications, San Jose California, USA) GPMPs, there were no geographic restrictions as to where patients were recruited from and therefore patients were recruited from different countries. All included patients were placed in 5 separate GPMPs. The aim was to have between 8 to 12 patients in each GPMP. Patient recruitment and screening of patients was completed by 3 research assistants (Doctor of Physical Therapy students). The research assistants were trained and supervised by the lead researcher (primary author of this research). The lead researcher remained blinded to the pain outcome scores and other matters related to each patient during the recruitment and screening process, including scores at post intervention follow-up.

Inclusion and Exclusion Criteria

Inclusion criteria: 1. Patients who had pain with or without referred pain, or post-surgical pain for 3 months or more. 2. Patients with chronic Musculoskeletal Pain (spine and extremities) including Osteoarthritis (OA) and Rheumatoid Arthritis (RA) 3. Patients ranging from the age of 20 and upwards. 4. Patients with or without referred pain, or post-surgical pain persisting for longer than 3 months. 5. No major changes in existing medication or other treatments during the course of the intervention and 6. Patients willing to participate in a group based telehealth program.

Exclusion criteria: 1. Patients unable to understand or speak English. 2. Pain due to malignancy. 3. Patients waiting to undergo surgery or having had surgery within the past 3 months prior to the commencement of the intervention. 4. Patients who were scheduled to start other types of treatment; for example, with a physical therapist, during the course of the program. 5. Patients with cognitive pathology. 6. Patients diagnosed psychiatric conditions (eg psychosis) and, 7. Patients with no access to internet or unable to use the Zoom software.

Intervention Description

Intervention Setting: GPMPs in this research were carried out through a telehealth format (Zoom software). Each group received the exact same treatment. The telehealth GPMPs included 6 sessions (1 session a week), and for approximately 3 hours per session. Table 1 reveals the treatment content that was provided through the telehealth GPMPs.

Content within (Telehealth) Group-Based Pain Management Program: Discussions and Sessions
General group Introduction: Ice-breakers
✓ Subjects introduce themselves
✓ Clinician introduced himself/herself
✓ Outline of aims of the program
✓ Shared Group goals
✓ Agreed upon group-rules
Impact of Pain on individuals` lives: Biopsychosocial impact
Pain cycles and activity cycles: over and under activity leading to `Boom and Bust` idea
Changing Maladaptive Pain Behaviors
SMART goal setting: Short-term, medium-term and long-terms goal setting
Pain diaries: Yes or No?
Therapeutic Pain Neuroscience Education (TPNE): What is pain?
The importance of exercise and movement: exercise and movement principles for chronic pain
Graded Activity, Graded exposure and Pacing: Use to achieve SMART goals without flaring up pain
Thoughts, Feelings and Behavior: Cognitive Behavioral therapy (CBT) and Dialectical Behavioral Therapy (DBT); Challenging unhelpful thoughts.
Psychological relaxation/stress management exercises and techniques; including mindfulness, meditation and other relaxation exercises
Flare-Up Management
Diet and Chronic Pain

Other topics and questions that group members requested to be covered through the course of the program
SMART goals: Specific, Measurable, Attainable, Realistic, Time-Based; TPNE: Therapeutic Pain Neuroscience Education, CBT: Cognitive Behavioral Therapy; DBT: Dialectical Behavioral Therapy; GPMP: Group-Based Pain Management Program.

Table 1: Group-based Pain Management Programs Content.

Outcome Measures

The primary pain outcome measures examined in this research were pain self-efficacy (The Pain Self Efficacy Questionnaire-PSEQ), pain catastrophizing (The Pain Catastrophizing Scale-PCS Total) and pain kinesiophobia (The Tampa Scale of Kinesiophobia-TSK). The secondary pain outcome measures for the purpose of this study were pain intensity (The Visual Analogue Scale -VAS) overall QOL (Short Form Health Survey -SF-36 Total). Lower scores on the VAS, PCS-Total and TSK suggest less pain intensity, less pain catastrophizing and less kinesiophobia respectively, and thus change in scores (pre-intervention scores subtracted from post-intervention scores) with a negative value represent improvement in these three outcome measures. Higher scores on the PSEQ, and SF-36 Total suggest greater pain self-efficacy and greater QOL and therefore change in scores (pre-intervention scores subtracted from post-intervention scores) with positive values suggest improvements in these two outcome measures results. Prior to the start of the intervention, baseline measures were taken for each of the above instruments and again following the end of the intervention. Qualtrics Software (Qualtrics Software Company, Provo Utah, USA) was used to capture the results of the outcome measures.

Patient demographics and baseline pain measures were collected by the research assistants in the screening process. The pain outcome scores were also collected at post-intervention follow-up by the research assistants. The main demographics and clinical characteristics required for collection were gender, age, ethnicity (country of origin/nationality), site of pain on the body, number of months with pain, and EWB (SF-36 general health and emotional well-being sub-measure) at baseline. As with the SF-36 Total scoring system, the SF-36 general health and EWB sub-measure suggests that a higher score reflects stronger EWB and therefore change in scores with positive values indicates improvements in the patients` EWB.

Intervention Description: At the beginning of each session following session 1, patients were provided with the opportunity to summarize their week and how their use of the tools taught to them in the previous session went. They also had opportunity to ask questions at which point the clinician was able to answer the questions and/or other group members may have aided in facilitating the answers. A Power Point Presentation (PPP) was used to navigate each session in combination with a supplementary pain management manual for each patient that had been developed over many years by the primary author. The manual was designed to consolidate patients` knowledge and tools around self-management strategies. The manual also incorporated homework tasks for the patients to undertake between sessions to practice various skills that had been taught to them during the weekly get-together sessions. The actual exercise sessions were not created to act as a specific treatment modality as part of the GPMPs, but rather instituted to merely educate patients on how to exercise with CP and reduce their potential fear underpinning exercise through graded exposure, graded activity, and pacing techniques. At the end of the final session (1-2 days following the last session) each patient was again required to complete the outcome measures.

Statistical Procedures: To begin with, relevant tests for normality of distribution of the outcome measures data for pre post-test changes in the study were completed prior to any of the following statistical procedures to assess whether to use parametric versus non-parametric statistical tests. In addition, all underlying assumptions for each statistical test were also examined before conducting the specific statistical examination. Baseline descriptive measures were first examined including the means, standard deviations, and frequencies for each demographic, clinical characteristic and baseline pain outcome measures. The main parametric analyses performed in this study were firstly, Pearson's Correlation Coefficient tests to examine whether or not there was a relationship between all the continuous variables in the study (age, time with pain, EWB and baseline pain outcome measures' scores) as the independent Variables (IV), with all the pre-test post-test changes in scores for the pain outcome measures as the dependent variables (DVs). For the Pearson's correlation coefficient values, a magnitude (-1 to+ 1) and significance or lack thereof amongst the relationships was noted. In terms of strength of the relationship, 0.7 is considered strong, between 0.5 and 0.7 is moderate strength and less than 0.4 is a weak or no correlation [37]. Eta values and Eta-squared values were also calculated to reveal the association between the categorical/nominal baseline variables (gender, nationality, site/location of pain) with the continuous DVs.

Following the above analyses and based on the Pearson's correlation coefficients that displayed statistically significant results, multiple linear regression was used for the DVs that had more than one IV found to be statistically significant. Multiple regression analyses were used to determine the best predictive variables among the specific IVs on the magnitude of change in each DV. The categorical nominal variables (gender, nationality and site/location of pain) were added to each model to understand their influence on each model.

Cohen's d effect sizes were calculated to determine the effect size pertaining to the magnitude of change in the pain outcome scores from baseline to post-intervention using an online statistical calculator(https://www. socscistatistics.com/effectsize/). Commonly used interpretations of Cohen's d results are small

being d=0.2, medium d=0.5 and large being d=0.8 [38].

Results

A total of 42 patients started the intervention with no drop out during the intervention. Table 2 below, provides the descriptive statistics for the specific variables analysed in this study; baseline data, post-treatment data and difference in scores from pre-to post-treatment for the pain outcome measures.

All EWB baseline scores showed a statistically significant association with all pre-treatment pain outcome measures' scores. In addition, all post-treatment pain outcome scores displayed improvements with respect to their baseline scores. Again, based on how each outcome measure instrument functioned, the particular mean score for change was either positive or negative. In addition, the primary outcome measures being the PSEQ, PCS-Total and TSK had medium to large effect sizes between pre-and-post-intervention scores; d=0.90, d=0.75 and d=0.77 respectively. Table 2 summarizes the mean scores and standard deviations of the pain outcome measures at baseline, post-treatment, as well as the mean scores and standard deviations for the score changes from pre-to-post treatment. In addition, Table 2 provides the mean age and standard deviation for age, duration with pain, and baseline EWB. Frequencies are also provided for nationality, gender and location of pain on the body. Finally, Table 2 also provides correlational analyses between the baseline pain outcome measures scores and age, time with pain and EWB.

Pain Outcome Measures and other Clinical and Demographic Variables.	Means (SD) for the Pain Outcome Measures at baseline and Frequency for the Demographic and Clinical Variables at Baseline (pre-treatment).	Pearson`s Correlations between continuous demographic/clinical variables and Baseline Pain outcome Measure scores: *Statistically significant results (p<0.05)	Post-Treatment Pain Outcome Measures` Mean scores (SD). *Improvement in scores	Pre-Treatment – Post-Treatment Mean Score Differences for the Pain Outcome Measures: Mean (SD)., Cohen`s *d* effect size
VAS	61.09 (20.49)	• VAS with age: r= 0.14, p=0.37 • *VAS with EWB: r= -0.36, p=0.02 • VAS with pain duration: r= 0.03, p=0.82	*53.19 (22.25)	-7.90 (18.65), *d*=0.36
PSEQ	32.50 (11.61)	• PSEQ with age: r= 0.07, p=0.64 • *PSEQ with EWB: r= 0.60, p=0.00 • PSEQ with pain duration: r= -0.07, p=0.63	*42.45 (10.44)	9.95 (10.52), *d*=0.90
PCS-Total	25.30 (13.59)	• PCS-Total with age: r= 0.07, p=0.63 • *PCS-Total with EWB: r= -0.52, p=0.00 • PCS-Total with pain duration: r= -0.03, p=0.82	*15.78 (11.40)	-9.52 (10.52), *d*=0.75
TSK	39.14 (7.25)	• TSK with age: r= -0.12, p=0.45 • *TSK with EWB: r= -0.42, p=0.01 • TSK with pain duration: r= -0.20, p=0.25	*33.47 (7.49)	-5.66 (6.90), *d*=0.77
SF-36 Total	46.58 (15.62)	• SF-36 Total with age: r= -0.08, p=0.57 • *SF-36 Total with EWB: r= 0.52, p=0.00 • SF-36 Total with pain duration: r= -0.02, p=0.90	*54.91 (15.52)	8.56 (15.69), *d*=0.53
SF-36 EWB	59.38 (18.60)	N/A	N/A	N/A
Age (years)	51.33 (16.32)	N/A	N/A	N/A
Duration of Pain (years)	15.13 (14.16)	N/A	N/A	N/A
Location of Pain on the Body • Multiple sites: • Spinal (one or more areas): • Upper limb only: • Lower limb only: • Other:	 • 26 subjects (61.9%) • 11 subjects (26.2%) • 1 subjects (2.4%) • 1 subjects (2.4%) • 3 subjects (4.7%)	• N/A	N/A	N/A
Nationality: • South Africa: • Other:	 • 27 subjects (64.3%) • 15 subjects (35.7%)	N/A	N/A	N/A

VAS:Visual Analogue Scale; PSOCQ:Pain Stages of Change Questionnaire; PSEQ:Pain Self-Efficacy Questionnaire; PCS-Total:Pain Catastrophizing Scale Total Score; TSK:Tampa Scale of Kinesiophobia; SF-36 Total:Short Form Health Survey-36 Total Score (Overall quality of Life); SF-36 EWB:SF-36 Emotional wellbeing.

Table 2: Descriptive Statistics for the Scores of the Baseline (pre-treatment) Pain Outcome Measures, Post Treatment Pain Outcome Measures, Difference in Scores from Baseline to Post-Treatment as well as Other Baseline Clinical and Demographic Variables.

Table 3 summarizes the results of the Pearson's Correlations Coefficients between baseline measures and change in scores from pre-to-post-intervention. The magnitude of the statistically significant associations ranged from either a positive or negative weak relationship to a moderately strong negative relationship. The weakest relationships included r=-0.31 between the PCS-Total at baseline measure and change in score for the TSK from pre-to-post treatment suggesting a weak inverse relationship between PCS-Total scores at baseline and change in TSK scores. In addition, the TSK baseline score and change in PSEQ scores had a weak positive relationship being r=0.31. The strongest relationship was between the PCS-Total baseline score and changes in PCS-Total scores from pre-to-post treatment. This showed a moderately strong inverse relationship (r=-0.60). This result suggests that if a patient scored very high (poorly) on the PCS-Total score at baseline, the change in score from pre-to-post treatment would be small, meaning PCS-Total would only improve slightly. However, if a participant scored low at baseline, the magnitude of change increases even further which would account for even greater improvements in scores at post treatment for this measure. To note, it was the primary outcome measures in this study, namely the changes in scores for the PSEQ, PCS-Total and TSK that all had more than one statistically significant association with specific IVs. However, it is relevant to note that changes in pain intensity (VAS) had a positive weak relationship with baseline EWB (r=0.37) and was statistically significant ($p<0.05$). In addition, change in VAS scores also had a weak but inverse relationship with EWB measured at baseline which was also statistically significant ($p<0.05$, r=-0.37). Figures 1, 2 and 3 all graphically reveal the associations between the pre-treatment primary outcome measures` scores (PSEQ, PCS-Total and TSK scores) with their respective change in scores from pre-to post-treatment.

Mean Pre-Treatment (Baseline) Measures:	VAS Pre-Post treatment differences as Improvement; (r, p-value)	PSEQ Pre-Post treatment differences as Improvement; (r, p-value)	PCS-Total Pre-Post treatment differences as Improvement; (r, p-value)	TSK Pre-Post treatment differences as Improvement; (r, p-value)	SF-36 Total Pre-Post treatment differences as Improvement; (r, p-value)
Age	r= 0.27, p=0.08	r= -0.10, p=0.57	r= 0.10, p=0.62	r= 0.34, *p=0.02	r= -0.01, p=0.93
Length of Time with Pain	r= 0.13, p=0.39	r= -0.10, p=0.53	r= 0.10, p=0.52	r= 0.01, p=0.92	r= -0.10, p=0.54
SF-36-EWB (Emotional wellbeing measure)	r= 0.37, *p=0.01	r= -0.36, *p=0.02	r= 0.32, *p=0.04	r= 0.36, *p=0.02	r= -0.30, p=0.06
VAS	r= -0.37, *p=0.04	r= 0.30. p=0.05	r= -0.13, p=0.40	r= -0.04, p=0.80	r= 0.10, p=0.58
PSEQ	r= 0.18, p=0.25	r= -0.56, *p=0.00	r= 0.18, p=0.24	r= 0.17, p=0.26	r= -0.01, p=0.94
PCS-Total	r= -0.28, p=0.07	r=0.33, *p=0.03	r= -0.60, *p=0.00	r= -0.31, *p=0.04	r= 0.16, p=0.31
TSK	r= -0.15, p=0.34	r= 0.31, *p=0.04	r= -0.26, p=0.09	r= -0.44, *p=0.00	r= 0.19, p=0.22
SF-36-Total	r= 0.15, p=0.32	r= -0.36, *p=0.02	r= 0.36, *p=0.02	r= 0.30, p=0.06	r= -0.50, *p=0.00

VAS: Visual Analogue Scale; PSOCQ: Pain Stages of Change Questionnaire; PSEQ: Pain Self-Efficacy Questionnaire; PCS-Total: Pain Catastrophizing Scale Total Score; TSK: Tampa Scale of Kinesiophobia; SF-36 Total: Short Form Health Survey-36 Total Score (overall Quality of Life); SF-36 EWB: SF-36 Emotional Wellbeing; r: Pearson`s Correlation Coefficient.

Table 3: Summary Table of Pearson`s Correlation Coefficients between Pre-treatment/Baseline continuous Variables/Measures and Pre-Post Treatment Differences as Improvement in Pain Outcome Measures (Pain Manifestations).

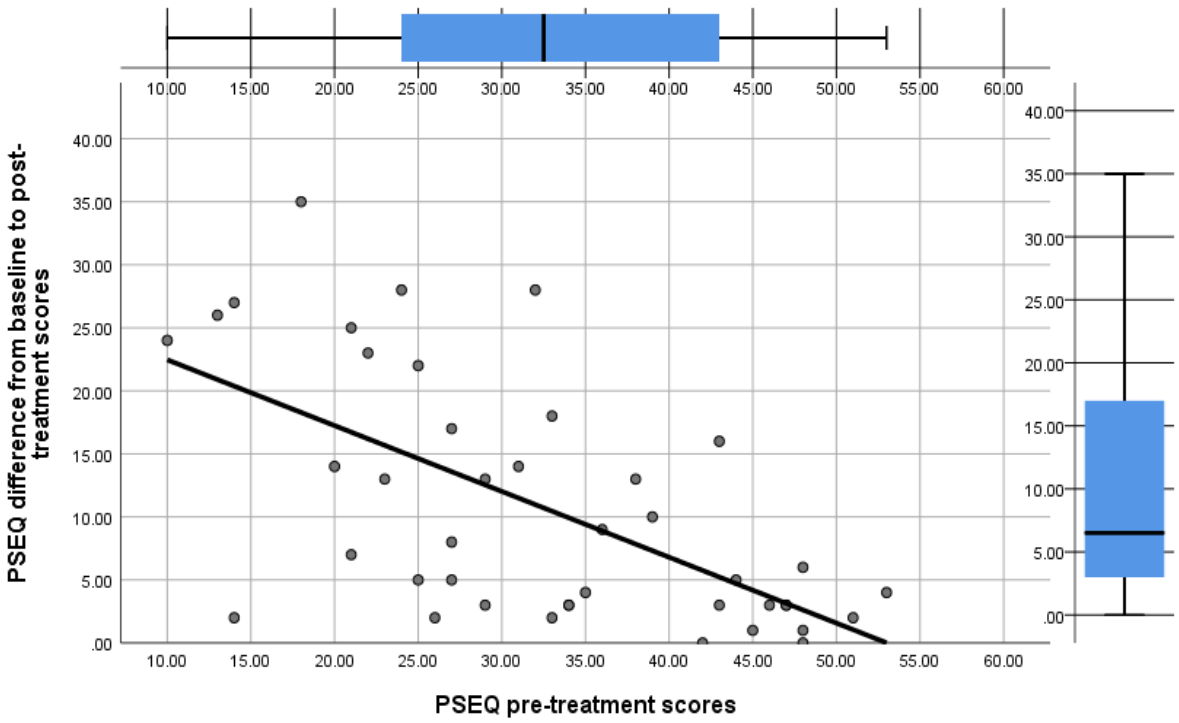

Figure 1: Scatter plot and Box and Whisker plot presenting the statistically significant association between PSEQ pre-treatment scores (IV) and the PSEQ pre-post treatment difference in mean scores (DV).

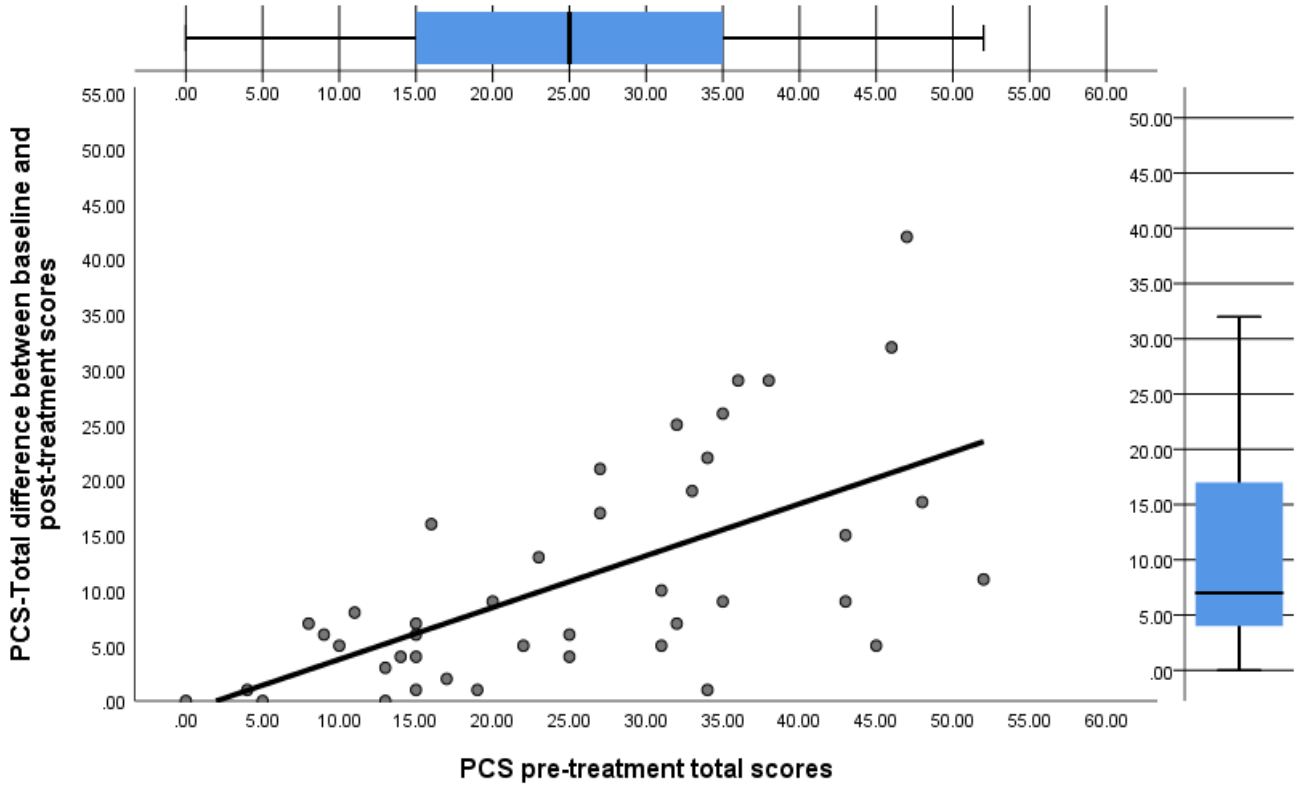

Figure 2: Scatter plot and Box and Whisker plot presenting the statistically significant association between PCS-Total pre-treatment scores (IV) and the PCS-Total pre-post treatment difference in mean scores (DV).

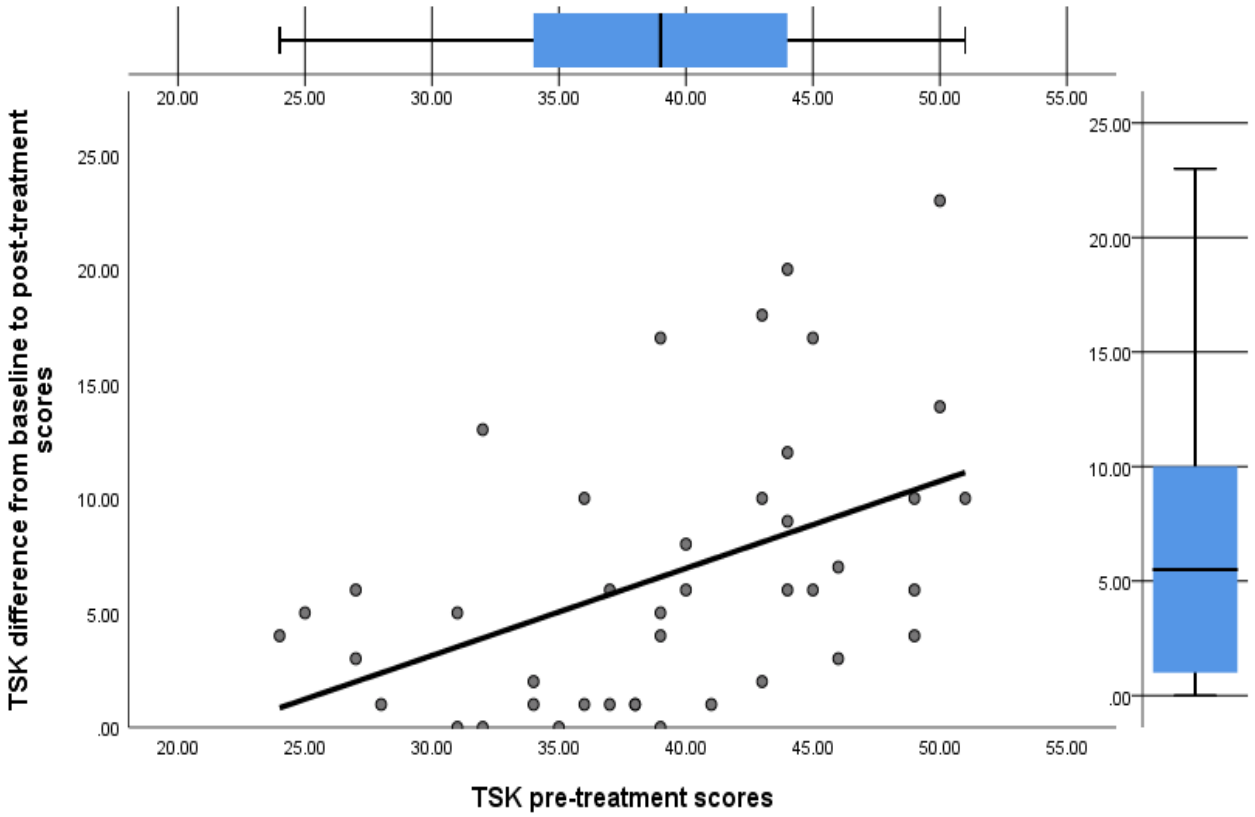

Figure 3: Scatter plot and Box and Whisker plot presenting the statistically significant association between TSK pre-treatment scores (IV) and the TSK pre-post treatment difference in mean scores (DV).

Multiple Regression Analyses

Through the correlation analyses, the primary outcome measures that were statistically significantly associated with more than one IV, included all 3 primary outcome measures:1. The PSEQ, 2. The PCS-Total, and 3. The TSK. Each of these DVs were analyzed against the variable/s with which they had a statistically significant association. The IVs that were therefore included in the analyses were age, EWB, baseline PSEQ, baseline PCS-Total, baseline TSK and the baseline SF-36 Total scores. Table 4 summarizes the results of the regression analyses.

Multiple Regression Statistics	PSEQ: Change in Scores from pre-to post treatment (DV)	PCS-Total: Change in Scores from pre-to post treatment (DV)	TSK: Change in Scores from pre-to post treatment (DV)
-IV Variables entred into the model:	• SF-36 Total pre-treatment, TSK pre-treatment, EWB, PCS-Total pre-treatment, PSEQ pre-treatment	• SF-36 Total pre-treatment, EWB, PCS-Total pre-treatment.	Age, EWB, PCS-Total pre-treatment., TSK pre-treatment
-Model overall correlation:	• r=0.56	• r=0.60	• r=0.53
-F statistic (p-value):	• 3.31 (*p=0.01)	• 7.39 (*p=0.00)	• 3.73 (*p=0.01)
-R-squared, % variation explained by the model on the DV, and p-value final model:	• 0.31, 31%, (*p=0.01)	• 0.37, 37% (*p=0.00)	• 0.28, 28% (*p=0.01)
-Unstandardized Beta, t-value, p-value, 95% CI :	➢SF-36 Total: B=-0.02, t=-0.15, p=0.87, 95% CI= -0.26 to 0.23 ➢TSK: B=-0.01, t=-0.05, p=0.95, 95% CI= -0.58 to 0.55 ➢EWB: B=-0.03, t=-0.33, p=0.74, 95% CI= -0.24 to 0.17 ➢PCS-Total: B= -0.02, t=-0.14, p=0.89, 95% CI= -0.34 to 0.30 ➢PSEQ: B= -0.50, , t=-2.53, *p=0.01, 95% CI= -0.86 to -0.10	➢SF-36 Total: B=0.08, t=0.76, p=0.42, 95% CI= -0.14 to 0.32 ➢EWB: B=-0.02, t=-0.20, p=0.83, 95% CI= -0.23 to 0.18 ➢PCS-Total: B= -0.50, t=-3.60, *p=0.00, 95% CI= -0.74 to -0.21	➢Age: B=0.11, t=1.69, p=0.10, 95% CI= -0.02 to 0.24 ➢EWB: B=0.04, t=0.53, p=0.60, 95% CI= -0.10 to 0.17 ➢PCS-Total: B= 0.008, t=0.08, p=0.93, 95% CI= -0.20 to 0.22 ➢TSK: B=-0.36, t=-2.02, p=0.05, 95% CI= -0.72 to 0.001
-Tolerance for each variable:	• SF-36 Total (0.57), TSK (0.51), EWB (0.58), PCS-Total (0.45), PSEQ (0.43)	• SF-36 Total (0.68), EWB (0.62), PCS-Total (0.68)	• Age (0.80), EWB (0.58), PCS-Total (0.47), TSK (0.54)
-VIF:	• SF-36 Total (1.73), TSK (1.95), EWB (1.71), PCS-Total (2.21), PSEQ (2.29)	• SF-36 Total (1.47), EWB (1.61), PCS-Total (1.47)	• Age (1.24), EWB (1.71), PCS-Total (2.12), TSK (1.82)

VAS: Visual Analogue Scale; PSOCQ: Pain Stages of Change Questionnaire; PSEQ: Pain Self-Efficacy Questionnaire; PCS-Total: Pain Catastrophizing Scale Total Score; TSK: Tampa Scale of Kinesiophobia; SF-36 Total: Short Form Health Survey-36; SF-36 Total: Scale for Overall Quality of Life; SF-36 EWB: SF-36 Emotional Wellbeing; *Significant p-value set at p<0.05.

Table 4: Main Regression Analysis Summary Table; Relationships between the Predictor Variables (IVs- Statistically Significant Baseline Scores from previous Pierson`s Coefficient Analyses) and DVs (Pain Outcome Scores` Difference from Pre-Treatment to Post-Treatment.

1. The PSEQ Pre-Treatment Post-Treatment Score Difference (DV) with mean PSEQ pre-treatment scores, mean PCS-Total pre-treatment scores, mean TSK pre-treatment scores, mean SF-36 Total pre-treatment scores and the mean EWB pre treatment scores: A multiple linear regression model was fitted to explain in the difference in scores for the PSEQ from baseline to post-treatment, based on the mean pre-treatment scores of the PSEQ, PCS-Total, TSK, SF-36-Total and EWB. The results of the overall correlation for this model was positive and moderate in size (r=0.56). The proportion of variance in the dependent variable that was explained by the independent variables (the full model) was 31% and was found to be statistically significant (p<0.05) as well as the overall variation on the difference in scores for the PSEQ from baseline to post treatment based on this model was 31% (R-Squared=0.31). As shown in Table 4, the only statistically significant predictor variable (p<0.05) was pre-treatment mean PSEQ scores. For every unit increase in the PSEQ at pretreatment, the predicted difference in scores for the PSEQ from baseline to post-treatment decreased by 0.50 (B=-0.50) units. This decrease in change of scores might potentially be the results of regression to the mean based on this research being a longitudinal study. All other relevant statistical data are presented in Table 4.

2. The PCS-Total Pre-Treatment Post-Treatment Score Difference (DV) with the mean PCS-Total pre-treatment scores, mean SF-36 Total pre-treatment scores and the mean EWB pre treatment scores: A multiple linear regression model was fitted to explain in the difference in scores for the PCS-Total from baseline to post-treatment, based on the mean pre-treatment scores of the PCS-Total, SF-36-Total and the SF-36 EWB. The result of the overall

correlation for this model was r=0.60 (positive and moderate in strength). The proportion of variance in the dependent variable that was explained by the independent variables (full model) was 37% (R-Squared = 0.37). As presented in Table 4, the only statistically significant predictor variable was pre-treatment mean PCS-Total scores. For every 1 unit increase in the PCS-Total at pre-treatment, the predicted difference in scores for the PCS-Total from baseline to post treatment increased by 0.50 (B=-0.50) units. This decrease in change of scores might potentially be the result of regression to the mean based on this research being a longitudinal study. Potentially, despite the negative value, the way the PCS-Total measure functions and was scored, this still might mean that the predicted difference in PCS-Total scores increased by 0.50 units.

3. The TSK Pre-Treatment Post-Treatment Score Difference (DV) with the mean age, mean EWB, mean PCS-Total pre-treatment scores, and mean TSK pre-treatment scores: A multiple linear regression model was fitted to explain the difference in scores for the TSK from baseline to post-treatment the, based on the mean age of the sample, mean pre-treatment scores of the PCS-Total and mean pre-treatment TSK scores. The results to the overall correlation for this model was r=0.53 (positive moderate association). The proportion of variance in the dependent variable that was explained by the independent variables (the full model) was 28% (R Squared=0.28). There were no statistically significant predictive variables within this overall regression model. All relevant statistical data are shown in Table 4.

Baseline Demographic and Clinical Categorical Variables (IVs location of body pain, nationality and gender) association with each Primary Outcome Measures (DV); The PSEQ pre-treatment post-treatment mean score difference, the PCS-Total pre treatment post-treatment mean score difference, and the TSK pre-treatment post-treatment mean score: Table 5 below, demonstrates the strength of the association between the nominal/categorical variables (IVs) and the change in scores for the primary pain outcome measures (DVs). The interpretation of the strength of the associations are presented in the table via Eta scores, which all were small to extremely small in magnitude. As for location/site of pain in the body, the highest association was found between location of pain and the change in TSK scores (Eta=0.38). As for nationality, the largest association was found between nationality and the TSK change in scores (Eta=0.23). Finally, for gender, all the associations were extremely small; the highest being an Eta of 0.14, again with the TSK. In addition, Table 5 provides the percent variation that each sub-category under each nominal variable has on the IVs predictive nature on the DVs. To note, each nominal variable sub-category was mutually exclusive and therefore, for each category, the percent variations did not necessarily add up to 100%. Table 5 demonstrates no consistent pattern in variation of scores between the nominal sub-category variables and their associated IV with the DVs.

DV- Pain Outcome Measure Difference in Scores from Pre to Post-Treatment	Nominal IV- Site (location) of Pain	Nominal IV-Nationality (Country of Origin)	Nominal IV-Gender
PSEQ			
▪Eta:	•0.29 (small association between the 2 variables.	•0.003 (Extremely small association between the 2 variables)	•0.07 (Extremely small association between the 2 variables)
▪% of variation in the DV explained by the pre-treatment outcome measure (IV) for each category of the nominal IV (*mutually exclusive values):	➢Subjects with:	➢Subjects from:	➢Subjects classified as:
***Each subcategory is mutually independent therefore do not have to add up to 100%**	•Multiple sites:38.2% •Spinal pain (1 or more) regions): 31.5% •Other sites: 91.2% •Lower or upper limb: 0%	•South Africa:38.1% •Other countries:40.5%	•Female: 31.9% •Male: 69.9%
PCS-Total			
▪Eta:	•0.35 (small association between the 2 variables	•0.20 (small association between the 2 variables	•0.04 (Extremely small association between the 2 variables)
▪% of variation in the DV explained by the pre-treatment outcome measure (IV) for each category of the nominal IV (*mutually exclusive values):	➢Subjects with:	➢Subjects from:	➢Subjects classified as:
***Each subcategory is mutually independent therefore do not have to add up to 100%**	•Multiple sites:44.8% •Spinal pain (1 or more) regions): 44% •Other sites: 84.2% •Lower or upper limb: 0%	•South Africa:33.6% •Other countries:64.2%	•Female: 40.9% •Male: 32.6%
TSK			
▪Eta:	•0.38 (small association between the 2 variables.	•0.23 (small association between the 2 variables.	•0.14 (Extremely small association between the 2 variables)
▪% of variation in the DV explained by the pre-treatment outcome measure (IV) for each category of the nominal IV (*mutually exclusive values):	➢Subjects with:	➢Subjects from:	➢Subjects classified as:
***Each subcategory is mutually independent therefore do not have to add up to 100%**	•Multiple sites:20.6% •Spinal pain (1 or more) regions): 49.4% •Other sites: 54.7% •Lower or upper limb: 0%	•South Africa:18.1% •Other countries:29.8%	•Female: 22.3% •Male: 19.5%

Table 5: Association between the Nominal IVs (location of pain, nationality, and gender) on the change in scores for the pain outcome measures from pre-to post-treatment (DV). Eta values provided with strength of association noted. % of variation in the DV explained by the pre-treatment outcome measure score (IV) for each nominal variable category.

Discussion

Early detection of patients who may not improve through pain management treatment, via an assessment of baseline characteristics [39], including demographic variables and baseline clinical pain manifestations, as well as rate of change in pain outcome measures' scores, can facilitate the gathering of valuable knowledge around prognosis for patients with CP [39]. Based on the current research Pearson's Correlational analyses results, the only pre-treatment to post treatment differences to not display more than 1 statistically significant correlation with any of the pre-treatment variables besides its own pre-treatment scores, was the pain intensity (VAS) change in score and SF-36 Total score.

The general statistical non-significant results around baseline pain intensity as a predictor or as a DV in our current study, is echoed by a previous Multidisciplinary Pain Treatment (MPT) study that found patients experienced, on average, a small reduction in pain intensity within the first 6 months of attending a MPT [39].

Emotional Well-being at Baseline and Change in Pain Outcome Measures Scores: Interestingly, EWB at baseline had an inverse relationship with pain self-efficacy changes. Findings from the development of the Therapeutic Group Context Questionnaire (TGCQ), suggest that better EWB is consistent with significantly lower scores throughout the TGCQ [40]. The recent development of the TGCQ, allows researchers and clinicians to evaluate how patients in telehealth GPMPs perceive the amount that the Therapeutic Alliance (TA) and Group Dynamics (GDs) has on their overall pain experience [40]. This questionnaire has been shown to be a valid and reliable instrument for patients with CP, as assessed through telehealth GPMPs [40]. The hypothesis from the TGCQ development study was that patients with greater emotional stability and less social phobia required less TA and rely less on the telehealth group than patients with more compromised general emotional security. This idea is supported by previous literature that supports the notion that individuals with weaker emotional wellness and heightened social phobia seem to require more support from their clinicians and fellow group-members [41-43]. Therefore, they tend to build greater therapeutic relationships with their clinicians and other group members. Ultimately, this may have an effect on pain outcome measures following telehealth GPMPs, and potentially improve overall pain outcome variables. This may be specific to self-efficacy as a pain outcome measure; weaker EWB at baseline might serve as a function for improved self-efficacy through a telehealth GPMP, whereas better EWB at baseline might prohibit the initiation of greater self-efficacy through such an intervention for the reasons described above. Therefore, with respect to the current study, it is suggested that baseline EWB may be an important variable that aids in predicting changes in self-efficacy. These transformations in self-efficacy are suggested to occur secondarily through the formation of the TA and GDs by virtue of a telehealth GPMP intervention.

EWB at baseline was statistically significantly associated with all baseline pain outcome scores ($p<0.05$), in the current study, and suggested that better EWB was related to less pain manifestations based on all pain outcome scores for all measures at baseline. However, of interest, the current analysis suggested that with higher wellbeing measured at baseline, the change from baseline to post-treatment in self-efficacy, as alluded to previously, gets smaller. Therefore, having stronger EWB at the start of a telehealth group-based pain management intervention, may not have a major impact on changes in pain self-efficacy. This result may possibly be understood based on pain self-efficacy falling under the umbrella of general emotional wellness. A key finding in the current study suggests, however, that as EWB increases at baseline, it seems that changes in pain kinesiophobia and pain catastrophizing from pre-to-post treatment increases in a positive direction (improvement of both scores and constructs). Thus, this study suggests that better EWB at pre-treatment had a statistically significant relationship with changes in fear of movement and pain catastrophizing. In addition, improvements in the actual scores of the TSK and PCS scores, as well as all other pain outcome measures examined, demonstrated positive outcomes based on telehealth GPMPs.

As briefly noted earlier, in the multiple regression analyses (Table 4), the only demonstrated statistically significant predictive results regarding difference in scores based on pre-to post-intervention changes in scores, was with their individual baseline pain outcome scores. The above was apparent with the primary outcome measures being the PCS-Total and the PSEQ. However, there was no statistically significant predictive difference found with changes in TSK scores with the TSK baseline scores. Therefore, the only predictor variable (IV) that had a significant influence on the PCS-Total and PSEQ change in scores from pre-treatment post-treatment, was their individual pre-treatment mean scores. Thus, this was the best fit model produced for 2 of the 3 primary pain outcome measures evaluated in this research. Previous research found that higher levels of kinesiophobia were related to age [44]. It is suggested that the current telehealth study did not accommodate enough on a technological level for older adults, and so age did not appear to be a significant predictor for kinesiophobia specifically.

Baseline Pain Intensity and Emotional Well-being: Previous research has revealed that baseline pain intensity can act as a predictor for CP [45]. A further study that examined Chronic Lower Back Pain (CLBP), concluded that pain intensity at baseline was one of 2 variables that predicted an association with improved pain outcome measures immediately following McKenzie Physical Therapy treatment, as well as at 12 months follow up [46]. In the current research, EWB was found to have a statistically significant ($p<0.05$) and a weak to moderate inverse relationship ($r= -0.36$) with pain intensity at baseline. However, the current study did not find that pain intensity had a statistically significant association with any of the change in scores for the pain outcome measures excluding itself and was therefore not involved in any of the multiple regression analyses as a potential predictor variable, based on our methodology. Thus, increased EWB at baseline being associated with greater changes in VAS scores (VAS scores improving from pre-to-post treatment), appears to support the idea that psychosocial variables at baseline such as EWB, can have a positive impact on pain intensity as a measure of the pain experience. Higher levels of EWB at baseline may therefore be understood as a useful prognostic variable in improved pain intensity through telehealth GPMPs.

Change in Scores in Pain Outcome Measures Related to Patients` Individual Baseline Scores: When analyzing the multiple regression models associated with changes in the primary outcome measures, it was interesting to find that the only statistically significant predictors for each one of these DVs was their individual baseline scores at pre-intervention. With reference to the Perason`s Correlation Coefficient`s Table 3, each one of the baseline primary outcome measures` scores had a moderately strong inverse relationship with their change of scores from pre- to

post-intervention, suggesting that the higher their baseline scores, the less magnitude of change over the course of the intervention. This may be indicative of a potential ceiling effect where further clinical change may be limited as a result of higher baseline scores. However, in opposition, the lower their baseline scores, the greater their change in scores. This potentially suggests that individuals participating in a telehealth GPMP, have the capacity to improve upon their pain outcome scores, particularly if they score lower at pre-intervention. It may be hypothesized that lower scores at baseline, facilitate greater room for growth and improvement through a telehealth GPMP specifically with a focus on these particular pain outcome measures; pain self-efficacy, pain catastrophizing and pain kinesiophobia. In opposition, when reflecting upon the baseline scores of the above measures, the general correlational results indicated positive relationships with changes in other outcome measures besides changes within themselves. Therefore, this suggests that when patients score better at baseline in these primary outcome measures, other outcome measures seem to improve greater in terms of change and vice versa. This theory is highlighted in a previous piece of research that identified that higher levels of pain self-efficacy and pain acceptance at baseline, for example, were associated with more positive pain outcomes besides pain self-efficacy and pain acceptance [47]. However, it is important to note that baseline scores may be seen as potential covariates for the degree of change in the specific outcome measures evaluated.

Patients Beliefs around their Pain Experiences: An individual's belief and evaluation in the irreparability of deficits that may have developed as a result of a specific injury (or no identifiable injury), might contribute to symptoms of depression [48]. Depression and other associated emotions are understood to compound the burden of CP or chronic illness and in turn, contribute to disability, and therefore reduced QOL [48]. It is clear that patients` cognitions and emotional status around their pain experiences, is a critical area to evaluate when it comes to understanding baseline factors that possibly predict the outcomes following pain management, such as the current study; telehealth GPMPs. The results of this study suggest that EWB, measured at pre-treatment through the SF-36 EWB sub measure, had a weak to moderate association with the change in scores from pre-treatment to post-treatment in pain self-efficacy (PSEQ), pain catastrophizing (PCS) and pain kinesiophobia (TSK); r=-0.36, r=0.32 and r=0.36 respectively. All of these relationships displayed a statistically significant correlation ($p<0.05$). A previous study that evaluated psychological programs for surgical patients, emphasized that baseline emotional distress should be understood as a covariate for Readiness to Change (RTC) maladaptive behaviors with regards to general psychological distress [49]. Therefore, decreased overall psychological health and emotional well-being are factors that may negatively influence the efficacy that GPMPs such as the current telehealth GPMP study may have had on patient's pain outcomes following intervention.

Other Patient Demographic and Clinical Variables at Baseline being associated with Pain Outcome Measures: Another study which examined patients in a pain management program, used measures of depression, self-efficacy, kinesiophobia, location of pain on the body, duration of pain, gender, age, marital status, and race as predictor variables on pain related outcomes for patients with co-morbid musculoskeletal pain and depression [50]. The study found that kinesiophobia, as with the current study, was a significant predictor of various pain outcome measures following their intervention [50]. However, the study being referenced above, did not find statistically significant results pertaining to the baseline magnitude of depression, location of pain, pain self-efficacy as well as the other demographic variables on the pain outcome measures at post-intervention [50]. As with the research above by Ang et al. (2010), the current study did not find any initial statistically significant associations between the DVs and length of time with pain.

The present study also found that gender and nationality all contributed to a very small variation in the DVs explained by the specific pre-treatment mean pain outcome measures` scores. Location of pain contributed slightly more than gender and nationality on the variation in the DVs explained by the pre treatment mean pain outcome measures` scores.

Alongside age, gender, pain duration, pain intensity, pain sensory qualities, marital satisfaction and pain catastrophizing, a previous study found that perceived injustice emerged as the strongest predictor of pain interference measures, disability, depression, and anxiety [51]. Perceived injustice emerged as the strongest contributor towards certain pain manifestations such as disability, depression, and anxiety even when taking age, sex, pain duration, pain severity, pain sensory qualities, pain catastrophizing and marital satisfaction into account [51]. The current research found that baseline pain catastrophizing (PCS-Total) was a statistically significant predictor of change in pain catastrophizing scores from pre-to post treatment. However, the study by Martinez-Borba et al (2021) found that perceived injustice levels in patients with CP, was a greater predictor than pain catastrophizing and various other pain related variables (more specific to the pain sensation), in the explanation of both physical and mental status of individuals with CP [51]. The research by Martinez-Borba, et al (2021) did not include a pain management intervention, but rather retrospectively asked patients to fill in various questionnaires that related either to potential predictor variables and questionnaires that were related to various pain-related health variables. Thus, this alone could present with varying results according to the impact that an intervention study, such as the current telehealth GPMP research, may establish.

Limitations

The current research did not use the perceived injustice experience questionnaire as this was not initially identified as one of the key potential predictor variables for the pain outcome measures following telehealth GPMPs. Our sample size was only moderately large, which may have ensued various results being statistically insignificant (potential type 2 errors). However, it is still notable

that the sample did incorporate multiple positive facets including patients from different countries. Having patients included from a broad array of nationalities, allowed us to conclude that there was a variation in the pain outcome measures based on whether patients were from South Africa (the majority of patients) or whether they were from other countries. Although a main aim of the study was to examine how much various baseline pain outcome scores contribute to changes in these pain manifestation measures through telehealth GPMPs, we do highlight that these baseline scores may contribute to the overall results through the means of potentially acting as covariates.

Recommendations

Including measures examining patients perceived injustice levels whilst screening CP patients, has been found to be a significant predictor of poor psychological and physical health outcomes in this population group [51]. Future research should focus on perceived injustice as a potential baseline predictor variable on pain outcome measures following either in-person or telehealth GPMPs. In addition, it may be useful to measure perceived injustice as a DV, following such intervention, to understand whether or not a telehealth GPMP would change the degree of perceived injustice. Comparing the results of this study to the application of the baseline outcome measure scores as covariates, would be a useful statistical analysis in a future study. Finally, a larger sample size in future research may also account for the reduction of potential Type 2 errors.

Conclusion

Understanding, in more detail, the best predictive models around baseline variables can facilitate the most useful prognostic models implemented within telehealth GPMPs as well as the inclusion of cost-effective treatment approaches such as telehealth GPMPs. The current research found that most of the baseline demographic, clinical features and pain manifestations (IVs) might be relatively associated, to various degrees, to changes in various pain outcome measure scores from pre-treatment to post-treatment (DVs). However, not all of these baseline measures were statistically significant and thus were not included in the best fit predictor models for each DV. Notably, EWB at baseline was associated with greater change in the majority of pain outcome measures based on telehealth GPMPs. The study suggested that all the primary pain outcome measures that were investigated in this study (changes in their scores from pre-to post treatment), were statistically significantly predicted only by their individual pre-treatment outcome scores.

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References

1. Dahlhamer J, Lucas J, Zelaya C, Nahin R, Mackey S, et al. (2018) Prevalence of Chronic Pain and High-Impact Chronic Pain Among Adults United States, 2017. MMWR Morb Mortal Wkly Rep 67:1001-1006.
2. Eaton L, Gordon D, Wyant S, Theodore BR, MeinsAR, et al. (2014) Development and Implementation of a Telehealth Enhanced Intervention for Pain and Symptom Management. ContempClin Trials 38:213-220.
3. Shigekawa E, Fix M, Corbett G, Roby DH, Coffman J (2018) The current state of telehealth evidence: a rapid review. Health Aft (Millwood) 37:1975-1982
4. Anderson KO, Mendoza TR, Valero V, Richman SP, Russell C, et al. (2000) Minority cancer patients and their providers: Pain management attitudes and practice. Cancer88:1929-1938.
5. Chodosh J, Solomon D, Roth C, Chang JT, Maclean CH, et al. (2004)The Quality of Medical Care Provided to Vulnerable Older Patients with Chronic Pain. J Am GeriatrSoc52:756-761.
6. Myers CD, Riley3rd JL, Robinson ME (2003) Psychosocial contributions to sex-correlated differences in pain. Clin J Pain 19:225-232.
7. Wandner L, Scipio C, Hirsh A, Torres C, Robinson M (2012) The Perception Of Pain In Others: How Gender, Race, and Age Influence Pain Expectations.J Pain 13: 220-227.
8. Larsson C, Hansson EE, Sundquist K, Jakobsson U (2017) Chronic pain in older adults: prevalence, incidence, and risk factors. Scand J Rheumatol46(4):317-325.
9. Craft RM, Mogil JS, Maria Aloisi A (2004) Sex differences in pain and analgesia: The role of gonadal hormones. Eur J Pain 8(5):397-411.
10. EI-Shormilisy N, Strong J, Meredith P (2015) Associations among gender, coping patterns and functioning for individuals with chronic pain: A systematic review. Pain Res Manag 20(1):48-55.
11. Greenspan JD, Craft RM, LeResche L, Arendt-Nielsen L, Berkley KJ, et al. (2007) Studying sex and gender differences in pain and analgesia: A consensus report. Pain 132(SUPPL 1):1-22.
12. Mills SEE, Nicolson KP, Smith BH (2019) Chronic Pain: a Review of its Epidemiology and Associated Factors in Population-Based Studies. Br J Anaesth123(2): 273-283.
13. Unruh AM (1996) Gender variations in clinical pain experience. Pain 65(2-3):123-167.
14. Wiesenfeld-Hallin Z (2005) Sex differences in pain perception and interpretation.Gend Med 2(3):137-145.
15. Gobina I, Villberg J, Valimaa R, Tynjala J, Whitehead R, et al. (2019) Prevalence of Self-reported Chronic Pain Among Adolescents: Evidence from 42 Countries and Regions. Eur J Pain (United Kingdom) 23(2):316-326.
16. Ferreira KDS, Speciali JG (2015) Epidemiology of Chronic Pain in the Office of a Pain Specialist Neurologist. ArqNeuropsiquiatr 73(7):582-585.
17. Bartley EJ, Fillingim RB (2013) Sex Differences in Pain: A Brief Review of Clinical and Experimental Findings. Br J Anaesth 111(1):52-58.
18. Malon J, Shah P, Koh WY, Cattabriga G, Li E, et al. (2018) Characterizing the Demographics of Chronic Pain Patients in the State of Maine Using the Maine all Payer Claims Database. BMC Public Health 18(1):1-12.
19. Macedo LG, Smeets RJEM, Maher CG, Latimer J, McAuley

JH (2010) Graded activity and graded exposure for persistent nonspecific low back pain: A systematic review. PhysTher 90(6):860-879.

20. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, et al. (2017) Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden ofDisease Study 2016. Lancet. 390(10100):1211-1259.
21. Mailis-Gagnon A, Yegneswaran B, Lakha SF, Nicholson K, Steiman AJ, et al. (2007) Pain Characteristics and Demographics of Patients Attending a University-Affiliated Pain Clinic in Toronto, Ontario. Pain Res Manag 12(2):93-99.
22. Kerr S, Fairbrother G, Crawford M, Hogg M, Fairbrother D, et al. (2004) Patient Characteristics and Quality of Life among a Sample of Australian Chronic Pain Clinic Attendees. Intern Med J 34(7):403-409.
23. May C, Brcic V, Lau B (2018) Characteristics and complexity of chronic pain patients referred to a community-based multidisciplinary chronic pain clinic. Can J Pain 2(1):125-134.
24. Lumley M, Cohen J, Borszcz G, Cano A, Radcliffe AM, et al. (2011) Pain and emotion: a biopsychosocial review of recent research. J ClinPsychol 67(9):942-968.
25. Fayaz A, Croft P, Langford RM, Donaldson LJ, Jones GT (2016) Prevalence of chronic pain in the UK: A systematic review and meta-analysis of population studies. BMJ Open 6(6):1-12.
26. Schofield P (2018) The assessment of pain in older people: UK national guidelines. Age Ageing 47: 1-22.
27. Antony T, Merghani TH (2016) The influence of demographic and psychosocial factors on the intensity of pain among chronic patients receiving home-based nursing care. Indian J Palliat Care 22(3):362-365.
28. Jordan KP, Thomas E, Peat G, Wilkie R, Croft P (2008) Social risks for disabling pain in older people: A prospective study of individual and area characteristics. Pain 137(3):652-661.
29. Janevic M, McLaughlin S, Heapy A, Thacker C, Piette J (2017) Racial and Socioeconomic Disparities in Disabling Chronic Pain: Findings from the Health and Retirement Study. J Pain 18(12):1459-1467.
30. Brekke M, Hjortdahl P, Kvien TK (2002) Severity of musculoskeletal pain: Relations to socioeconomic inequality. SocSci Med 54(2):221-228.
31. Eachus J, Chan P, Pearson N, Propper C, Smith GD (1999) An additional dimension to health inequalities: disease severity and socioeconomic position. J Epidemiol Community Health 53:603- 611.
32. Breivik H, Collett B, Ventafriddda V, Cohen R, Gallacher D (2006) Survey of chronic pain in Europe: Prevalence, impact on daily life, and treatment. Eur J Pain 10: 287-333.
33. Campbell CM, Edwards RR (2012) Ethnic differences in pain and pain management. Pain Manag (3):219-230.
34. Vos T, Allen C, Arora M, Barber RM, Bhutta ZA, et al. (2016) Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet 388:1545-1602.
35. Huffman KL, Mandell D, Lehmann JK, Jimenez XF, Lapin BR (2019) Clinical and Demographic Predictors of Interdisciplinary Chronic Pain Rehabilitation Program Treatment Response. J Pain 20(12):1470-1485.
36. Romm MJ (2021) Telehealth Group-Based Pain Management Programs: A Prospective Cohort Prognostic Study Investigating Therapeutic Contextual Factors and Other Potential Predictor Variables that Impact on Pain Outcome Measures, University of Miami, Page no:1-414.
37. Schober P, Schwarte LA (2018) Correlation coefficients: Appropriate use and interpretation. AnesthAnalg126(5):1763-1768.
38. Lakens D (2013) Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. Front Psychol4:1-12.
39. Page MG, Romero Escobar EM, Ware MA, Choiniere M (2017) Predicting treatment outcomes of pain patients attending tertiary multidisciplinary pain treatment centers: A pain trajectory approach. Can J Pain 1(1):61-74.
40. Romm M, Cahalin LP (2021) The development of the Therapeutic Group Context Questionnaire: Reliability and validity measures based on telehealth Group-based Pain Management Programs. J Telemed TelecarePg No:1-13.
41. Woody SR, Adessky RS (2002) Therapeutic alliance, group cohesion, and homework compliance during cognitive behavioral group treatment of social phobia. BehavTher 33(1):5-27.
42. Turabian J (2019) Psychology of doctor-patient relationship in general medicine. Arch Community Med Public Heal 5(2): 62- 68.
43. De Balle M, Johnson JG, De Fruyt F (2010) Patient and clinician perceptions of therapeutic alliance as predictors of improvement in depression. Psychother Psychosom 79(6):378-385.
44. Larsson C, Ekvall Hansson E, Sundquist K, Jakobsson U (2016) Kinesiophobia and its relation to pain characteristics and cognitive affective variables in older adults with chronic pain. BMC Geriatr 16:128.
45. Mehta SP, Macdermid JC, Richardson J, MacIntyre NJ, Grewal R (2015) Baseline pain intensity is a predictor of chronic pain in individuals with distal radius fracture. J Orthop Sports PhysTher 45(2):119-127.
46. Garcia AN, Costa LOP, Costa LDCM, Hancock M, Cook C (2019) Do prognostic variables predict a set of outcomes for patients with chronic low back pain: a long-term follow-up secondary analysis of a randomized control trial. J Man ManipTher 27(4):197-207.
47. Kalapurakkel S, Carpino EA, Lebel A, Simons LE (2014) Pain Can't Stop Me: Examining Pain Self-Efficacy and Acceptance as Resilience Processes Among Youth With Chronic Headache. JpediatrPsychol 40(9):926-933.
48. Sullivan MJL, Adams H, Horan S, Maher D, Boland D, et

al. (2008) The Role of Perceived Injustice in the Experience of Chronic Pain and Disability: Scale Development and Validation. J OccupRehabil 18(3):249-261.

49. Krampe H, Salz AL, Kerper LF, Krannich A, Schnell T, et al. (2017) Readiness to change and therapy outcomes of an innovative psychotherapy program for surgical patients: Results from a randomized controlled trial. BMC Psychiatry 17(1):1-16.
50. Ang DC, Bair MJ, Damush TM, Wu J, Tu W, et al. (2010) Predictors of pain outcomes in patients with chronic musculoskeletal pain co-morbid with depression: Results from a randomized controlled trial. Pain Med 11(4):482-491.
51. Martinez-Borba V, Ripoll-Server P, Yakobov E, Susa-Ribera C (2021) Predicting the Physical and Mental Health Status of Individuals with Chronic Musculoskeletal Pain from a Biopsychosocial Perspective. Clin J Pain 37(3):211-218.