# COSMIN- based on Gagnier et al (2021) COSMIN reporting guideline for studies on measurement properties of patient-reported outcome measures. Quality of life research. <http://www.equator-network.org/>

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|  | Detailing how the matters detailed in the guideline are addressed in your paper | Reported on page nro. |
| **Title** |  |  |
| The name of instrument | The name of the instrument (health sciences generic competence (HealthGenericCom) instrument) is included in the title. | 1 |
| Measurement property | The psychometric testing is included in the title. | 1 |
| Study sample | The study sample isn´t included in the title but includes in the abstract | 1 |
| **Abstract** |  |  |
| The name of instrument | The name of the instrument (health sciences generic competence (HealthGenericCom) instrument) and the type of instrument (self-evaluation) is reported. | 1 |
| Measurement property | The validity and reliability of the instrument development are mentioned shortly in the abstract. | 1 |
| Design | The design is described in the abstract (cross-sectional study design) | 1 |
| Sample | The sample size (n=276) and geographic location are described. | 1 |
| Methods | The development and psychometric testing four step process has been mentioned in the abstract. Four phases: 1) establishing the theoretical background; 2) testing content validity; 3) testing structural validity; and 4) testing internal consistency are more deeply described in Methods section. | 1 |
| Result | The Results are shortly described in the abstract (Face and content validity was tested by 13 experts, structural validity was tested with exploratory factor analysis, and internal consistency was evaluated by calculating Cronbach’s alpha. The structural validity was tested using data from Finnish health sciences students (n=276). The content validity index of the whole HealthGenericCom instrument was 1 for relevance and for clarity. Using exploratory factor analysis a model of eight factors (with 88 items) was created: 1) competence in leadership, administration, and finance; 2) competence in people-centred guidance; 3) competence in health promotion; 4) competence in evidence-based practice; 5) digital competence; 6) competence in work well-being and self-management; 7) competence in collaboration and problem-solving; and 8) competence in societal interaction).  The content validity index, exploratory factor analysis and Cronbach`s alpha values were described more strictly in the Results section. | 1 |
| Discussion/Conclusion | Developed and psychometrically tested instrument were evaluated, and the usability of the instrument was described. | 1 |
| **Introduction and background** |  |  |
| Name and describe the PROM of interest | The name of the instrument is mentioned, and its intended use are described in introduction. The total instrument, with details, is described in Methods section. | 1-3 |
| Target population | Instrument is for self-evaluating health sciences students and experts health science generic competence. | 1-3 |
| Citation of the original development of instrument | Citations are provided regarding to theoretical framework that is based to systematic review and qualitative study and generation of new items. Citations are provided. | 1-3 |
| State of knowledge and rationale | Earlier designed instruments for measuring core competencies (self-evaluation) of professionals and experts like leaders were described. | 1-3 |
| Definition | Definitions of all used concepts (competence, generic competence, health sciences education, health sciences competence, are presented.  Earlier designed instruments for professionals´ self-evaluation were described and the rationale for developing the new instrument for self-evaluation is presented. | 1-3 |
| Objectives and hypothesis | Objectives are presented and no hypothesis was set for this study. | 4 |
| **Methods** |  |  |
| Study design | Study design details are described according to four phases of the study:   1. Phase I. Establishment of the theoretical background and instrument design: Theoretical background for the items was developed based on a systematic review of existing instruments for measuring health care professionals' core competences and a qualitative study concerning health sciences students’ experiences of health sciences competence development. 2. Phase II. Face and content validity evaluation using content validity index (CVI) methods with one round of assessment by 13 experts. 3. Phase III. Structural validity testing was supported by using exploratory factor analysis (EFA), which included Principal Axis Factoring and Promax rotation. 4. Phase IV. Internal consistency was evaluated by calculating Cronbach`s alpha.   Detailed also in figure 1 | 4-6, (Including Figure 1) |
| Participants | Participant details are described according to phases of the study:   1. Phase II: Expert panel (13 experts) with inclusion criteria (experience and understanding about health sciences expertise) and pilot test of the instrument by 15 health sciences students. 2. Phases III and IV: students (N=1400) with inclusion criteria: 1) the student was studying health sciences in a Bachelorʼs or Masterʼs degree programme; and 2) the student was willing to participate in the study. A total of 291 health sciences students (N=1400) responded. For the psychometrical testing of the instrument, univariate and multivariate outliers have been removed (n=15), which means that data from 276 participants were used to measure the validity and reliability of the instrument. 3. Sampling method was purposive sampling.   Detailed also in figure 1. | 4-7 (including Figure 1) |
| Instrument administration | The Webropol online survey system (V3.0, Webropol, Helsinki, Finland) was used for data collection during the spring 2022. | 7 |
| Data collection procedure | Data collection time frame and the number of reminders is described. | 7 |
| Power /sample size calculation | Study sample size was estimated by counting at least three participants per instrument item. | 4 |
| Statistical analyses | Face and content validity were tested and validated through an expert panel. A total of 13 experts were recruited, of which 11 represented university teachers, principal lecturers, university lecturers, researchers, clinical nursing science experts and two second-year Bachelor’s degree students. Inclusion criteria for recruiting experts was understanding about health sciences field and expertise.  The content validity was measured by calculating the Content Validity Index, which comprised both an individual item evaluation (I-CVI) and overall instrument validation (S-CVI/Ave) (Polit et al. 2021). The items were rated for relevance and clarity (Polit et al., 2007). The limit for an acceptable I-CVI score was set as ≥ 0.78 for each item.  Structural validity was tested using IBM SPSS Statistics (V27.0, IBM Corporation, Armonk, NY).  Univariate and multivariate outliers were identified with Mahalanobis distances and Mardia’s kurtosis index, with the p-value threshold set at <0.001; any identified outliers were removed.  The Kaiser-Mayer-Olkin (KMO) test and Bartlett’s test of Sphericity (BTS) were used to evaluate sampling adequacy. Internal consistency was evaluated by calculating Cronbach's alpha values. | 6-7 |
| Missing data | No missing data. For the psychometrical testing of the instrument, univariate and multivariate outliers have been removed (n=15), which means that data from 276 participants were used to measure the validity and reliability of the instrument. | 4 |
| Post hoc analysis | Not applicable in this study | - |
| **Results** |  |  |
| Missing data | No missing data. | - |
| Participants characteristics | Participant characteristics included seven sociodemographic background questions and 13 questions regarding orientation practices that are described in detail in Table 1. | 7-9, (including Table 1 |
| Sample size | The sample size (n=276) is described in pages 7-9 | 7-9 |
| **Discussion** |  |  |
| MP evidence | Measurement properties are described in the results section and more strictly in a Table 2 | 11-14 (including Table 2) |
| Practical relevance | Instrument`s practical relevance is discussed from perspectives of  -education,  -individual and  - managers and leaders. | 15 |
| Strength and limitations | Strengths were discussed as to be instrument’s theoretical framework, content validity evaluation by a panel of experts and face validity evaluation with health sciences students.  Limitations are described: larger or different sample may have provided different results. | 16 |
| Generality | Generalizability issues are discussed in limitation section. | 16 |
| Instrument changes | Psychometric were discussed to be adequate.  It was discussed that validation of the HealthGenericCom instrument is needed, for example, to provide cultural validation.  It has been also discussed that HealthGenericCom instrument could also be adjusted for educators and experts to determine the utility of the instrument in different organisations. | 16 |
| Future research | Future research recommendation are described. | 16 |
| **Conclusion** |  |  |
| Conclusion | Overall conclusion HealthGenericCom instrument is a valid ja reliable instrument. This instrument is useful not only for educational policy developers, but also relevant for experts who want to assess and build the competences necessary for providing high-quality social- and health care. It is useful in competence management and organizational leadership. | 17 |
| **Other information** |  |  |
| Conflict of interest | Conflict of interest are discussed in required Title page. | Title page |
| **Content Validity** |  |  |
| Relevace | Face and content validity were tested and validated through an expert panel. A total of 13 experts were recruited, of which 11 represented university teachers, principal lecturers, university lecturers, researchers, clinical nursing science experts and two second-year Bachelor’s degree students. Inclusion criteria for recruiting experts was understanding about health sciences field and expertise. The items were rated for relevance and clarity by the expert panel. | 6, 10 |
| Comprehensiveness | Expert panel (13 experts) were asked to evaluate the relevance and clarity of each items and give additional comments. After modifications new expert panel round was done. | 6, 10 |
| Comprehensibility | 1. Expert panel (13 experts) were asked to evaluate the clarity of each items. 2. 15 health science students were asked to assess the comprehensibility, clarity and duration of the instrument. | 6, 10 |
| Relevance results | Four items were deleted due to low score of relevance and clarity. Ten items were deleted due to similarity. | 10 |
| Response options and recall period | Health sciences students (n=15) were asked (pilot test) to assess the comprehensibility, clarity and duration of the instrument. | 6, 10 |
| Comprehensiveness results | Four items were deleted due to low score of relevance and clarity. Ten items were deleted due to similarity. | 6, 10 |
| Comprehensibility results | It is described that no changes made after 15 health science students` evaluation (pilot test). | 10 |
| **Structural validity** |  |  |
| Factor analyses: classical test theory | EFA was carried out because there were no clear a priory hypothesis. EFA cut-off loading was set. Number of factors was determined according to theoretical framework and by counting the number of eigenvalues. EFA principal axis factoring and Promax variation was conducted. Each eight factors have been described with percentage of the total variance.  Methods and results are described in more detail in table 2. | 6, 10-11  Table 2 in pages 11-14 |
| Item Response theory (IRT) analyses | Not applicable in this study | - |
| **Internal consistency** |  |  |
| Unit of measurement | Cronbach’s alpha was used to assess internal consistency for each factor and for entire instrument. Details are described in Table 2. | 6,14, Table 2 in pages 11-14 |
| Continuous scores | The Cronbach’s alpha values was calculated for each of the eight factors and for total scale. Details are described in Table 2. | 14, Table 2 in pages 11-14 |
| Dichotomous scores | Not applicable in this study | - |
| **Reliability** |  |  |
| PROM administrations | Cronbach’s alpha was used to assess internal consistency for each factor and for entire instrument. Details are described in Table 2.  Process of administrating the measurements to the students is described. | 6,14 Table 2 in pages 11-14 |
| Statistical analyses | See earlier Cronbach’s alpha was used to assess internal consistency for each factor and for entire instrument. Details are described in Table 2. | 6,14 Table 2 in pages 11-14 |
| Methods to improve reliability | See earlier Cronbach’s alpha was used to assess internal consistency for each factor and for entire instrument. Details are described in Table 2.. | 6,14 Table 2 in pages 11-14 |
| **Criterion validity** |  |  |
| Criterion | It was not done in this study, because there were no instruments to be used as criterion. Despite existing instruments designed for competence self-evaluation, none of these instruments included all the competences required for health sciences generic expertise. | - |
| Continuous scores | It was not done in this study, because there were no instruments to be used as criterion. Despite existing instruments designed for professionalsʼ or leadersʼ self-evaluation, none of these instruments included all the competences required for health science expertise. | - |
| Categorical scores | It was not done in this study, because there were no instruments to be used as criterion Despite existing instruments designed for professionalsʼ or leadersʼ self-evaluation, none of these instruments included all the competences required for health science expertise. | - |