The Impact of Female Chronic Pelvic Pain Questionnaire (IF-CPPQ): A Validation Study

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Disclosure of Interests

None to declare.

Contribution to Authorship statement

The paper was conceived by MA, CL, and CG. MA wrote the first draft, with further contributions from all authors. Statistical analyses were undertaken by MA. All authors contributed to data interpretation, reviewed successive drafts, and approved the final version of the manuscript. All authors agree that any questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Details of Ethics Approval

The study received ethics approval from the Psychology Ethics Committee at the University of Southampton (date of approval: 4 September 2014; ERGO ethics number: 14988).

Abstract

Objectives: The aim of this study was to assess the validity, reliability, and factor structure of the Impact of Female Chronic Pelvic Pain Questionnaire (IF-CPPQ).

Methods: This was a cross-sectional questionnaire study that was administered online. To be eligible to participate, women had to have experienced chronic pelvic pain (CPP) for a minimum of three months and be at least 18 years of age. A total of 969 women (mean age 35.4 years, SD = 12.0) took part. The main outcome measure was the IF-CPPQ. Additional validated measures that assessed related constructs were also administered. Principal axis factor analysis (PAF) was used to assess the factor structure of the IF-CPPQ. Internal consistency was assessed using Cronbach's alpha. Convergent and discriminant validity was assessed using Pearson correlations between factor scores on the IF-CPPQ and measures of related constructs. The consistency and model fit of the resulting factor structure was assessed using confirmatory factor analysis.

Results: The final 26-item questionnaire comprised five factors (Psychological Impact, Sexual Impact, Relationship Impact, Occupational Impact, and Emotional Impact). Findings suggested good convergent and discriminant validity and internal consistency.

Discussion: The findings indicate that the IF-CPPQ is a reliable and valid measure of the impact of CPP on women. While the IF-CPPQ has the potential for multiple uses within research and clinical practice, further research is needed to determine the questionnaire's ability to detect clinically meaningful changes with treatment.

Keywords: Chronic pelvic pain; Questionnaire; Quality of Life; Psychometric; Factor Analysis; Validation; Reliability

Introduction

Chronic pelvic pain (CPP) is one of the most common pain problems experienced by women and is associated with several gynaecological conditions (1-3). It can be defined as intermittent or constant pain in the lower abdomen or pelvis of at least 6 months in duration and is associated with negative cognitive, behavioural, sexual and emotional consequences (4, 5). Despite a high prevalence rate, (6) CPP is still poorly understood and difficult to diagnose (7). Several studies have assessed the impact of CPP. Women with CPP have significantly lower levels of sexual satisfaction and sexual activity (8) and higher rates of anxiety and depression compared to healthy controls (9).

Most studies assess the impact of CPP using study-specific (10, 11) or generic quality of life measures (QoL) (8, 9, 12). Generic measures have shown poor face validity when administered to women with CPP (13). Some questionnaires focus on specific CPP conditions e.g., endometriosis, (14, 15) interstitial cystitis, (16) pelvic pain and urinary symptoms, (17), irritable bowel syndrome (IBS) (18, 19), and vulvodynia (20). Although useful for evaluating the impact of disease-specific symptoms on QoL, these questionnaires focus on pain characteristics such as intensity and duration rather than the impact of the pain (16, 17). Most also do not consider the broad range of areas that may be affected by CPP, such as work, relationships, and emotional wellbeing (17) and few measures evaluate the impact of CPP on intimate relationships (21-23). Questionnaires developed to assess CPP regardless of diagnosis include the CPP Questionnaires (24) and the CPP Questionnaire (CPPQ)-Mohedo test (25). However, these measures were developed primarily as screening tools and neither assesses the psychological, relationship, or sexual impact of CPP.

The Endometriosis health Profile (EHP)-30 (26) is one of the very few patient-generated questionnaires in this area. The final questionnaire includes several important

domains such as the impact on work, perceptions of the medical profession, infertility, social support, and control and powerlessness. The EHP-30 has been found to have good internal consistency, construct validity, and test-retest reliability (26, 27). However, this questionnaire was designed specifically for women with endometriosis and therefore may not be suitable for women with CPP who do not have endometriosis.

Another comprehensive measure is the Vulvar Pain Assessment Questionnaire (VPAQ) (20). The VPAQ assesses cognitive/emotional functioning, physical functioning, coping skills, partner factors, and pain characteristics experienced by women with chronic vulvar pain. While a number of domains are assessed, the VPAQ is predominantly aimed at women with chronic vulvar pain rather than CPP more broadly.

Currently there is no existing measure that assesses the impact of CPP on women's lives that is suitable for women with different diagnoses. Disease-specific questionnaires can only be used by women with a clear diagnosis, which can take many years to obtain. CPP has been considered a syndrome in its own right (2, 11, 24). As health QoL assessments made by patients can differ from those of healthcare professionals, (13, 28) development of measures should be informed by women who experience CPP.

To address this need, the Impact of Female Chronic Pelvic Pain Questionnaire (IF-CPPQ) was developed to assess the impact of CPP on women's lives. The items were generated based on qualitative interviews with women experiencing CPP (29, 30) and have been piloted in think-aloud interviews (31).

The aim of the current study was to assess the validity, reliability, and factor structure of the newly developed IF-CPPQ. Quality criteria for instrument properties are important. Such criteria can help determine the methodological quality of studies and are useful for the evaluation of different measures. Terwee, Bot, and de Boer et al. (32) defined

a set of quality criteria for measurement properties for the development of health status questionnaires. The quality criteria include the following measurement properties: content validity; internal consistency; criterion validity; construct validity; reproducibility; responsiveness; floor and ceiling effects; and interpretability (32). These quality criteria were used in the design of this study to help ensure quality in the development of the new CPP measure.

Materials and Methods

Participants

Inclusion criteria included experience of CPP (i.e. intermittent or constant pain in the lower abdomen or pelvis) for a minimum of six months and age at least 18 years (33). National UK and international charities who support individuals with CPP conditions were contacted and asked to distribute information about the study and advertisements were also placed on social media and in newspapers.

There is a lack of agreement in the literature regarding the appropriate sample size for exploratory factor analysis (34). The appropriate sample size also depends on the number of items included, with a participant to item ratio of 10:1 recommended in order to reduce sampling error (35). According to Tabachnick and Fidell (36), at least 300 cases are sufficient for factor analysis.

Measures

Participants provided demographic data (including age, ethnicity, religious affiliation, occupational status, highest level of education, relationship and marital status, and pain-related diagnoses) and information about their average pain levels over a typical month (from 1 “no pain” to 10 “worst imaginable pain”).

IF-CPPQ

In a previous qualitative study, one-to-one interviews were conducted with 25 women experiencing CPP to explore the impact of the pain on their quality of life (29). The mean age of this sample was 36.6 (22-63) and participants had experienced pain for an average of 8.5 years. The main diagnoses included Endometriosis, Neuropathic pain/ Pudental neuralgia, Vulvodynia, and IBS. The data from these interviews were thematically analysed (37), which resulted in themes that covered the impact of CPP on multiple domains, including everyday functioning, mood, relationship satisfaction, sexual functioning, and occupational functioning. The development of the initial items for the IF-CPPQ was informed by the qualitative data obtained from these interviews. Specifically, the main themes that resulted from the qualitative data were selected as the main constructs to be measured by the new questionnaire. The initial questionnaire items were then generated based on these constructs and followed the principles outlined in Sudman and Bradburn (37). This led to the development of 72 items. Items were then removed and adjusted after gaining further feedback from women with CPP in a think-aloud study (27). The resulting questionnaire contained 52 items. A sample item is "I felt that I have not been "heard" or listened to by people close to me when I have talked about my pain." Items are rated on a five-point scale ("Strongly agree," "Agree," "Neither agree nor disagree," "Disagree," and "Strongly disagree").

The Pain Disability Index (PDI) (38)

This is a validated seven-item questionnaire (39) that assesses the degree to which pain interferes with various daily activities. The PDI was selected because some of the items on the IF-CPPQ assess the impact of CPP on everyday functioning, which relates to the constructs measured by the PDI. Responses are made on a scale of 0 to 10, with 0 indicating

"no disability" and 10 "total disability." Scores on the PDI were expected to have positive correlations with the IF-CPPQ.

The World Health Organization Quality of Life (WHOQOL)-BREF (40)

This 26-item questionnaire assesses four domains of QOL: physical health, psychological, social relationships, and the environment and has good validity and reliability (40). The WHOQOL-BREF was selected because it is a generic measure of QOL and it was expected that the items on the IF-CPPQ would also assess similar domains of QOL. Scores on the WHOQOL-BREF were expected to show positive correlations with the IF-CPPQ.

The Hospital Anxiety Depression Scale (HADS) (41)

This is a validated 14-item questionnaire that assesses anxiety and depression (42). This questionnaire was included because it was designed for patients in non-psychiatric hospital clinics and research has shown anxiety and depression to mediate the impact of CPP (43). The HADS was predicted to have positive correlations with the IF-CPPQ.

The Dyadic Sexual Communication Scale (DSC) (44)

This 13-item questionnaire assesses perceptions of communication about sexual matters with relationship partners. Items are rated on a six-point scale from "Disagree strongly" to "Agree strongly"; the measure has good reliability and validity (44). The DSC was included because the IF-CPPQ contains items that assess sexual and relationship functioning. Because a higher score on the DSC indicates positive sexual communication, scores on the DSC were predicted to show negative correlations with the sexual and relationship functioning items on the IF-CPPQ.

The Female Sexual Distress Scale-Revised (FSD-R) (45)

This 13-item validated questionnaire assesses sex-related personal distress in women. Items are rated on a five-point scale from "Never" to "Always." This questionnaire

shows good validity and reliability (45). The FSD-R was included because the IF-CPPQ contains sexual functioning items, which may relate to sexual distress. Scores on the FSD-R were expected to show positive correlations with the sexual functioning items on the IF-CPPQ.

The Social Desirability Response Set (SDRS)-5 (46)

This five-item questionnaire was included to assess the degree to which IF-CPPQ responses were influenced by social desirability. The SDRS-5 has good reliability and validity (46).

Procedure

Questionnaires were administered via iSurvey, a University of Southampton online research survey tool. Women chose to take part by following the website link to the study. Participants were able to access the study link on National UK and international charities' websites (including the Vulval Pain Society, the Pelvic Pain Support Network, and the Interstitial Cystitis Association), and on social media. After providing informed consent, participants completed the questionnaires. The study was approved by the institutional ethics committee.

Data Analysis

We used principal axis factor analysis (PAF) to assess the factor structure of the IF-CPPQ and to test whether the scales were valid measures of hypothesised factors; published protocols/guides were followed (34, 35). PAF was used to examine the common variance and eliminate error variance within the factor structure of the IF-CPPQ. Oblimen rotation was employed as the rotation method to allow for correlations among the subscales (47). Factors were retained if they had an eigenvalue value greater than one (47) and were

excluded if: they had a loading of < 0.3 on factors; they had very low correlations with other items (r < .3); they correlated very highly with other items (r > 0.8); they had high loadings (> 0.3) on multiple factors; they loaded on a factor but were markedly different to other items within the same factor e.g., a work-related item that loaded onto a sexual functioning factor. Although these criteria were used as guidelines, it was also important that the final solution made theoretical and clinical sense. To achieve this, several solutions were examined before deciding on the final model.

Internal consistency testing was assessed using Cronbach's alpha. Convergent validity was assessed using Pearson correlations between factor scores ofn the IF-CPPQ and scores on the other questionnaires (see Measures). The consistency and model fit of the resulting factor structure was assessed using confirmatory factor analysis (CFA), using maximum likelihood estimation. To determine how well the hypothesised factor model fit the data, three fit indices were used: the Chi-Square X^2 test, the Comparative Fit Index (CFI), and the root mean square error of approximation (RMSEA). The X^2 examines model fit by comparing the estimated correlation matrix under the model with the sample correlation matrix (48). Good model fit is indicated by a small nonsignificant X^2 value, which reflects little discrepancy between the observed and hypothesised model (48). The CFI is an incremental fit index and compares the hypothesised model to a worst fitting or "null" model (48). A value greater or equal to 0.95 has been suggested to reflect acceptable fit (49). The RMSEA is considered to be a "badness-of-fit" index whereby a value of zero indicates the best fit (48). It reflects how closely the model fit approximates a reasonably fitted model, with good model fit having values <0.05 (50).

The data were split in half and one half of the data was analysed using EFA to develop the hypothesised model or factor structure of the IF-CPPQ. The second half was

analysed using CFA to confirm the hypothesised model and assess its consistency. Pearson correlations between the IF-CPPQ and the validated questionnaires were obtained on the full data set. SPSS Statistics 24 was used to conduct the EFA and the add-on software, AMOS Graphics, was used to conduct the CFA.

Results

Participant characteristics

Recruitment took place between June and August 2015. A total of 1,086 women started the study; after excluding those who did not complete all items on the IF-CPPQ, 969 women were included in the analyses. Of these, 815 (84.12%) completed all items across all of the questionnaires.

The mean age of the participants was 35.4 years (range = 18-78). The sample was predominantly White (93.1%), in full- or part-time employment (44.8% and 21.7%, respectively), well-educated (42.4% had a university degree) and in an exclusive/committed relationship (77.1%). Regarding country of residence, the majority (69.8%) were from Europe, followed by the U.S. (17.5%) and New Zealand (8.3%). Women reported a range of CPP-related conditions, the most common being endometriosis (68.4%), IBS (35.0%) and pelvic adhesions (23.8%). Table 1 presents sample demographic information and Table 2 participants' reported CPP severity.

Factor analyses

PAF was conducted on the 52 items with oblimen rotations. To ensure the results were reliable, data analysis was repeated and resulted in three different factor model solutions. Model 1 was achieved after 13, model 2 after 15, and model 3 after 11 iterations, respectively. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analyses: model 1, KMO = .89; model 2, KMO = .87; model 3, KMO = .89. Bartlett's test of

sphericity was significant in all three models, $p < .001$, which indicates that the correlation matrix was significantly different from an identity matrix (i.e., that there were no relationships among the items). All three models contained five factors (or subscales), all with good internal consistency as measured by Cronbach's alpha.

Models 1 and 3 were very similar and consisted of almost identical factors: Psychological Impact, Sexual Impact, Relationship Impact, Occupational Impact, and Emotional Impact. They differed in their total number of items (model 1 had 25 items and model 3 had 27 items). There were also differences in the item factor loadings, particularly for the Psychological Impact, Relationship Impact, and the Emotional Impact factors. The first four factors in model 2 were the same as the other two models. The fifth factor in model 2 differed and included items reflecting impact on everyday functioning.

Although all three models had good factor structures, model 3's factor structure was more stable, demonstrated by the fact that models 1 and 3 comprised the same factors. The item loadings in model 3 also made better theoretical sense compared with model 1, even though the overall factors were the same. For example, item 43 ("I felt that I have not been "heard" or listened to by people close to me when I have talked about my pain") loaded on the Relationship Impact factor in model 1, which seemed incongruent because the other items on this factor concerned issues relating specifically to one's partner. In model 3, this item was replaced by item 33 ("I felt closer to my partner because of the pain").

CFA was used to assess the fit of model 2 in comparison to model 3 to determine which of the two models was a better fit of the data. Because, as previously discussed, model 3 was superior to model 1, CFA was not conducted on model 1. Instead, a 1-factor model where all the items loaded onto one factor was also assessed to test the assumption

of unidimensionality. The results of the fit indices for all three models (i.e., Models 2 and 3 and the unidimensional model), are summarised in Table 3.

The results in the top half of Table 3 are based on models 2 and 3, as indicated by the findings from the EFA. Both models resulted in a high Chi-square that was significant at $p < .001$, which is indicative of poor model fit. However, the Chi-square is known to be very sensitive to sample size and can be failed when conducted on large samples, even with very slight differences between the observed and predicted covariances (48, 51). This issue is overcome by the fit indices CFI and RMSEA, which indicated good model fit for both models 2 and 3. The Chi-square, CFI, and RMSEA all showed an improvement of model fit when error covariances were estimated. Seven covariances between error variables were estimated in model 2 and 14 in model 3. Regression weights for models 2 and 3 were statistically significant at the $p <0.001$ level. Item 42 ("I felt anxious about experiencing pain during sexual activity in future relationships") was the only item in both models with a p-value equal to 0.001. Although this was statistically significant, this was the largest p-value compared with the rest of the items. When item 42 was removed, model fit was improved in both models, as indicated by a reduction in the Chi-square and RMSEA and increases in the CFI (see Table 3).

The results of the Chi-square indicated that model 2 was a better fit of the data than model 3. However, the fit indices indicated both models had good fit. The CFI was only slightly higher for model 3, suggesting better model fit. Because the models mainly differed in their fifth factor (Psychological Impact in model 3 vs General Functioning in model 2), the characteristics of the distributions of the data for these factors were investigated. Both histograms showed negative skewness, which indicates a greater distribution of scores at the higher end of the scales. The General Functioning subscale was more negatively skewed,

with a skewness statistic of -1.14 (SE, 0.08) compared with -0.66 (SE, 0.08) for the Psychological Impact subscale. Kurtosis was 1.64 (SE, 0.16) for the General Functioning subscale and 0.00 (SE, 0.16) for the Psychological Impact subscale. Although it was expected that the data for these subscales would be negatively skewed, the results suggested that more women would score higher on the General Functioning subscale compared with the Psychological Impact subscale. Items from the Psychological Impact subscale reflect more severe psychological consequences of the pain. Thus, it was expected that women who are more severely affected by their pain would be more likely to endorse these items. In addition, there was more variability in scores for the Psychological Impact subscale compared with the General Functioning Subscale. This suggests that the Psychological Impact subscale would likely be better at discriminating between women that score high and those that score low on this subscale compared with the General Functioning subscales. Taken together, model 3 (with the removal of item 42) was chosen as the final solution for the IF-CPPQ.

Pearson correlations were computed between the IF-CPPQ subscales and the other validated questionnaires (see Table 4). All the correlations were significant at the $p < .001$ level in the expected direction. With the exception of the Psychological Impact subscale, the correlations between social desirability scores (SDSR-5) and the IF-CPPQ subscale scores were not significant.

Table 5 provides a summary of the results for model 3, which contained 27 items that in combination explained 62.75% of the variance. Table 6 presents the correlations between the five factors in model 3. All the subscales had good reliabilities (r's between .72-.91). and the Cronbach's alpha of the IF-CPPQ overall was 0.64. The final version of the IF-CPPQ is shown in Appendix A.

Discussion

Main findings

This study presents the development and validation of a new questionnaire assessing the impact of CPP on women, the IF-CPPQ. The results show the questionnaire is a reliable and valid measure of the impact of CPP. Based on both EFA and CFA, the IF-CPPQ has five subscales: Emotional Impact, Sexual Impact, Relationship Impact, Occupational Impact, and Psychological Impact. Women with a number of different diagnoses associated with CPP were recruited, which is reflective of this population. (52)

Several of the quality measurement properties recommended by Terwee et al. (32) were assessed and achieved in the current study. Content validity was achieved through previous qualitative work to ensure the items of the IF-CPPQ were representative of the different factors related to the impact of CPP (29, 30). Internal consistency was assessed and achieved using Cronbach's alpha in the current study. Concurrent and construct (convergent and discriminant) validity were assessed and achieved by correlating the IF-CPPQ total and subscale scores with other validated measures that assess related constructs. Although most of the quality criteria have been assessed and achieved, two important measurement properties outlined by Terwee and colleagues (32) – responsiveness and interpretability – were not evaluated. Future studies should assess the responsiveness and interpretability of the IF-CPPQ to determine whether the questionnaire is able to detect clinically meaningful changes in the impact of CPP over time, such as the minimal clinically important difference (MCID) (53). The MCID can be defined as the minimum change in scores in the domain of interest that patients perceive to be beneficial and that lead to a change in the patient's management (53). Translating the changes in measurement scores so that they are clinically meaningful is necessary for interpreting

research results (53). In the context of CPP, confirming the MCID is important to determine how women with CPP evaluate the treatments they receive.

The remaining measurement properties that were not assessed included predictive validity, test-retest reliability, and floor and ceiling effects. However, these properties are of uncertain relevance in relation to the IF-CPPQ. This is because CPP is a long-term condition and usually very unpredictable. Therefore, scores on the IF-CPPQ will likely vary over different time points. Finally, due to the debilitating nature of CPP, many participants will likely score relatively high on the IF-CPPQ, indicating ceiling effects. Consequently, a normal distribution is not expected and would be difficult to achieve with this particular sample.

There are several advantages of the IF-CPPQ over previously published questionnaires. First, the items were generated based on qualitative interviews and were piloted in "think-aloud" interviews, in both instances with women experiencing CPP (29, 30). The think-aloud method involves asking participants to say out loud their thought processes during a task (54). This method allowed the researchers to determine the acceptability and suitability of the questions for women with CPP. Second, the IF-CPPQ assesses the impact of CPP on several facets of women's lives. Though consideration of the emotional and psychological impact of CPP has historically been somewhat neglected in CPP research (55-57), there is now a growing recognition of the importance of various dimensions of QoL in relation to CPP (15, 20). The IF-CPPQ validates and recognises the multidimensional impact of CPP. Other areas that are often not covered by existing questionnaires include relationship and sexual functioning (15-17, 19). The IF-CPPQ includes two subscales that assess the impact of CPP on relationships and on sexual functioning; items on these subscales were derived from themes identified in a qualitative study that explored the impact of CPP (29). Regarding sexual functioning, women with CPP report significantly

decreased sexual function in comparison to pain-free women, as well as higher levels of pain with intercourse, sexual avoidance, and sexual dissatisfaction (22, 43). Many women report that their CPP has had a negative impact on their relationships beyond sexual functioning (29), but the impact of CPP on women's relationships with partners has been given even less attention compared with sexual functioning (43, 58, 59). It is important to assess the impact of CPP on personal relationships separately from sexual functioning.

Third, because the items on the IF-CPPQ are not tied to specific CPP conditions, it can be completed by women who have no formal diagnosis and by women with multiple CPP-related conditions. Although some women receive a formal diagnosis for their pain, such as endometriosis, it is not uncommon for women with CPP to have received no diagnosis (60, 61). The IF-CPPQ response options also allow women to indicate how much they are affected by their pain by specifying how much they agree or disagree with the items. In contrast, other questionnaires such as the EHP-30 use response categories that indicate how often particular events have occurred (e.g., "Never," "Sometimes," and "Always"). While there is some overlap between the VPAQ and the IF-CPPQ, the former questionnaire aims to assist in the screening and diagnosis of vulvar pain, while the IF-CPPQ aims to assess the impact of CPP on a number of QoL variables. A number of questions on the VPAQ relate specifically to women with vulvar pain (e.g., pain with using tampons), whereas all questions on the IF-CPPQ are potentially relevant to women with all types of CPP.

The final IF-CPPQ comprises 26 items. Although the length is comparable to other questionnaires that are considered acceptable for this clinical population (15, 20), there is still the potential for participants to experience burden when completing questionnaires. This is especially relevant for clinical research studies where participants are asked to

complete multiple measures at a given time. Future research can focus on developing a short version of the IF-CPPQ so that it is accessible to various research and clinical contexts.

Previous studies have used generic measures to assess improvements in CPP across a range of outcomes, including pain, quality of life, and sexual functioning. Examples of measures used include the Short Form-12 (62), the Female Sexual Function Index (63), and the Brief Pain Inventory (64). The IF-CPPQ can be used pre- and post- treatment to assess improvement alongside additional generic measures. Moreover, the IF-CPPQ can be used as an addition and not necessarily as a replacement for disease- specific tools such as the EHP-30 for endometriosis (15), in conditions where women have received a diagnosis.

Strengths and Limitations

The current study had some notable strengths. As discussed above, a patient-led approach was used in developing the IF-CPPQ and the items concern how CPP has impacted women's lives from their perspective (29). The previous qualitative data obtained provided good insight into the different ways women with CPP can be affected by their pain. Feedback on the initial items was also gained from women with CPP in a think-aloud study, which ensured the items were comprehensible and provided an opportunity to remove or reword ambiguous items (30, 31). Both of these earlier studies were important in ensuring the IF-CPPQ had good content and face validity. Finally, another strength was the large sample size that allowed for both EFA and CFA to be conducted, which provided better support for the overall factor structure of the IF-CPPQ.

Study limitations also need to be acknowledged. Although criteria were used to help determine an acceptable factor solution, some of the decision making process in EFA can be viewed as subjective or arbitrary e.g., the eigenvalue-greater-than-one rule and scree test (65). There are also limitations with the use of fit indices in CFA. Values of fit statistics only

indicate the average or overall fit of a model (48). Therefore, even if some aspects of the model poorly fit the data, the value of fit statistics can still be favourable. In addition, there is little relation between values of fit indices and the degree or type of misspecification i.e., they do not indicate how much the model departs from the data (48). Finally, fit statistics do not indicate whether the results are theoretically meaningful (48).

Thresholds for fit indices that are widely used (49) were intended to be used as "rules of thumb" only. However, there is the issue of "fit statistic tunnel vision" whereby researchers become so preoccupied with fit statistics that other information e.g., whether the parameter estimates actually make sense, is overlooked (48). Therefore, as with EFA, it is important for researchers to use interpretation guided by theoretical understanding of their data (65). Furthermore, while the internal consistency of the individual scales showed excellent reliability, Cronbach's alpha for the overall scale score was 0.64. Though this score still indicates good reliability, it is somewhat low compared to the individual scale scores.

Another study limitation concerns the method of recruitment. Because the study was administered online it may have been open to potential selection bias. This is because women with more complaints or more severe CPP are more likely to seek out help. Therefore, women with more severe CPP may be over-represented in the current sample compared with the population of women with CPP more generally. Moreover, because this study was online, recruitment relied upon a self-selected sample from the general population. This meant that clinical confirmation of reported diagnoses was missing. The self-reported nature of the sample also meant there was limited control on recruiting more balanced proportions of women with certain CPP diagnoses. Future research should validate the IF-CPPQ in well-phenotyped CPP sub-populations (e.g., endometriosis, IBS, BPS). This

would demonstrate that the IF-CPPQ can be validly applied to the various CPP sub-populations.

The development of the questionnaire did not involve any input from health professionals. Although the focus is on the impact of CPP from the women's perspective, health practitioners involved in the management and treatment of CPP may have knowledge of additional areas of life that are impacted by the pain and which may have been missed.

A final limitation concerns the sociodemographic characteristics of the sample; most participants were White and were well-educated. It is important for future studies to recruit participants with more diverse backgrounds and to assess whether the measure is suitable for women with different cultural backgrounds.

Conclusions

The IF-CPPQ questionnaire has the potential to be used in several ways. First, the measure can be used to select women who have been severely impacted by their CPP into trials of interventions/treatments. Because the IF-CPPQ is not disease-specific, it can assess the impact of CPP in women without any formal diagnoses. (66, 67) The IF-CPPQ could also potentially aid communication between women with CPP and their health care professionals so that women can communicate exactly *how* their pain is impacting their lives rather than just their pain levels. While the IF-CPPQ has the potential for multiple uses within research and clinical practice, further research is needed to determine its ability to detect clinically meaningful changes.

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Appendices

Appendix A: Final 26 item IF-CPPQ

This questionnaire is intended to be used by adult women who experience chronic pelvic pain. The questionnaire aims to assess the impact of chronic pelvic pain on women's lives in terms of everyday activities (e.g. being able to sit, household tasks, and hobbies), being able to work, socialising, relationships, and sexual relationships. Thinking about the past month only, please indicate how much you agree or disagree with the following statements. The questions concern your chronic pelvic pain. Please answer each question with respect to your chronic pelvic pain.

Answer format:

Response categories:	Scoring:
Strongly disagree	0
Disagree	1
Neither agree nor disagree	2
Agree	3
Strongly agree	4

1) I felt embarrassed about my pain

2) I have had difficulties communicating with my partner about my pain*

3) I felt controlled by my pain

4) I have felt socially isolated because of the pain

5) I felt unable to cope with my pain

6) I felt less connected to my partner because of the pain*

7) I felt despair about my pain

8) I have avoided sexual activity because of the pain*

9) I have gotten upset easily because of the pain

10) I felt that my pain has taken away my life

11) Sexual activity has been very painful (either during or after sexual activity)*

12) The pain has made me feel less confident

13) I took time off work (including any voluntary work or education) because of the pain*

14) The pain has reduced my ability to feel sexually aroused (either during partnered sexual activity or during masturbation)*

15) I experienced low mood because of the pain

16) I have felt negatively judged at work because of my pain*

17) I have had thoughts about ending my life because of the pain

18) The pain has reduced my desire to engage in sexual activity*

19) I felt closer to my partner because of my pain*

20) I felt irritable or snappy because of the pain

21) I have been unable to enjoy sexual activity because of the pain*

22) I felt angry because of the pain

23) My pain has not been taken seriously by my partner*

24) The pain has negatively affected my performance at work (including any voluntary work or education)*

25) I felt guilty for not being able to engage in sexual activity because of the pain*

26) I felt frustrated at not being able to engage in sexual activity*

**indicates that these questions will have an additional response option – "Not applicable"*

Tables

Table 1

EFA participants (*N* = 483), CFA participants (*N* = 484), and overall dataset (*N* = 969)

Age:			
	EFA	**CFA**	**Total Sample**
Mean, (SD)	35.1 (11.92)	35.7 (12.0)	35.4 (11.96)
Range	18-76	18-78	18-78
Experience of pain (years):			
	EFA	**CFA**	**Total Sample**
Mean, (SD)	10.80 (8.67)	11.25 (9.28)	10.99 (8.98)
Range	0-56	0-50	0-56
Years since diagnosis:			
	EFA	**CFA**	**Total Sample**
Mean, (SD)	5.17 (6.0)	5.53 (6.67)	5.32 (6.31)
Range	0-45.08	0-40.00	0-45.08
Diagnoses (%):			
	EFA	**CFA**	**Total Sample**
Endometriosis	67.5	69.3	68.4
Vulvodynia	12.4	9.3	10.8
Polycystic ovary syndrome	13.9	12.1	13.0
Pelvic organ prolapse	3.3	3.5	3.4
Pelvic adhesions	26.1	21.6	23.8
Interstitial Cystitis	19.3	20.2	19.7
Irritable bowel syndrome	36.6	33.3	35.0
Pudendal neuralgia	2.3	2.1	2.2
Pelvic inflammatory disease	8.1	7.8	7.9
No diagnosis/unknown	11.2	9.3	10.2

Ethnic background (%):

	EFA	CFA	Total Sample
White	93.6	92.6	93.1
Mixed / multiple ethnic groups	2.7	2.5	2.6
Asian	1.2	1.6	1.4
Black/African/Caribbean	1.0	1.6	1.3
Other ethnic group	0.8	1.0	0.9

Country resident in (%):

	EFA	CFA	Total Sample
Europe	71.8	68	69.8
South America	0.4	0.4	0.3
Australia	1.2	1.9	1.5
Canada	1.0	1.9	1.4
East Asia	0.0	0.6	0.3
New Zealand	8.7	7.8	8.3
United States	16.6	18.5	17.5

Employment status (%):

	EFA	CFA	Total Sample
Homemaker	11.2	10.5	10.8
Paid full-time employment	40.6	49.0	44.8
Paid part-time employment	21.9	21.4	21.7
Retired	6.0	6.2	6.1
Unemployed	19	10.9	15.0

Student (%):

	EFA	CFA	Total Sample
Non-student	80.3	82.7	81.2
Full-time student	10.8	9.1	9.9

Part-time student	7.2	7.6	7.4
Highest education level (%):			
	EFA	**CFA**	**Total Sample**
College or Equivalent	30.2	26.5	28.4
No qualifications	1.2	0.6	0.9
Other vocational/ work-related qualifications	4.3	4.9	4.6
Prefer not to say	0.8	0.8	0.8
Professional qualification	8.9	8.8	8.9
Secondary School/ High School	13.7	12.8	13.2
University Bachelor's degree or equivalent	25.3	27.0	26.1
University Postgraduate degree or equivalent	14.9	17.7	16.3
Relationship status (%):			
	EFA	**CFA**	**Total Sample**
Casual relationship	1.9	1.6	1.8
Exclusive/committed relationship	76.8	77.4	77.1
Single	18.8	19.3	19.1
Marital status (%):			
	EFA	**CFA**	**Total Sample**
Divorced/separated	8.9	6.8	7.8
Civil partnership	3.9	3.9	3.9
Married	38.5	46.9	42.7
Single	46.2	40.3	43.2
Widowed	0.8	1.0	0.9

Note: "EFA" – Exploratory factor analysis; "CFA" – Confirmatory factor analysis

Table 2

Pain questions

Question	$\bar{x}$ **(SD)**
N= 969	
How would you rate your current pain level?	5.33 (2.43)
How would you rate your pain at its worst over the past month?	8.07 (1.82)
How would you rate your pain at its best over the past month?	3.29 (2.51)
N=275	
If the past month was not a typical one, how would you rate your average experience of pain over a typical month?	6.50 (2.15)

Note: Scores on these questions ranged from "0 – No Pain" to "10 – Worst imaginable pain".

Table 3

Goodness of fit indices for Models 2, 3, and the unidimensional model (N=462)

	χ^2 **(df)**	**RMSEA**	**CFI**
Unidimensional	3558.78 (324)**	0.15	0.51
Model 2	513.41 (258)**	0.05	0.95
Model 3	588.78 (300)**	0.05	0.96
Removal of item 42:	χ^2 **(df)**	**RMSEA**	**CFI**
Model 2	437.51 (235)**	0.04	0.96
Model 3	502.20 (274)**	0.04	0.97

*Note: "**" - Significant at $p < .001$; Good fit is indicated by CFI $\geq .95$ and RMSEA $\leq .05$*

Table 4

Pearson correlations between the IF-CPPQ subscales and total score with validated measures

Factor	Questionnaire	Expected correlation direction	r Value	r^2
Emotional Impact	HADS-A	Positive	0.49**	0.24
	HADS-D	Positive	0.44**	0.19
	WHO_PSYCH	Negative	-0.46**	0.21
	SDRS-5	Positive	0.048	0.002
Sexual Impact	DSC	Negative	-0.18**	0.03
	FSDS-R	Positive	0.6**	0.36
	SDRS-5	Positive	0.049	0.002
Relationship Impact	DSC	Negative	-0.4**	0.16
	FSDR-R	Positive	0.39**	0.15
	WHO_SOCIAL	Negative	-0.45**	0.20
	SDRS-5	Positive	0.035	0.001
Occupational Impact	PDI	Positive	0.47**	0.22
	WHO_PHYS	Negative	-0.5**	0.25
	SDRS-5	Positive	0.072	0.005
Psychological Impact	HADS-A	Positive	0.5**	0.25
	HADS-D	Positive	0.59**	0.35
	WHO_PSYCH	Negative	-0.6**	0.36
	SDRS-5	Positive	0.123**	0.015
IF-CPP Tot	WHO-1	Negative	-0.37**	0.14

WHO-2	Negative	-0.38**	0.14
PDI	Positive	0.44**	0.19
SDRS-5	Positive	0.075	0.006

*Note: "HADS-A" - The Hospital Anxiety and Depression Scale – Anxiety scale; "HADS-D" - The Hospital Anxiety and Depression Scale – Depression scale; "DSC" - The Dyadic Sexual Communications Scale; "FSDS-R" - The Female Sexual Distress Scale – Revised; "PDI" - The Pain Disability Index; "WHO_PHYS" – The WHO quality of life-Bref physical health subscale; "WHO_PSYCH" - The WHO quality of life-Bref psychological health subscale; "WHO_SOCIAL" - The WHO quality of life-Bref social health subscale; "WHO-1" - The WHO quality of life-Bref overall quality of life; "WHO-2" - The WHO quality of life-Bref overall health; "SDRS-5" – The Social Desirability Response Set-5; "**" – $p < 0.001$.*

Table 5

Summary of PAF rotated factor loadings for Model 3 (Superior model) / 27 items

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Psychological Impact:					
(6) I felt embarrassed about my pain	.55				
(9) I felt controlled by my pain	.54				
(11) I have felt socially isolated because of the pain	.67				
(13) I felt unable to cope with my pain	.74				
(15) I felt despair about my pain	.57				
(20) I felt that my pain has taken over my life	.46				
(22) The pain has made me feel less confident with myself	.50				
(31) I have had thoughts about ending my life because of the pain	.42				
Sexual Impact:					

(Continued on next page)

Table 5 continued

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(16) I avoided sexual activity because of the pain		.62			
(21) Sexual activity has been very painful (either during or after sexual activity)		.70			
(24) The pain has reduced my ability to feel sexually aroused (either during partnered sexual activity or during masturbation)		.69			
(32) The pain has reduced my desire to engage in sexual activity		.79			
(36) I have been unable to enjoy sexual activity because of the pain		.89			
(42) I felt anxious about experiencing pain during sexual activity in future relationships		.63			
(46) I felt guilty for not being able to engage in sexual activity because of the pain		.78			
(50) I felt frustrated at not being able to engage in sexual activity		.82			
Relationship Impact					

(Continued on next page)

Table 5 continued

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(8) I have had difficulties communicating with my partner about my pain			.60		
(14) I felt less connected to my partner because of the pain			.52		
(39) My pain has not been taken seriously by my partner			.66		
(33) I felt closer to my partner because of my pain			.63		
Occupational Impact					
(23) I took time off work (including any voluntary work or education) because of the pain				.75	
(28) I have felt negatively judged at work because of my pain				.52	
(44) The pain has negatively affected my performance at work (including any voluntary work or education)				.77	
Emotional Impact					

(Continued on next page)

Table 5 continued

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(18) I have gotten upset easily because of my pain					.58
(26) I experienced low mood because of the pain					.42
(35) I have felt irritable or snappy because of the pain					.77
(38) I felt angry because of the pain					.60
Eigenvalue	9.09	3.39	1.84	1.49	1.14
%Variance explained	33.66	12.56	6.82	5.51	4.21
Cronbach's α:	.84	.91	.72	.76	.75

Note. Numbers in parentheses "()" indicate the item number in the original questionnaire

Table 6

Correlations between factors in Model 3

	1	2	3	4	5
Emotion	-				
Sexual	.330	-			
Relationship	.357	.671	-		
Occupation	.466	.157	.105	-	
Psych	873	.398	.369	.52	-