[Cross-cultural adaptation, reliability, and validity](https://www.tandfonline.com/doi/full/10.1080/09593985.2022.2108530?src=) of the Pain Self-Efficacy Questionnaire - Hebrew version

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# Abstract

*Purpose:* This study aims to translate, culturally adapt, and evaluate the psychometric properties of the Hebrew Pain Self-Efficacy Questionnaire (PSEQ).  
*Methods:* The study was designed according to the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) recommendations for patient-reported outcome measurement instruments. The PSEQ was initially translated into Hebrew and cross-culturally adapted. The Hebrew version of the PSEQ (PSEQH) was administered to participants suffering from chronic musculoskeletal pain, along with other self-report  
measures of pain (NPRS, FABQ, HADS, PCS, and SF-12). Eight hypotheses on expected correlations of the PSEQ-H with other instruments were formulated a priori to assess construct validity. Structural validity was assessed using confirmatory factor analysis. Floor and ceiling effects, test-retest, and internal consistency reliability were also assessed.  
*Results:* The translation process retained the unidimensional model of the PSEQ. The PSEQ-H demonstrates excellent internal consistency (Cronbach’s α = 0.97) and test-retest reliability (ICC = 0.88), and no significant ﬂoor and ceiling effects were observed. Construct validity was found satisfactory as 75% (six) of the analyses between the PSEQ-H and the other self-reported measures met the hypotheses. Factor analysis confirmed the single-factor structure of the questionnaire.  
*Conclusions:* The PSEQ-H version was found to have excellent reliability, good construct, and structural validity, and can be used with heterogeneous chronic musculoskeletal pain populations. Future studies should test the PSEQ-H’s responsiveness and psychometric properties with specific pain populations.

# Introduction

Globally, in 2017, musculoskeletal (MSK) disorders accounted for 1.3 billion prevalent cases, 121.3 thousand deaths, and 138.7 million Disability Adjusted Life Years (DALY) (Safiri et al., 2021). The most prevalent conditions were low back pain (36.8%), followed by other musculoskeletal diseases (21.5%), osteoarthritis (19.3%), neck pain (18.4%), gout (2.6%), and rheumatoid arthritis (1.3%) (Safiri et al., 2021).

Chronic musculoskeletal pain is chronic pain experienced in muscles, bones, joints, or tendons, characterized by significant emotional distress or functional disability longer than three months (Perrot et al., 2019). Chronic musculoskeletal pain is a highly prevalent, disabling, and costly condition, with a substantial socioeconomic burden on individuals, employers, healthcare systems, and society (Cimmino et al., 2011; Patel et al., 2012; Safiri et al., 2021).

Several psychological factors can be present in patients with chronic pain, which can play a vital role in predicting chronicity and recovery from chronic symptoms (Lee et al., 2015; Linton & Shaw, 2011; Pincus et al., 2002; Wessels et al., 2006). One of these psychological factors that have been extensively studied is self-efficacy (Martinez-Calderon et al., 2018). According to Bandura (1997) self-efficacy determines how much effort and persistence people exhibit in facing obstacles or aversive experiences (Bandura, 1977).

Higher self-efficacy levels are associated with greater physical functioning, physical activity participation, health status, work status, satisfaction with the performance, and overall lower levels of pain intensity, depressive symptoms and fatigue (Martinez-Calderon et al., 2018). Furthermore, self-efficacy has been found as the highest-potent mediator in the relationship between pain and disability (Lee et al., 2015). Self-efficacy is hypothesized to influence pain and associated outcomes in at least two ways. First, it affects the performance of actions necessary to manage or control pain (Lackner et al., 1996). Second, perceived self-efficacy can determine how situations associated with pain are managed. For example, patients with low pain-coping self-efficacy beliefs may avoid painful activities or use more pain medication in those situations (Council et al., 1988).

Several measuring tools are available to assess pain-related self-efficacy (Dubé et al., 2021). These tools include the Arthritis Self-Efficacy Scale (ASES; 20 items), the Chronic Disease Self-Efficacy Scale (33 items), the Pain Self-Efficacy Questionnaire (PSEQ; 10 items), and the Chronic Pain Self-Efficacy Scale (22 items), and the Self-Efficacy Scale (8 items) (Miles et al., 2011; Vergeld & Utesch, 2020). According to a recent Delphi study, the most frequently used and preferred self-efficacy measurement tool is the PSEQ, as it demonstrates sound clinometric properties and theoretical foundation (Sleijser-Koehorst et al., 2019).

The PSEQ has been used in several languages and clinical settings, mostly in chronic pain (Adachi et al., 2014; Asghari & Nicholas, 2009; Chala et al., 2021; Chiarotto et al., 2015, 2018; Dubé et al., 2021; Ferreira-Valente et al., 2011; Lim et al., 2007; Nicholas, 2007; Sardá et al., 2007; van der Maas et al., 2012). The PSEQ is a single-factor questionnaire comprising ten items rated on a 0-6 Likert scale, with higher scores representing better self-efficacy. For heterogeneous chronic pain populations, the PSEQ demonstrates excellent internal consistency with Cronbach's α coefficient of 0.88-0.94 and good test-retest reliability with ICC = 0.75-0.83 across its original and various translations (Adachi et al., 2014; Asghari & Nicholas, 2009; Ferreira-Valente et al., 2011; Lim et al., 2007; Nicholas, 2007; Sardá et al., 2007; van der Maas et al., 2012). Furthermore, confirmatory factor analysis with the population mentioned above supports the single-factor structure (Asghari & Nicholas, 2009; Ferreira-Valente et al., 2011; Nicholas, 2007; van der Maas et al., 2012; Vong et al., 2009).

As of yet, there is no translation of the PSEQ to Hebrew. Therefore, the main aim of this study is to translate, culturally adapt, and evaluate the psychometric properties of the PSEQ in Hebrew (PSEQ-H. Based on self-efficacy theory and previous findings, the PSEQ-H scores were hypothesized to correlate negatively, in a magnitude of 0.3-0.6, with pain, catastrophizing, distress, fear, and disability levels measured in this study (Chiarotto et al., 2015; Costa et al., 2011; Jackson et al., 2014; Martinez-Calderon et al., 2018; Nicholas et al., 2015; Sleijser-Koehorst et al., 2019).

# Methods

## Study design

This study was a cross-sectional online survey (Google Forms; Alphabet Co., Mountain View, California) conducted anonymously among participants in Israel suffering from chronic musculoskeletal pain. Phase one of the study included translating the PSEQ to Hebrew according to the recommendations for best practices in cross-cultural questionnaire adaptation (Beaton et al., 2000). Phase two included evaluating the psychometric properties of the translated version according to COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) (Mokkink et al., 2018; Prinsen et al., 2018; Terwee et al., 2018). Participants were requested to complete a sociodemographic characteristic evaluation (age, weight, height, smoking status, employment status, symptoms' location and duration) followed by the PSEQ-H and other validated Hebrew versions of self-reported pain-related measurements. The psychometric properties assessment process included internal consistency, test-retest reliability, Standard Error of Measurement (SEM), Smallest Detectable Change ­95% (SDC95%), construct validity, floor and ceiling effects, and structural validity using Confirmatory Factor Analysis (CFA). The study was approved by the ethical review board of Ariel University (AU-HEA-NBA-20200902-2).

## Translation procedure

The translation and cross-cultural adaptation process included the following five steps, as per Beaton et al., 2000, and was conducted with the permission and assistance of the original PSEQ author. Step Ⅰ: The original English PSEQ version (Nicholas, 2007) was translated into two separate Hebrew versions by one of the authors (NBA) and two physical therapy students who were unfamiliar with the questionnaire's concepts. Step Ⅱ: the translators discussed the discrepancies between both versions and synthesized a single version. Step Ⅲ: Back translation from Hebrew into English by another physical therapy student and an industrial engineer separately. Both translators were unfamiliar with to the questionnaire's concepts and fluent in English and Hebrew. Step Ⅳ: Discussion of materials from the former steps by an expert committee and establishing a pre-final draft. The committee consisted of two physical therapists, a musculoskeletal pain researcher, the original author of the PSEQ, and a psychologist specializing in psychological aspects (and their measurement) in pain population research. Step Ⅳ: The pre-final version was then discussed between five participants suffering from chronic pain, who were fulfilling the same inclusion criteria of the study. These patients were asked to check the cultural relevance of the items, highlight those that were not clear or had doubtful meaning and to evaluate the comprehensiveness and readability of the translated version. Their comments were reviewed by the committee, after which a final version was produced.

## Participants

Participants were recruited using online and offline advertisements disseminated by physical therapy students over social media platforms and on campus. Inclusion criteria were as follows: aged 18 and above, Hebrew speakers, suffering from chronic musculoskeletal pain (> 3 months, either consistent or intermitted pain).

## Test-retest reliability

A nested prospective subgroup of 75 participants was asked to fill out the survey a second time seven days post-completion of the first survey. To ensure anonymity, each participant received a serial code to use when filling out the surveys. Furthermore, participants were asked whether they experienced any change in their symptoms during the last week using a 3-point global rating of change (worse, no change, and better) (Jaeschke et al., 1989). Participants reporting a change were excluded from the reliability analysis.

## Patient-reported measures

Disability

Disability was measured using the 6-item Physical Component Summary of the Short-Form 12 questionnaire (PCS-SF-12) (Amir et al., 2002). Scores were computed and normalized according to published algorithms (Ware et al., 1996). Total scores range from 0-100, with higher scores indicating better physical functioning (Ware et al., 1996). A score of 50 or less on the PCS-SF-12 has been recommended as a cut-off to determine a physical condition (Ware et al., 1995). The disability score was determined by reversing the PCS-SF-12 total score for each participant. Due to the score reversing, scores ≥ 51 represent a physical condition.

*Pain intensity*

Pain levels were measured using the Numeric Pain Rate Scale (NPRS). Participants were asked to rate their most severe and average pain intensity the preceding week on a scale of 0-10 (10 = severest pain). This tool is widely used in the literature and is valid compared to other pain rating measures (Childs JD et al., 2005; Gagliese et al., 2005).

### Fear-avoidance beliefs

The Fear Avoidance Beliefs Questionnaire (FABQ) was used to examine participants' beliefs concerning the potential harm of work or general physical activity to their pain (Waddell et al., 1993). The FABQ consists of 11 items; each scored 0-6. Higher numbers indicate increased levels of fear-avoidance beliefs. FABQ measures two factors, a 7-item work subscale score (FABQ-work) and a 4-item physical activity subscale score (FABQ-pa). FABQ has been culturally adapted to Hebrew and demonstrated good internal consistency and test-retest reliability (Jacob et al., 2001).

### Pain catastrophizing

Pain-related catastrophic thoughts or feelings were measured with the Pain Catastrophizing Scale (PCS) (Sullivan et al., 1995). It is a three-factor questionnaire (rumination, helplessness, and magnification) derived from 13 items scored 0-4. Higher scores indicate more catastrophic thoughts or feelings. The PCS's internal consistency and test-retest reliability are high (Lamé et al., 2008; van Damme et al., 2002), and the PCS's Hebrew version has demonstrated α = 0.86 (Granot & Ferber, 2005).

### Anxiety and depression

Anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS) (Bjelland et al., 2002). It is a two-factor questionnaire derived from 14 items (7 independent items measuring anxiety and depression separately) scored from 0 to 3. Higher scores indicate more significant anxiety (HADSa) or depression (HADSd) levels. HADS was found to perform well in assessing the symptom severity and caseness of anxiety disorders and depression. The HADS's Hebrew version has demonstrated α = 0.86 and α = 0.89 for the anxiety and depression subscales, respectively (Buria et al., 2015).

## Sample size

The sample size required for the correlation analysis was calculated with G\*Power 3.1.9.4 using the z-test family to detect the correlation between two measures, for example, the total PSEQ and PCS-SF-12 scores. The input parameters were as follows: for a two-tailed test, assuming a medium effect size of 0.5, α = 0.05, and power = 0.95, the total sample size recommended was 147 participants. For the CFA, a sample of 300 was set as the goal for recruitment (Thompson, 2004).

## Statistical analysis

### PSEQ's psychometric properties

Missing data from the PSEQ and all other measured constructs were tested for randomicity using Little's missing completely at random test (Little, 1988). The Sociodemographic properties and the sample's questionnaires' scores were described using medians, inter-quartile range (IQC), means, and standard deviations (SD). Internal consistency was measured by calculating Cronbach's α; values 0.8 and above were considered good (Lee Anna Clark, 2019). Floor and ceiling effects were measured by the percentage of scores achieving minimum and maximum values, respectively. These effects were considered present if more than 15% of the respondents had achieved any of the minimum or maximum values (Terwee et al., 2007). Test-retest reliability of the PSEQ was evaluated by calculating the intra-class correlation coefficient (ICC) for each item and total score. The ICC model used was a two-way random effect model (Mokkink et al., 2018; Prinsen et al., 2018; Terwee et al., 2018). ICC values of 0.75-1.00(Koo & Li, 2016)d as excellent (Koo & Li, 2016). SEM and SDC95% were calculated as follows:   
SEM = SD change scores√(1-ICC) and SDC = 1.96 × √2 × SEM (Portney & Watkins, Foundations of Clinical Research: Applications to Practice, 3rd Edition | Pearson," n.d.).

*Construct Validity*

Construct validity was evaluated using correlation analysis between the total results of the PSEQ-H and the NPRS (average and severest pain) (Childs JD et al., 2005; Gagliese et al., 2005), PCS-SF-12 (Amir et al., 2002), FABQ (physical activity and work) (Jacob et al., 2001), PCS (Granot & Ferber, 2005), and HADS (anxiety and depression) (Buria et al., 2015). The central hypothesis was that the calculated correlation coefficients will negatively range from 0.3 to 0.6 with the PSEQ-H (Asghari & Nicholas, 2009; Dubé et al., 2021; Ferreira-Valente et al., 2011; McWilliams et al., 2015; Tuck et al., 2021). Construct validity was considered satisfactory when 75% or more of the hypotheses were met, moderate when 50% to 75% were in agreement, and low when fewer than 50% were met (Chiarotto et al., 2018). Choosing the type of correlation analysis was based on the normality assumption, tested by the ratio of kurtosis and skewness to their standard errors (Pearson/Spearmen for a normal/non-normal distribution, respectively). Calculated ratios and values greater than |±1.96| were considered a non-normal distribution (Field, 2018).

*Structural Validity*

CFA was used to confirm the unidimensionality of the PSEQ-H, as it is preferred over explorative factor analysis (Prinsen et al., 2018). Initially, Bartlett's test of sphericity was tested for significance (*p* < .05), and the Kaiser-Meyer-Olkin measure of sampling adequacy was set to a minimum of 0.6 (Field, 2018). The items of the PSEQ-H were treated as ordinal variables. Therefore, the diagonally weighted least-squares (DWLS) was set as the estimation method (Gunzler et al., n.d.). Multiple fit indices were used: comparative fit index (CFI) ≥ 0.95, Tucker-Lewis index (TLI) ≥ 0.95, root-mean-square error of approximation (RMSEA) ≤ 0.05 and standardized root mean square residual (SRMR) ≤ 0.05 (Gunzler et al., n.d.). Data analysis was performed using IBM SPSS Statistics version 27 (IBM Corporation, Armonk, NY) (IBM Corp, 2020), aside from the CFA, which was performed using the "lavaan" and "lavaanPlot" packages for Rstudio (RStudio, Inc, Boston, MA) ("CRAN - Package lavaanPlot," n.d.; Rosseel, 2012; RStudio Team, 2020).

# Results

## Participants

Initially 311 responses were collected. The final data analysis provided a total sample size of 304 cases. Seven participants were omitted listwise for missing responses, all of which were missing completely at random (*p* = 1). Sociodemographic characteristics and total scores for the measured constructs are shown in table 1.

**Table 1** Sample characteristics

## Translation and cross‐cultural adaptation

In the forward translation (steps Ⅰ and Ⅱ), since Hebrew is a gender-oriented language, the items were reformulated as addressing males while a statement that the questionnaire applies to both sexes was added to the instructions. A major point of discussion between the translators was the translation of “confident” that literally translated in Hebrew can have several meanings; the chosen term resembles "capability". Furthermore, item three was reformulated—"despite the pain" and was shifted to the beginning of the sentence to improve the readability of the item. In the back-translation (step Ⅲ), the chosen term for translating “confident” was correctly interpreted by the back translators as “confident”. The expert committee (step Ⅳ) reviewed the documentation of the previous steps and approved the pre-final version. Comprehensiveness and readability assessment (step Ⅴ) suggested adding "including" at the begging of the description within the parenthesis in item five. Additionally, "despite the pain" was repositioned at the beginning of the sentence for item ten. The committee approved the suggested changes and the final version was established (appendix 1).

## PSEQ's psychometric properties

Internal consistency for the translated PSEQ was good, with Cronbach's α = 0.97. Floor and ceiling effects were insignificant—0.7% and 8.9% of the participants scored the lowest and highest possible scores, respectively. The final test-retest reliability sample included 47 participants (median interval of one day between responses). From the initial 75 twice-surveyed participant responses, nine did not answer at any point, five were excluded due to reported changes in their condition, two were duplicates, and eight were missing test or retest values. The PSEQ's translated version demonstrated excellent test-retest reliability with the total score's ICC = 0.88 (95% CI 0.78-0.93), SEM = 3.10, and SDC95% = 8.59 (Cicchetti, 1994).

**Table 2** Corrected item-total correlation, item mean, and standard deviation for the Hebrew Pain Self-Efficacy Questionnaire items (n = 47)

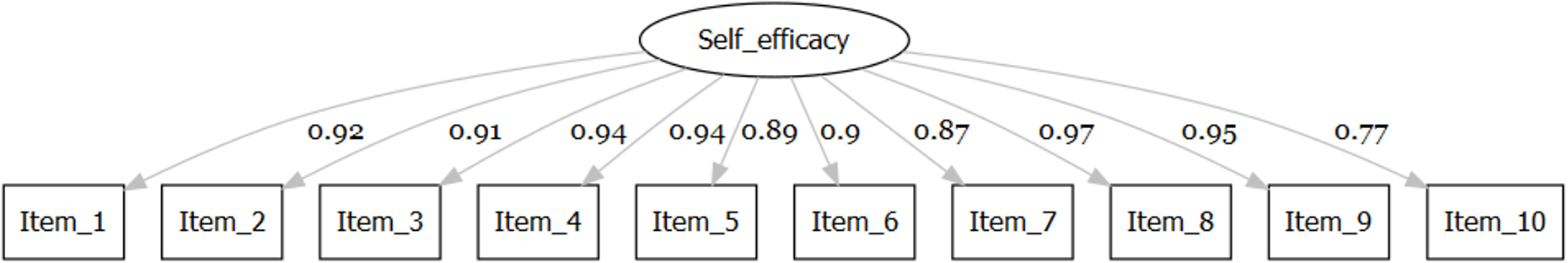
## Validity

For construct validity, most of the questionnaires' total scores of the measured constructs were non-normally distributed (table 3). Therefore, Spearman's correlation coefficients were calculated between the PSEQ scores and the comparator questionnaires' scores. Six of the eight (75%) calculated correlations met the hypothesized magnitude and direction, The exceptions were the correlations with the fear-avoidance questionnaire's subscales (table 3).

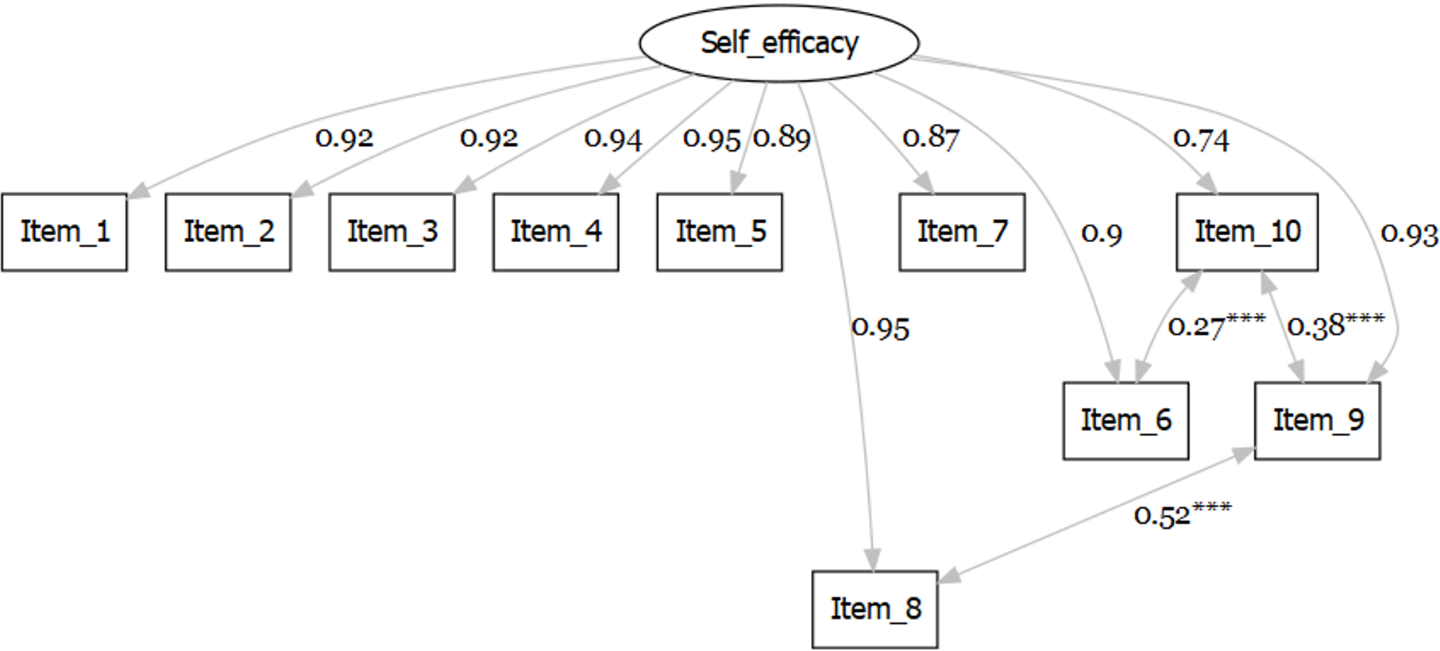
For structural validity, the calculated KMO (0.95) and Bartlett's Test (*p* < 0.001) met the a priori set values (see scree plot in appendix 2). The PSEQ-H's single-factor CFA resulted the following model fit Indices: TLI = 0.99, CFI = 0.99, RMSEA = 0.07 (95% CI 0.054-0.091) and SRMR = 0.025. Except for the RMSEA, all indices suggest an excellent fitting model (fig. 1) (Gunzler et al., n.d.). To improve the model by achieving the pre-established RMSEA ≤ 0.05, modification indices were evaluated. Modification indices provide an estimated value in which the model’s chi-square (χ2) test statistic would decrease if a fixed parameter were added to the model and freely estimated (Whittaker, 2011).According to the modification indices, three correlations were drawn between the residuals of items 10 with 9, 10 with 6, and 9 with 8 (see table 2 for all items). The improved model's new RMSEA value was 0.04 (90% CI 0.01-0.07), TLI = 1.00, CFI = 1.00, and SRMR = 0.019 (fig. 2)

**Table 3** Descriptive and construct validity data for the Hebrew pain self-efficacy questionnaire. Data represent the total scores' means, medians, and distributions of the measured constructs and Spearman's correlation coefficients with the PSEQ-H (n = 304).

**Fig. 1** Confirmatory factor analysis model for the Hebrew pain self-efficacy questionnaire



All coefficients are standardized.

**Fig. 2** Confirmatory factor analysis modified model for the Hebrew pain self-efficacy questionnaire****\*\*\*Significant at p < 0.001. All coefficients are standardized.

# Discussion

This study is the first to translate and cross-culturally adapt the PSEQ to Hebrew, providing valuable information to researchers and clinicians who intend to assess the self-efficacy of Hebrew-speaking chronic MSK pain populations. The PSEQ-H was found to be a unidimensional measure of pain self-efficacy, and its construct validity was satisfactory according to the hypothesis testing. Additionally, the PSEQ-H has demonstrated good internal consistency, excellent test-retest reliability, and insignificant floor/ceiling effects.

The translation process of the PSEQ to Hebrew integrated a few minor cultural adaptations which were accepted following consultation with the original author, expert committee, and a pre-final sample. The majority of preceding translation and cross-adaptation studies have similarly reported minor modifications to the original PSEQ's version (Dubé et al., 2021). Among these studies are adaptations to Chinese- Hong Kong (Lim et al., 2007), Chinese-Mainland (Yang et al., 2019), Catalan (Castarlenas et al., 2020), Danish (Rasmussen et al., 2016), Italian (Chiarotto et al., 2015), Japanese (Adachi et al., 2014), Mongolian (Tuck et al., 2021), Persian (Asghari & Nicholas, 2009), Portuguese-Brazilian (Sardá et al., 2007), Portuguese-European (Ferreira-Valente et al., 2011). The Italian version of the PSEQ had a similar difficulty in translating "confident" as described in the current study, and for both versions, the back translation team correctly interpreted the chosen term as "confident" (Chiarotto et al., 2015).

The original PSEQ validation study (Nicholas, 2007) and previous adaptation studies have found high internal consistency (Cronbach's α > 0.9) (Adachi et al., 2014; Asghari & Nicholas, 2009; Briet et al., 2014; Lim et al., 2007; Tuck et al., 2021; Vong et al., 2009; Yang et al., 2019). Similarly, the high internal consistency found in the current study may imply a redundancy in the items of the PSEQ-H (Cortina, 1993). Therefore, future studies could investigate adapting one of the shortened PSEQ's versions to Hebrew or, as previously suggested, use item response theory methods with the PSEQ-H (Embretson & Reise, 2013; McWilliams et al., 2015; Nicholas et al., 2015). Most studies evaluating the PSEQ's floor and ceiling effects did not find any significant effects, and the current study is no exception. Only two studies found considerable ceiling effects for the PSEQ; 17.9% (Briet et al., 2014) and 20% (Kortlever et al., 2015). Both studies were conducted with English speaking participants suffering upper extremity conditions, possibly indicating this effect results from characterizing this type of population.

The PSEQ unidimensionality has been confirmed in populations with chronic MSK pain, neck pain, and upper limb pain (Dubé et al., 2021). This study found that three of the initial CFA model's four goodness of fit indices met the pre-established criteria, but the current model's RMSEA (0.072) did not. However, RMSEA, TLI, and CFI values tend to be higher using DWLS as the estimation procedure for CFA (Savalei, 2020; Xia & Yang, 2019). More importantly, the results of the CFA for both the initial and modified models are sufficient to validate the unidimensionality of the PSEQ-H according to the COSMIN guidelines (Mokkink et al., 2018; Prinsen et al., 2018; Terwee et al., 2018). The modified model in this study shares a similarity to previous studies adding the covariances between the error terms of items eight ("I can still accomplish most of my goals in life, despite the pain") and nine ("I can live a normal lifestyle, despite the pain") (Chiarotto et al., 2015; Ferreira-Valente et al., 2011; Vong et al., 2009). This similarity suggests that both items assess a very similar domain and should be considered in future studies looking to create a shorter version of the PSEQ-H.

For construct validity, the PSEQ-H was found to correlate with the other related factors, similarly to previous studies with chronic MSK pain samples (Asghari & Nicholas, 2009; Dubé et al., 2021; Ferreira-Valente et al., 2011; McWilliams et al., 2015; Tuck et al., 2021). However, the correlation between the PSEQ-H and the FABQ was below *r* = 0.2, lower than the hypothesis. A possible explanation for the lower-than-expected correlation may be attributed to the difference in the measurement tools used. Previous translation studies conducted with chronic musculoskeletal pain, chronic neck pain, and low back pain patients have used the Tampa Scale of Kinesiophobia (TSK) and found it is negatively correlated with the PSEQ (*r* = -0.48 to -0.38) (Chiarotto et al., 2015, 2018; van der Maas et al., 2012). In this study, fear-avoidance beliefs were evaluated using the FABQ since there is no Hebrew version for the TSK. Although FABQ and TSK aim to measure the same construct, they correlate low-moderately, possibly explaining this finding (George & Beneciuk, 2015).

## Sample characteristics

The sample population of this study is subject to various forms of selection bias that may influence the analysis results. First, it is a relatively young (M±SD, 34.2 ± 14.6) sample (Cimmino et al., 2011; Dubé et al., 2021; Lee et al., 2015) with a high level of working individuals (74%) compared to other adaptation studies (Adachi et al., 2014; Asghari & Nicholas, 2009; Lim et al., 2007; Nicholas, 2007; Sardá et al., 2007; van der Maas et al., 2012) and the original PSEQ study (Nicholas, 2007). However, the pain levels range from mild levels of "average pain" (4 ± 2.08) to moderate levels of "severest pain" (5.67 ± 2.36), similar to other studies in the field ranging from 3 to 6 (Boonstra et al., 2016; Chala et al., 2021; Chiarotto et al., 2015; Costa et al., 2011; Ferreira-Valente et al., 2011; Gay et al., 2015; Lim et al., 2007).

The disability levels are relatively low (63.7 ± 24.07), with only one-third of the participants categorized as suffering a physical condition according to the SF-12-PCS's scores ≥ 51 cut-off (explained in the measures section). Furthermore, the mean self-efficacy level for this sample (41.54 ± 15.69) is considered high and characterizing working chronic pain individuals (Nicholas, 2007; Nicholas et al., 2015) .This finding resembles only two other studies with a sample of chronic MSK pain patients collected from clinical settings (Ferreira-Valente et al., 2011; Vong et al., 2009). Both of these studies' samples were collected from community-based health care institutions, as opposed to other studies with lower measured self-efficacy levels with patients attending pain clinics and hospitals (Adachi et al., 2014; Asghari & Nicholas, 2009; Lim et al., 2007; Nicholas, 2007; Sardá et al., 2007; Tuck et al., 2021; Yang et al., 2019). These discrepancies may partially explain the high self-efficacy measured in this study and perhaps contribute to the validity of the Hebrew translated version as the participants were sampled from a non-clinical setting.

One-quarter of the participants were classified with a clinically relevant level of catastrophizing (PCS score ≥ 30), similar to clinical samples of pain patients (Sullivan et al., 1995).Only 10% of the sample could be categorized as clinically depressed (HADSd score ≥ 8), 25% as clinically anxious (HADSa score ≥ 8), and the mean scores for these factors are similar to other studies (Adachi et al., 2014; Chiarotto et al., 2015; Marshall et al., 2017).

# Limitations

First, according to Beaton et al.'s recommendations (Beaton et al., 2000), the pre-final version of the translation should be evaluated by at least 30 participants. In the current study, only five participants were involved in that stage. Additionally, it is recommended to have a linguistic specialist in the expert committee and this study did not include such a specialist.

Second, the test-retest reliability scores should be interpreted with caution due to the brief time interval between measures, with a median interval of one day, increasing the risk for recall bias. This brief time interval was chosen to allow maximal re-measuring and minimal change in the pain levels despite the accepted COSMIN recommendation for two weeks between measures (Mokkink et al., 2018; Prinsen et al., 2018; Terwee et al., 2018). However, we believe that there is sufficient evidence in the literature to support the notion that the difference between a two-week and two-day interval between measurements is insignificant (Marx et al., 2003). Furthermore, the ICC scores in this study are in line with other studies that adapted the questionnaire (Adachi et al., 2014; Asghari & Nicholas, 2009; Ferreira-Valente et al., 2011; Lim et al., 2007; Nicholas, 2007; Sardá et al., 2007; van der Maas et al., 2012). Therefore, there is a reasonably high certainty that the PSEQ-H's reliability is sufficient despite the modified time interval. Future research should assess the PSEQ-H with a more accepted test-retest time interval, as well as it's responsiveness.

# Conclusions

The current work developed and presents the PSEQ-H as a reliable and valid instrument for evaluating self-efficacy in a population with chronic musculoskeletal pain. Future studies should evaluate the PSEQ-H's responsiveness and feasibility with specific pain populations, and clinical settings.

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## Author Contributions

All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by Noa Ben-Ami and Yaniv Nudelman. The first draft of the manuscript was written by Yaniv Nudelamn and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

## Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Ariel University (2.9.2020/AU-HEA-NBA-20200902-2).

## Consent to participate

Informed consent was obtained from all individual participants included in the study.