

Title:

Patient-related experience measurement scales for endoscopy procedures - A systematic review, COSMIN and conceptual model evaluation

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Patient Reported Experience Measure in Endoscopy: A Systematic Review using COSMIN & Conceptual Evaluation

Objective & Methods



systematic review

- Conceptual Model (5 domains)
- COSMIN Tools (Box 4-8)

Graphic Summary



Key Findings & Takeaway

- CEST: Strong psychometrics (using COSMIN Checklist)
- ENDOPREM: Strong patient-centered content
- All PREMs lack Health
 Motivation domain

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Abstract	XU	17
Background:	Patient experience is a quality indicator in gastrointestinal endoscopy, as	18
	recognized by the European Society of Gastrointestinal Endoscopy (ESGE).	19
	Despite this, no standardized tools or metrics have been formally endorsed for	20
	routine use.	21
Objective:	To identify and evaluate patient-reported experience measures (PREM) used in	22
	endoscopic procedures, assessing their psychometric properties and conceptual	23
	completeness, and to explore gaps for future development.	24
Methods:	A systematic literature review was conducted up to March 2023, including	25
V	studies involving adults (>18 years) who underwent endoscopic procedures and	26
	completed PREM. Instruments were assessed using the COSMIN risk of bias tool	27
	and a patient experience conceptual model.	28



- Results:Of 1.911 articles screened, 10 studies met the inclusion criteria. The Colonoscopy29Experience Score Tool (CEST) proved the strongest psychometric performance,30while the Endoscopic Patient-Reported Experience Measure (ENDOPREM)31showed superior conceptual coverage. However, no single instrument met both32psychometric and conceptual standards. A critical gap identified across all tools33was the absence of items related to patient health motivation.34
- Conclusion: CEST is psychometrically superior and ENDOPREM is conceptually robust. Future 35
 PREM should adopt a hybrid approach—combining the psychometric strengths 36
 of CEST with the conceptual complexity of ENDOPREM—while also incorporating 37
 domains such as patient motivation to improve relevance and impact. 38
- Implications:Measuring patient experience requires tools that are currently both scientifically39rigorous and patient-centered.Developing a Hybrid PREM is an essential next40step to support quality improvement in endoscopic care.41

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Keywords: Oncology. Endoscopy. Patient-reported experience measures. PREM. Education.

1. Introduction

Endoscopic procedures are currently essential for gastrointestinal diagnosis and treatment, 45 yet their invasive nature can lead to significant patient discomfort and anxiety. Understanding 46 patient-reported experience is a crucial aspect of improving procedural quality and patient- 47 centered care in endoscopy. **Patient-reported experience measures** (PREM) adapted to 48 endoscopy evaluate aspects such as discomfort, communication, dignity, and care relationships. 49

High-quality clinical care requires patient input on symptoms and the impact of treatments. 50 **Patient-reported outcome measures** (PROM) are currently standardized, validated, selfreporting instruments with use a patient's views and opinions to measure a patient's health 52 status and overall well-being while PREM capture patient perspectives on care delivery.¹ 53 Together (PROM and PREM), offer a comprehensive view of healthcare effectiveness.² 54

PREM are currently internationally recognized instruments for measuring the quality of health care services from the patients' perspective, PREM are currently gaining attention as an indicator of health care quality and provide information about patient-centeredness.³ PREM 57



paired with PROM provides a whole picture including patient experience, health outcomes, and 58 quality of life insights. 59

PREM provide insights into how patients perceive their care experiences, particularly in 60 invasive procedures like endoscopy, which can be unpleasant even for healthy individuals.³ 61 Validated PREM exist to assess patient satisfaction and interactions with healthcare systems. 62 Healthcare professionals play a crucial role in alleviating distress, ensuring comfort, and 63 supporting patients before, during, and after endoscopy.⁴ 64

The European Society of Gastrointestinal Endoscopy (ESGE) and the United European 65 Gastroenterology composed a list of key performance measures for lower gastrointestinal (GI) 66 endoscopy and patient experience is the 6th item approached.^{5,6} Initially, patient experience 67 monitoring was inconsistent but, by 2018, ESGE categorized it into three domains: comfort, 68 privacy, and dignity. The European Society of Gastroenterology and Endoscopy Nurses and 69 Associates (ESGENA) developed a core curriculum emphasizing the role of the entire healthcare 70 team (including physicians, nurses, technicians, and administrative staff) in increasing patient 71 experience and standardizing endoscopy care across Europe.⁷ 72

Ensuring quality care starts with understanding patient preferences and actively inquiring 73 about their needs and expectations, a standardized approach is necessary to measure patient 74 experience and health outcomes post-procedure. A 2022 systematic review introduced a 75 conceptual model with five domains: health motivation, discomfort, information, care 76 relationships, and understanding. To assess methodological quality in health-related outcome 77 measures, the COSMIN (COnsensus-based Standards for the selection of health Measurement 78 INstruments) checklist, developed through a Delphi study, was widely applied in earlier 79 systematic reviews to evaluate PREM's validity, reliability, and potential biases.⁸ 80

To assess study quality and evaluate methodological quality in measuring properties of 81 health-related outcomes a COSMIN checklist was accomplished after a Delphi study. Previously 82 published systematic reviews have examined the psychometric testing of PREM using the 83 COSMIN checklist to assess their validity and reliability and measure any bias in the study 84 design of PREM validity and reliability testing.³



This systematic review aims to answer the research question: What are currently the 86 validated patient-reported experience measurement (PREM) scales applied to gastrointestinal 87 endoscopic procedures, and how can their methodological rigor and feasibility for clinical 88 implementation be evaluated?

This aim focuses on:

- i. collect the available state-of-the-art questionnaires to acknowledge patient experience
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 ongoing for endoscopy procedures;
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- ii. identify and evaluate the most high-quality questionnaires in the field;
- iii. understand what can be feasible and reproduced in the endoscopy unit for patient 94experience evaluation. 95

2. Methods

The systematic literature review was guided by the Preferred Reporting Items for 98 Systematic Reviews and Meta-Analyses (PRISMA) statement.⁹ The Systematic review with 99 COSMIN guidelines for systematic reviews of patient-reported outcome measures.¹⁰ 100

Articles including PREM apply to endoscopic procedures. Include protocols and 101 questionnaires, evaluate the dimensions, and examine for studies that meet inclusion criteria. 102

To assess psychometric properties and data, synthesis was used according to the COSMIN 103 terminology.¹¹

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Inclusion and/or exclusion criteria106Target population: Studies involving adult patients aged 18 years or older were enrolled to107

focus on adult-centered endoscopy experiences. Pediatric studies were excluded intentionally, 108 as children's endoscopy experiences require distinct assessment PREM. 109

Language: Studies published in languages such as English, Portuguese, or Spanish. 110

<u>Study methods</u>: patient experience, protocols, or questionnaires applied to patients during 111 endoscopy procedures. 112

Search Methods



The search was conducted between January and March 2023 on EBSCOHost, Science 115 Direct, MEDLINE, CINAHL, Cochrane Plus Collection, and MedicLatina. 116

A systematic review was performed to find articles concerning patient experience applied 117 to GI endoscopy procedures. Relevant articles were examined to find additional articles. 118

The keywords chosen to search for existing articles were: Gastrointestinal, endoscopy 119 PREM, patient satisfaction, and patient-reported experience measure. 120

Additional considerations were given to general patient-reported outcome measures for 121 quality of life such as SF-36 or EQ-5D, and Patient-Reported Outcomes Measurement 122 Information System (PROMIS), though they were excluded due to lack of specificity for 123 endoscopic procedures. Recent studies on artificial intelligence-assisted endoscopy and patient 124 perception were reviewed but did not include validated PREM applicable to our inclusion 125 criteria. 126

This systematic review is registered with the International Prospective Register of 127 Systematic Reviews or PROSPERO – ID 1013417. 128

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Methodological Quality Assessment

Studies aimed at the development and/or validation of endoscopic procedures. These 131 studies had to comprise original data on one or more measurement properties defined in the 132 COSMIN taxonomy¹² as a framework to evaluate the methodological quality of development 133 and nine measurement properties, containing content validity, structural validity, internal 134 consistency, cross-cultural validity, reliability, measurement error, criterion validity, hypothesis 135 testing, and responsiveness. A Conceptual Model, that asses to describe how patients 136 experience endoscopy and compare the model against endoscopy-specific patient experience⁸ 137 was applied as well to all questionnaires. The Conceptual Model meta-ethnography research 138 identified five core domains central to patient experience in endoscopy: health motivation, 139 discomfort, information, care relationships, and understanding. These domains provided a 140 framework for evaluating the strengths and limitations of existing PREM. To operationalize 141 these domains across assessment PREM, each domain was mapped to guestionnaire items in 142 existing PREM. 143



- Health motivation (patients' reasons for undergoing endoscopy), 144
- Discomfort (physical and emotional distress during the procedure), 145
- Information (clarity, sufficiency, and timing of pre- and post-procedure explanations), 146

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Care relationships (interactions with healthcare professionals and perceived 147 emotional support),

• Understanding (patients' comprehension of the procedure and results).

Psychometric properties were analyzed: (4) measurement invariance / cross-cultural 150 validity; (5) reliability; (6) measurement error; (7) criterion validity; (8) hypothesis testing for 151 construct validity; to compare all data on several questionnaires, including the ones that were 152 evaluated in the 2021 meta-ethnography developed conceptual model. ⁸ 153

Study Selection and Quality Assessment

Two reviewers (MD and HR) independently examined the articles and screened the titles 156 and abstracts for eligibility using predetermined inclusion and exclusion criteria. Two 157 independent reviewers (MD and HR) again performed the COSMIN evaluation. Discrepancies of 158 opinion were resolved by consensus between the two reviewers or, if no consensus was 159 obtained, with the help of a third reviewer (PF), and the other authors. 160

Inter-rater agreement between reviewers was assessed, achieving a percentage agreement 161 of 90%. 162

3. Results

All the selected articles were full-text and published between 2007 and 2022 (Table 1). Two 165 studies were conducted in Australia, four in the UK, one in the USA, one in Canada, and four in 166 Europe. Questionnaires were applied to GI endoscopy or EUS. 167

In this review, the studies included participants who were undergoing endoscopic 168 procedures such as colonoscopy, EUS, and endoscopic retrograde cholangiopancreatography. 169 Routine symptoms and surveillance procedures were selected. 170

The search returns 1.911 articles (Figure 3), of which 160 were published after 2021. 171



After the removal of duplicates, 75 articles remained, and after abstracts and title 172 screening, six articles fulfilled all eligibility criteria. Using the exclusion criteria, one article was 173 excluded (because the scale is not in use), and one additional study was found by manual 174 search.¹³

This search returns one article.¹⁴ about ENDOPREM that was initially published in 2020 but 176 its validation was only concluded in 2021; the CSSQ (Colonoscopy Satisfaction and Safety 177 Questionnaire based on patient experience) development and validation study was published in 178 2019¹⁵, and the final version was published in 2023 with guestionnaire alterations (overall 179 satisfaction and safety).¹³ Since its final version was not considered in the 2021 systematic 180 review published⁸ ENDOPREM and CSSQ were considered for this research. PRO-STEP, a patient-181 reported scale for tolerability of endoscopic procedures using conscious sedation¹⁶. The 182 research from 2021⁸ was not included in the earlier systematic review and was not considered 183 for translation because it only considered some symptoms (pain, nausea, distention). 184

The PREUS (Patient Reported Experience Measure in Endoscopic Ultrasonography) study185protocol applies only to Endoscopic Ultrasound and without a final questionnaire.17186

Global Rating Scale¹⁸, designated by ESGE guidelines for patient experience evaluation is a 187 standard that details what an endoscopy service must do to deliver high-quality care and not 188 how to measure patient experience. 189

Therefore, the questionnaires chosen as candidates for translation were CEST 190 (Comprehensive Endoscopy Satisfaction Tool), CSSQ, and ENDOPREM. 191

Quality check: Conceptual model and COSMIN

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A total of 10 articles corresponding to 10 questionnaires applied to endoscopic procedures, 194 of which the most recent is from 2022; no questionnaires were found after 2022. After a quality 195 check with the COSMIN risk of bias tool, the CEST questionnaire had a *very good/adequate* in 196 general in all fields, and the GESQ (Gastrointestinal Endoscopy Satisfaction Questionnaire) 197 questionnaire had some *items very good/adequate* and some items *doubtful/inadequate*. The 198 other eight questionnaires had more *doubtful/inadequate* items. 199



After applying the Conceptual Model with five main concepts *(health motivation,* 200 *discomfort, information, caring relationship, and patient understanding)* and all included studies 201 contributed content to the synthesis all questionnaires lacked information about health 202 motivation. ENDOPREM demonstrated the most adequate in all fields (except *health* 203 *motivation*). CSSQP and CEST were next with some *doubtful, inadequate* evaluation items. 204

After evaluations with COSMIN and the Conceptual Model, the CEST questionnaire is the 205 one that demonstrated good evaluation with the two evaluation assessments. CEST 206 demonstrated superior psychometric quality, making it the most methodologically reliable 207 PREM for endoscopic procedures. ENDOPREM, while slightly less rigorous in psychometric 208 validation, aligned more closely with patient-centered domains, particularly in assessing *care* 209 *relationships* and *patient understanding*. Both questionnaires (CEST and ENDOPREM) 210 demonstrated strengths in different areas: CEST is more statistically robust, while ENDOPREM is 211 more aligned with the lived patient experience. 212

COSMIN Risk of Bias checklist was applied to assess the methodological quality of each 213 study. Since tool development requires content and structure validity, *boxes 1,2,3 (PROM 214 development, content validity, structural validity*) were bypassed, and the next checklist' boxes 215 were applied to each item. 216

Qualitative analysis of psychometric properties was done according to current COSMIN 217 guidelines.¹⁰ 218

The concept model was applied to the remaining studies of our research (after 2021) with 219 the same interest, to compare all data about all the research, whose results are in Table 3 and 220 Figure 1. 221

The Cosmin tools results are summarized in Table 2 and Figure 2. To summarize the 222 evidence, the results were pooled, accompanied by a rating of the summarized results (+;+/-; 223 –). Detailed information is available in Table 4. 224

The radar graphs were created by converting the classification (*inadequate, doubtful, 225 adequate, very good*) into numerical values (0,1,2,3) and adapting them to a percentage scale. 226

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229 Figure 1: Radar chart of the Conceptual Model with Five Domain Concepts (vide Table 3) 230 231 232 233 Figure 2: Radar Chart of Cosmin Checklist (vide Table 4) 234 235 236 237 4. Discussion 238 This review's limitations include possible publication bias, as the exclusion of non-English 239 studies outside Portuguese and Spanish, while the search included studies published in English, 240 Portuguese, and Spanish, the exclusion of studies in other languages could introduce language 241 bias, potentially overlooking valuable insights from regions where non-English studies are 242 currently predominant and potential underrepresentation of emerging PREM. The exclusion of 243 grey literature may have led to publication bias, as studies that were not published in peer-244 reviewed journals were not considered. This could have skewed the overall assessment of 245 available PREM. 246 This systematic review aims to bring together all available data on PREM to assess the 247 experience of patients undergoing endoscopic procedures and highlight areas where further 248 research is needed. 249 The lack of patient participation in the review process may have limited the scope of insight 250 into patient experiences. The adoption of PREM and PROM can accelerate a global shift toward 251 quality-based healthcare. This method of self-reported information eases the collection and 252 processing of experienced measures. PREM combined with condition-specific PROM provides a 253 complete picture, including patient experience, health outcomes, and perceptions of quality of 254 life. 255 It is necessary to use different terminologies such as patient experience, satisfaction, and 256 experience measure to include PREM applied to patient experience. This adaptation helped us 257



to understand what healthcare providers use nowadays worldwide.

(I) The available state-of-the-art questionnaires to acknowledge patient experience ongoing 259 for endoscopy procedures 260

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In this systematic review, we have provided an overview of the various patient-reported 261 experience measures for GI endoscopy. Until 2021, studies have proven limited exiting 262 colonoscopy-specific instruments to cover PREM to endoscopy procedures patients.⁸ 263

PREM, until 2021, did not completely cover patients' experiences with endoscopic 264 procedures such as colonoscopy. To achieve quality in endoscopy procedures, specific 265 instruments can be used to understand and cover all patient experiences. 266

Misconceptions and poor information about screening colonoscopy can affect the decision 267 of participating patients and compromise awareness of the benefits of a screening colonoscopy 268 with refusal of the procedure.⁸ To deliver high-quality GI endoscopy and overcome barriers in 269 health care is mandatory to measure patient experience. 270

The patient's experience must be valued from the moment they enter the gastroenterology 271 consultation; throughout the procedures (how patients perceive the consultations); the 272 facilities where the procedure takes place and the way the results are delivered.¹⁴ 273

(II) identify and evaluate the highest-quality PREM in the field

To compare outcomes and research to focus on research after 2021 we try to replicate the 275 systematic review and meta-ethnography conducted in 2021.⁸ Since the keywords or MESH 276 weren't available, we increased the period of published articles to evaluate if the articles were 277 similar, and if we were able to find all the studies. 278

The included articles evaluated the measurement of patient experience but did not follow 279 the COSMIN instrument tool to assess outcome measurement and study quality. To understand 280 which PREM is more suitable to be applied to the population, the COSMIN Risk of Bias tool was 281 implemented in all studies to assess the quality of studies. *Internal consistency, cross-cultural* 282 *validity/measurement invariance, reliability, measurement error,* and *criterion validity* were the 283 features used. 284

A research limitation is the need for adequate psychometric measurement properties 285 applied to PROM. It is imperative to measure PREM, and the lack of specific instruments makes 286



COSMIN the best tool available to measure patient experience. The conceptual model used in287this research was already validated by PREM.288

In this field, COnsensus-based Standards for the selection of health Measurement 289 INstruments (COSMIN) methodology will facilitate the selection of high-quality PROM for 290 research and clinical practice in ways to advance the science and application of health outcome 291 measurement.¹⁰ The COSMIN methodology does not currently consider all types of 292 measurement like patient-reported experience measures (PREM). PREM aims to investigate the 293 patient's experience of care from their perspective. Nevertheless, PREM need to have adequate 294 psychometric measurement properties (e.g., validity, reliability) to accurately measure patient-295 centeredness, as well as PROM.¹⁹ As done previously by the authors, to save resources by using 296 non-standardized PREM or PROM, we carried out this research by accepting guidelines for 297 assessing the psychometric properties of patient-reported measures.¹¹ 298

PREM Development:

Psychometric properties were used according to the COSMIN terminology²⁰. Qualitative 300 analysis of psychometric properties was done according to current COSMIN guidelines.¹⁰ The 301 evaluation of content validity was done according to Terwee et al.¹¹. We used the patient- 302 centered dimensions described in Table 4, to assess content validity. The following 303 psychometric properties were analyzed: (4) measurement invariance/cross-cultural validity; (5) 304 reliability; (6) measurement error; (7) criterion validity; and (8) hypothesis testing for construct 305 validity. 306

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In general, the development and validation of the PREM for endoscopic procedures are 307 currently described in three articles. ^{13,14,21} PREM were eligible for the assessment using the 308 COSMIN checklist. The articles included original validation studies. provides an overview of the 309 assessed PREM and its characteristics. The percentage agreement between the two reviewers 310 performing the COSMIN evaluation was 90%. 311

Content Validity is defined as "the degree to which the content of an instrument measures312the construct(s) it purports to measure"20 and it is considered a valuable measurement313property.314



Internal consistency, defined as "the degree of the interrelatedness among the items", is 315 usually assessed using Cronbach's alpha.⁹ This domain was determined to be of high 316 methodological quality in one study that was rated *very good* (Table 4). 317 *Measurement Properties:* 318

Measurement properties of the PROM in terms of reliability, validity, and responsiveness, 319 an overview of the summary scores for the methodological quality of each measurement 320 property can be found in Table 2. The studies that evaluated measurement invariance used *very* 321 *good* or *adequate* methods. 322

Reliability is defined as "the degree to which the measure is being free from measurement 323 error"⁹ and can be evaluated with repeated measurements in stable patients, with a proper 324 time interval, and under similar test conditions. To evaluate reliability in the reviewed articles, 325 the methods used were rated as *very good* for one study and adequate for two studies; in most 326 articles, inappropriate statistical methods were used, as confirmed by the results shown in 327 Table 2.

Measurement error is "the systematic and random error of a patient's score that is being 329 not attributed to changes in the construct to be measured",⁹ was rated 'as seen in Table 3. This 330 rating was often based on optimal repeated measurement conditions and adequate use of 331 statistical methods. 332

Content Validity

Content validity is defined as *"the degree to which the content of an instrument measures* 334 *the construct(s) it purports to measure"*,¹² The results of each study on the different 335 measurement properties were extracted and are currently shown in Table 2. 336

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Following the COSMIN method, we were able to formulate a recommendation on the most 337 appropriate PREM. The number of validation studies was limited, but the methodological 338 quality of one of the studies met COSMIN standards. 339

The meta-ethnographic conceptual model developed uses five main concepts to include 340 the colonoscopy's PREM: *health motivation, discomfort, information, caring relationship,* and 341 *understanding*. This concept must be applied before, during, and after the procedure (except 342 the caring relationship which should be only applied during the endoscopy).⁸ The concept of 343



health motivation is related to the patient's motivation to undergo the procedure; in case of 344 discomfort, it should be considered before, during, and after the procedure, because of the 345 bowel preparation. Information also occurs in these three stages, with information about the 346 procedure, teachings about bowel preparation, immediate information, and the result of the 347 procedure. A Caring relationship is explained by the behavior towards the patients by the 348 health professional and implicates how the patient experiences the colonoscopy. Friendly 349 behavior as well as professionalism and competence are currently key factors for patients. 350 Understanding is differentiated into two categories, pre-procedure and post-procedure 351 experiences. Again, the competence of healthcare professionals is important to patients 352 because they are concerned about possible complications and the patient's beliefs about the 353 procedure do not always match their experience. When bowel preparation or colonoscopy is 354 more difficult than expected, it implies an attitude toward the procedure and the willingness to 355 repeat or not a colonoscopy in the future.⁸ 356

The improvement of PREM evaluation over time is notorious and recent PREM such as 357 ENDOPREM, CEST, and CSSQP have respectable results on the COSMIN tool evaluation and 358 Conceptual Model. However, some aspects of participants' motivation during the procedure 359 are not currently considered in these PREM. 360

Health motivation and the need to assess the care relationship (before, during, or after the361procedure) are currently not covered in any study.362

The Newcastle ENDOPREM was developed to capture the experience throughout the 363 patient journey in gastrointestinal procedures¹⁴ and it scores in the five domains evaluation 364 items; it's an extended PREM in which the authors prepare a 10- to 15-minute interview with 365 the patient about the gastrointestinal procedure. When applying the COSMIN tool, Endoprem 366 gets a low score, especially in some calculated statistical parameters (Table 2). Although, as a 367 matter of concept, the PREM is suitable for the conceptual model (Table 3). 368

The CSSQP includes colonoscopy indicators and names factors related to the patients' 369 experience during the procedure, satisfaction indicators, and perceived safety, evaluated in 370 different centers. 371



When applying the COSMIN tool, the CSSQP adapts with an average score to the error of 372 the results measurement instrument (Table 2). However, in terms of concept, the PREM fits the 373 conceptual model (Table 3). 374

(III) understand what can be feasible and reproduced in the endoscopy unit for patient 375 experience evaluation 376

The Comprehensive Endoscopy Satisfaction Tool (CEST) is a valid measure of patients' 377 experience with the various components of endoscopic services and is the instrument with 378 better classification in the COSMIN tool. It allows the identification of domains that may have 379 an impact on patient experience because it is a practical PREM to compare patient satisfaction 380 over time and across facilities.²¹

CEST returned better results if we consider combined assessment, risk of bias COSMIN tool, 382 and Conceptual Model evaluation; however, ENDOPREM has better results in the conceptual 383 field. All PREM lack information about patient health motivation. To have a more complete 384 PREM, it is necessary to combine the quality of the CEST with the ENDOPREM conceptual 385 domains and add a new domain to introduce patient health motivation. 382

The findings of this systematic review have significant implications for clinical practice, 387 particularly in the evaluation and improvement of PREM in endoscopy. Given the 388 complementary strengths of these PREM, a hybrid approach incorporating the psychometric 389 rigor of CEST with the patient-centered focus of ENDOPREM may offer the most comprehensive 390 assessment strategy. Future research should aim to refine these PREM by addressing gaps 391 (mainly the lack of health motivation assessment) to create a fully patient-centered validated 392 instrument for endoscopy patient experience measurement. To enhance the assessment of 393 patient-reported experiences in endoscopic procedures, we propose the development of a 394 hybrid PREM tool that combines the strengths of two validated instruments: CEST and 395 ENDOPREM. 396

Current PREM fall short of comprehensively evaluating the endoscopic patient experience: 397 CEST stands out methodologically and ENDOPREM is conceptually robust. Future PREM should 398 adopt a hybrid approach, combining the psychometric strengths of CEST with the conceptual 399 depth of ENDOPREM, while also integrating neglected domains such as patient health 400



motivation. The development of such a tool is a future research priority aimed at ultimately401supporting clinical implementation.402

A hybrid PREM, developed through further research and confirmed across diverse 403 populations, could offer a standardized and meaningful tool for routine use in clinical 404 endoscopic settings.

Implementation barriers (such as time and resources) to implement a hybrid approach 406 across diverse clinical settings may require additional resources for training staff, integrating 407 the tool into electronic health records, and ensuring patient compliance in completing the 408 questionnaire. The need for a 10-15 minute interview for more comprehensive tools, like 409 ENDOPREM, might also create logistical challenges. Measuring patient experience requires 410 tools that are currently both scientifically rigorous and patient-centered. 411

While CEST is relatively concise, the integration of patient experience questionnaires into412clinical practice might overwhelm patients, particularly in high-volume settings. Reducing PREM413length and integrating questions directly into patient flow can help to mitigate this.414

Some endoscopy centers may be resistant to adopting new PREM, particularly if they 415 perceive them as adding complexity or diverting attention from clinical care. Overcoming this 416 resistance will require strong leadership and education on the value of systematically 417 measuring and improving the patient experience. 418

The implementation costs, such as training staff, acquiring questionnaire administration419PREM, and data processing, can also be a constraint in resource-limited centers.420

Standardization across different endoscopy centers and variability in endoscopy unit 421 practices and patient populations may affect the comparability of results across institutions. 422 Different levels of sedation, procedural settings, and healthcare systems might require 423 adaptation of certain PREM items. 424

ENDOPREM, CEST, and the hybrid between both combined with cultural and linguistic425adaptation for different patient situations. The limited availability of these validated versions in426other languages than English may restrict their wider adoption.427

Despite these barriers, the benefits of measuring and improving patient experience (such 428 as increased patient satisfaction, better clinical outcomes, and enhanced care quality) far 429



outweigh the challenges. With strong support for evidence-based practices and patient- 430 centered care, the integration of PREM like CEST can transform endoscopy services into more 431 responsive and patient-friendly environments. 432

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5. Conclusion

No existing PREM fully captures all the necessary domains, and no tool implemented the 434 health motivation domain. Future tool development should prioritize addressing this gap to 435 create more comprehensive and patient-centered measures. CEST is psychometrically superior, 436 ENDOPREM is conceptually richer, and future PREM should integrate both along with the 437 domain of patient health motivation. 438

We recommend that endoscopy centers integrate CEST for routine assessment of patient 439 experience due to its methodological robustness. However, some elements of ENDOPREM, 440 specifically those related to the patient journey, should be considered for adaptation. Future 441 research should focus on developing PREM with improved coverage of patient health 442 motivation and validating artificial intelligence-assisted endoscopy experiences. Literature 443 reinforces the importance of PREMs to improve health care. The application of the COSMIN 444 method in the elaboration of PREM is important for future research. 445

The CEST is the most complete when combined with COSMIN and the Conceptual Model. 446 ENDOPREM demonstrated better results in the Conceptual field. To proceed with a language 447 and cultural translation, the tool features will be considered, and an alteration to the missing 448 items for PREM evaluation. 449

As part of the process for language and cultural translation, it is crucial to consider the 450 features of both PREM and change them to fill gaps in the current tools, particularly if it's 451 related to health motivation. 452

Conflicts of Interest:

The authors declare no conflict of interest.



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Illustrations



Figure 3: PRISMA Flowchart of included studies.

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Tables

Table 1 – Main characteristics of the identified studies

Characteri	stics of th	ne ide	entified studies			
Author	Country	Year	Study design	Patient and procedures	Aim	Questionnaire
LIN	USA	2007	Quasi- Experimental	routine elective upper endoscopies and colonoscopies	compare satisfaction scores obtained by using on-site (OS) surveys versus mail- back (MB) surveys.	GIPPSS
ко	Canada	2009	Prospective cohort study	EGD and / or colonoscopy	Determine satisfaction after the procedure and correlation with later measurements	mGHAA9
Hoof	Norway	2011	Observational Survey application	Colonoscopy	quality assurance of colonoscopy	Gastronet
Thayparan	UK	2013	Cross-sectional Describe PSQ-18		Describe PSQ-18 questionnaire	PSQ
Hutchings	UK	2015	Scale design - Psychometric	large multicentre trial: Flexible sigmoidoscopy or upper Gl endoscopy	Questionnaire creation and validity testing	GESQ
Ghanouni	UK	2016	Cross-sectional study on patient	Colonoscopy following an abnormal faecal	Identify experience of screening programs crucial for service	BCSP-NHS

543



experiences	occult blood test	improvement	
	result		





			Cross-sectional		Identify experience of		
			study on		screening programs		
			patient		crucial for service		
			experiences		improvement		
					Identify the relevant		
Protons	Spain	2010	Psychometric	Colorectal cancer	dimensions to produce		
	Spain	2019	scale validation	screening	the instrument		
					(content validity).		
			Scale design		Measuring natient		
Noilson	υк	2021	and	GI endoscopy or		М	
Nelison			psychometric	CT colonography	gastrointoctinal	IVI	
			validation		Bustionitestina		
			Scale design				
Kutula	Australia	2022	and	Clandarania	develop and validate a		
китуја	Australia	2022	psychometric	Gi endoscopic	tool		
			validation	\mathbf{O}			
			Scale design	V			
			and		questionnaire creation		
Apadula	Italy	2022	psychometric	EUS	PREUS and validity testing.		
			validation				

GIPPSS - GI Procedure Patient Satisfaction Survey;	547
mGHAA-9 - modified Group Health Association of America-9 survey;	548
PSQ - Patient Satisfaction Questionnaire;	549
GESQ - Gastrointestinal Endoscopy Satisfaction Questionnaire;	550
BCSP-NHS - English Bowel Cancer Screening Programme in NHS;	551
CSSQP - Colonoscopy Satisfaction and Safety Questionnaire based on patient experience;	552
ENDOPREM - The Newcastle ENDOPREM;	553
CEST - Comprehensive Endoscopy Satisfaction Tool;	554



PREUS - Patient Reported Experience Measure in Endoscopic Ultrasonography.

Table 2: COSMIN Risk of Bias tool

COSMIN Checklist	t		Box 4	Box 5	Box 6	Box 7	Box 8
Questionnaires			Internal	Cultural	Reliability	Error	Validity
			consisten	c validity			
			у				
Lin, 2007	GIPPSS ²²		+/-	+	+/-	+/-	+/-
Ко, 2009	mGHAA-9 ²³		-	+/-	+/-	+/-	+/-
Hoff, 2011	Gastronet ²⁴		+/-	+	+/-	+/-	+/-
Thayaparan,	PSQ ²⁵		+/-	+/-	+/-	+/-	+/-
2013							
Hutchings, 2015	GESQ ²⁴		+	+	+	+/-	+/-
Ghanouni,2016	BCSP-NHS ²⁶		+/-	+	+/-	+/-	+/-
Brotons, 2019	CSSQP ¹⁵		+/-	+	+/-	+/-	+/-
Neilson,2021	ENDOPREM 27		-	+/-	+/-	+/-	+/-
Kutyla, 2022	CEST ²¹		+	+	+	+	+
Apadula, 2022	PREUS Study	Protocol	+	+	NA	NA	NA
	17						

Abbreviations:

Abbreviations:	557
(+) very good, adequate in general;	558
(-) doubtful, inadequate;	559
(+/-) not very good but not inadequate;	560
N/A – Not Available;	561
GIPPSS - GI Procedure Patient Satisfaction Survey;	562
mGHAA-9 - modified Group Health Association of America-9 survey;	563
PSQ - Patient Satisfaction Questionnaire;	564
GESQ - Gastrointestinal Endoscopy Satisfaction Questionnaire;	565
BCSP-NHS - English Bowel Cancer Screening Programme in NHS;	566



CSSQP - Colonoscopy Satisfaction and Safety Questionnaire based on patient experience;	567
ENDOPREM - The Newcastle ENDOPREM;	568
CEST - Comprehensive Endoscopy Satisfaction Tool;	569
PREUS - Patient Reported Experience Measure in Endoscopic Ultrasonography.	570



Table 3: Conceptual Model – Five Domain Concepts⁸

Conceptual Model

	Health							Contin			1			
	motivati	oDiscom	nfort		Inform	ation		Laring			Unde	Inderstanding		
Instrument	n					Relationship				ip				
	Overall	before	duri	ngafter	before	durir	ngafter	before	duri	ngafter	befo	reduri	ngafter	
GIPPSS ²²	-	+	+	+	+	-	+		+	•	-	- 1		
mGHAA-9 ²³	3_	-	+	-	+	-	+		+		+		+	
Gastronet ²⁴	4	-	+	-	+/-	-	+		+		-	-	-	
PSQ ²⁵	-	-	-	-	+	+	+		+		+	-	-	
GESQ ²⁴	-	-	+	-	+	-	+		+		-	-	-	
BCSP-NHS ²⁶	6_	-	+	+	+		+	V	-		+	-	-	
CSSQP ¹⁵	-	+	+	+	+	+	+		+		+	-	+	
ENDOPREM						С								
27	-	+	÷	+		+	+		+		÷	÷	+	
CEST ²¹	-	_	+	H.	+	+	+		+		+	-	+	
Footnotes: The	e conceptu	ual model	lacks	findings	about "c	aring r	elations	ships" b	becau	ise often	charad	terized	by self-	
care. The focus	s is on heal	thcare pro	ofessio	onals' res	pectful be	ehavio	ur towa	rd the p	oatier	nts.				
Abbreviations	:													
(+) very good, a	adequate i	n general;												
(-) doubtful, in	adequate;		1											
(+/-) not very g	good but no	ot inadequ	uate;											
GIPPSS - GI Pro	ocedure Pa	tient Satis	factio	n Survey	;									
mGHAA-9 - mo	odified Gro	up Health	Asso	ciation of	America-	9 surv	ey;							
P SQ - Patient S	atisfaction	Question	naire;											
GESQ - Gastroi	intestinal E	ndoscopy	Satisf	action Q	uestionna	ire;								
BCSP-NHS - En	glish Bowe	l Cancer S	creen	ing Progr	amme in	NHS;								
CSSQP - Colone	oscopy Sati	isfaction a	nd Sa	fety Que	stionnaire	e basec	l on pati	ient exp	perie	nce;				
ENDOPREM - 1	The Newca	stle ENDO	PREM	l;										
CEST - Compre	hensive En	idoscopy S	Satisfa	ction Too	ol.									

Table 4: Cosmin Checklist (Box 4,5,6,7,8) applied to the selected scales/questionnaires

Box 4. Internal consistency			ENDOPRE				GastroNe			
	CEST	CSSQP	М	PSQ	PREUS	GIPPSS	BCSP-NH	lS t	mGHAA-9	GESQ
1. Was an internal consistency statistic	very	very	doubtf	very	very	very	very	very	very	very
subscale separately?	good	good	ul	good	good	good	good	good	good	good
2. For continuous scores: Was Cronbach's alpha	very	doubtf	inade-	inade-	very	inade-	inade-	inade-	inade-	very
or omega calculated?	good	ul	quate	quate	good	quate	quate	quate	quate	good
3. For dichotomous scores: Was Cronbach's	s very	inade-	very	inade-	very	inade-	inade-	inade-	inade-	very
alpha or KR- 20 calculated?	good	quate	good	quate	good	quate	quate	quate	quate	good
4. For IRT-based scores: Was standard error or	f									
the theta (SE (θ)) or reliability coefficient or	f very	inade-	inade-	inade-	very	inade-	inade-	inade-	inade-	inade-
estimated latent trait value (index of (subject	t good	quate	quate	quate	good	quate	quate	quate	quate	quate
or item) separation) calculated?										
5. Were there any other important flaws in the	e very	doubtf	doubtf	doubtf	very	very	very	doubtf	doubtf	very
design or statistical methods of the study?	good	ul	ul	ul	good	good	good	ul	ul	good
Box 5. Cross-cultural validity\Measurement	t CEST	CSSQP	ENDOPRI	E PSQ	PREUS	GIPPSS	BCSP-NH	GastroNe	mGHAA-9	GESQ
								L		
1. were the samples similar for relevant	t very	adequa	adequa	adequa	very	very	very	very	adequa	very
characteristics except for the group variable?	good	te	te	te	good	good	good	good	te	good
2. Was an appropriate approach used to analyse	e very	very	adequa	adequa	very	very	very	very	adequa	very

the data?	good	good	te	te	good	good	good	good	te	good

2. Was an appropriate approach used to analyse	very	very	adequa	adequa	very	very	very	very	adequa	very
the data?	good	good	te	te	good	good	good	good	te	good
3. Was the sample size included in the analysis	very	very	very	very	very	very	very	very	very	very
adequate?	good	good	good	good	good	good	good	good	good	good
4. Were there any other important flaws in the	very	very	doubtf	doubtf	very	very	very	very	doubtf	very
design or statistical methods of the study?	good	good	ul	ul	good	good	good	good	ul	good

Box 6. Reliability	CEST	ENDOPRE						GastroN mGHAA		-
		CSSQP	М	PSQ	SQ PREUS	S GIPPSS	BCSP-NHS	et	9	GESQ
1. Were patients stable in the interim period on the	e very	very	very	very	NI / A	very	very	very	very	very
construct to be measured?	good	good	good	good	N/A	good	good	good	good	good
2. Was the time interval appropriate?	very	very	very	very	Ν/Λ	very	very	very	very	very
	good	good	good	good		good	good	good	good	good
3. Were the test conditions similar for the measurements? e.g. type of administration, environment, instructions	adequat , ,	very good	very	very good	N/A	very good	very good	very good	very good	very
	C	8000	8000	Bood		8000	8000	8000	8000	8000
4. For continuous scores: Was an intraclass correlation		inade		inade						
coefficient (ICC) calculated?	very	-	inade-	-	N/A	inade-	inade-	inade-	inade-	very
	good	quat	quate	quat		quate	quate	quate	quate	good
		е		е						
5. For dichotomous/nominal/ordinal scores: Was kappa	1	inade		inade						
calculated?	very	-	inade-	-	N/A	inade-	inade-	inade-	inade-	inade-
	good	quat	quate	quat		quate	quate	quate	quate	quate
		е		е						
Box 7. Measurement error	CEST	CSSQP	ENDOPRE VI	۶Q	PREUS	GIPPSS	3CSP-NHS	GastroN(e nGHAA-	SESQ
1. Were patients stable in the interim period on the		very	very	very	N/A	very	very	very	very	very
construct to be measured?	good	good	good	good	,,,	good	good	good	good	good

2. Was the time interval appropriate?	very	very	very	very	NI / A	very	very	very	very	very
	good	good	good	good	N/A	good	good	good	good	good
3. Were the test conditions similar for the measurements?	odequat	very	very	very	NI / A	very	very	very	very	very
(e.g. type of administration, environment, instructions)	е	good	good	good	N/A	good	good	good	good	good
4. For continuous scores: Was the Standard Error of Measurement (SEM), Smallest Detectable Change (SDC) or Limits of Agreement (LoA) calculated?	f adequat) e	inade- quate	very good	inade- quate	N/A	inade- quate	inade- quate	inade- quate	inade- quate	very good
5. For dichotomous/nominal/ordinal scores: Was the percentage (positive and negative) agreement calculated?	adequat t e	inade- quate	inade- quate	inade- quate	N/A	inade- quate	inade- quate	inade- quate	inade- quate	very good
6. Were there any other important flaws in the design of	r very	very	very	very		very	very	very	adequa	very
statistical methods of the study?	good	good	good	good	N/A	good	good	good	te	good
Box 8. Criterion validity	CEST	CSSQP	ENDOPRE M	'SQ	PREUS	GIPPSS	3CSP-NHS	GastroNe	nGHAA-9	GESQ
1. For continuous scores: Were correlations, or the area	adequat	inade-	inade-	inade-		inade-	inade-	inade-	inade-	inade-
under the receiver operating curve calculated?	е	quate	quate	quate	N/A	quate	quate	quate	quate	quate
2. For dichotomous scores: Were sensitivity and specificity	v adequat	inade-	inade-	inade-		inade-	inade-	inade-	inade-	inade-
determined?	е	quate	quate	quate	N/A	quate	quate	quate	quate	quate
3. Were there any other important flaws in the design of	r very	very	very	very	NI / A	very	very	very	very	very
statistical methods of the study?	good	good	good	good		good	good	good	good	good

Abbreviations:

CEST - Comprehensive Endoscopy Satisfaction Tool;	590
CSSQP - Colonoscopy Satisfaction and Safety Questionnaire based on patient experience;	591
ENDOPREM - The Newcastle ENDOPREM;	592
PSQ - Patient Satisfaction Questionnaire;	593
PREUS - Patient Reported Experience Measure in Endoscopic Ultrasonography;	594
GIPPSS - GI Procedure Patient Satisfaction Survey;	595
BCSP-NHS - English Bowel Cancer Screening Programme in NHS;	596
mGHAA-9 - modified Group Health Association of America-9 survey;	597
GESQ - Gastrointestinal Endoscopy Satisfaction Questionnaire.	598