Psychometric properties of self-reported measures of health-related quality of life in people living with HIV: a systematic review

Huan Wen1, Zhongfang Yang2,3, Zheng Zhu2,3*,†, Shuyu Han4, Lin Zhang5 and Yan Hu2,3*†

Abstract

Objective: To identify and assess the psychometric properties of patient-reported outcome measures (PROMs) of health-related quality of life (HRQoL) in people living with HIV (PLWH).

Methods: Nine databases were searched from January 1996 to October 2020. Methodological quality was assessed by using the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) Risk of Bias Checklist. We used the COSMIN criteria to summarize and rate the psychometric properties of each PROM. A modified Grading, Recommendations, Assessment, Development, and Evaluation (GRADE) system was used to assess the certainty of evidence.

Results: Sixty-nine studies reported on the psychometric properties of 30 identified instruments. All studies were considered to have adequate methodological quality in terms of content validity, construct validity, and internal consistency. Limited information was retrieved on cross-cultural validity, criterion validity, reliability, hypothesis testing, and responsiveness. High-quality evidence on psychometric properties was provided for the Medical Outcomes Study HIV Health Survey (MOS-HIV), the brief version of the World Health Organization’s Quality of Life Instrument in HIV Infection (WHOQoL-HIV-BREF), 36-Item Short Form Survey (SF-36), Multidimensional Quality of Life Questionnaire for Persons with HIV/AIDS (MQoL-HIV), and WHOQoL-HIV.

Conclusions: The findings from the included studies highlighted that among HIV-specific and generic HRQoL PROMs, MOS-HIV, WHOQoL-HIV-BREF, SF-36, MQoL-HIV, and WHOQoL-HIV are strongly recommended to evaluate HRQoL in PLWH in research and clinics based on the specific aims of assessments and the response burden for participants.

Keywords: HIV, AIDS, Quality of life, PROM, Systematic review

Introduction

With the introduction of antiretroviral therapy (ART), the life expectancy of PLWH has been prolonged. However, HIV, ART, infectious diseases, comorbidities, and premature aging pose challenges to the health-related quality of life (HRQoL) of PLWH. HRQoL can be defined as one’s perceived functioning in the physical, emotional, psychological, and social domains of health [1]. Alternatively, HRQoL was defined by Torrance as a concept incorporating factors that are part of an individual’s health [2]. HRQoL is currently regarded as a health aspect of quality of life (QoL); nonhealth aspects, including economic and political circumstances, are not included in HRQoL. Achieving a high level of HRQoL has become an important issue and a component of HIV/AIDS care [3]. In 2016, Lazarus and colleagues proposed adding a
Many HIV-specific and generic HRQoL patient-reported outcome measures have been validated in different contexts. As one of the earliest HIV-specific HRQoL PROMs, MOS-HIV is the most commonly used measure [8]. The MOS-HIV consists of 35 items and 10 dimensions, including general health perceptions, physical functioning, role functioning, pain, social functioning, mental health, energy, health distress, cognitive functioning, and overall self-rated quality of life. In addition to MOS-HIV, other HIV-specific HRQoL PROMs are also widely used, including the WHOQoL-HIV-BREF [9], Multidimensional Quality of Life Questionnaire for Persons with HIV/AIDS (MQoL-HIV) [10], HIV Disease Quality of Life 31-Item Instrument (HIV-QL31) [11], and Patient-Reported Outcomes Quality of Life–HIV instrument (PROQoL-HIV) [12]. Additionally, validated subscales or scales with over 40 items, such as the World Health Organization’s Quality of Life–HIV (WHOQoL–HIV) [13], HIV Overview of Problems Evaluation Scale (HOPES) [14], Functional Assessment of HIV Infection (FAHI) [15], HIV/AIDS Targeted Quality of Life (HAT-QoL) [16], and HIV/AIDS Quality of Life Questionnaire (HIV/AIDSQoL) [17], are also used to evaluate HRQoL. In addition to HIV-specific PROMs, some generic PROMs, including the Short Form Health Survey (SF-12, SF-36) [18, 19], EuroQol—5 Dimensions (EQ-5D) [20, 21], World Health Organization Quality of Life assessment (WHOQOL) [22], Medical Outcomes Study Health Survey (MOS) [23], Missoula-Vitas Quality-of-Life Index (MVQOLI) [24], Patient-Reported Outcomes Measurement Information System (PROMIS) [25], Health Assessment Questionnaire Disability Index (HAQ-DI) [26], Quality of Well-Being scale (QWB) [27], and Health Utility Index 3 (HUI3) [28], have been validated and used in the PLWH population globally. The advantage of using generic HRQoL PROMs is that researchers can directly compare the results with those of other groups based on the same problem without standardizing the data. However, for PLWH, generic PROMs may not be as sensitive as specific PROMs assessing HIV-specific dimensions of HRQoL regarding stigma, relationship issues, and comorbidities [29].

A preliminary literature search was conducted in PubMed, PsycINFO (EBSCO), Cochrane Library (Wiley) and JBI (Ovid), and many reviews on measures of HRQoL were found. Cooper et al. [29] briefly summarized PROMs with fewer than 40 items for measuring HRQoL in PLWH and found that the MOS-HIV was the most well-established measure. The WHOQoL-HIV-BREF and PROQoL–HIV were considered to have good psychometric properties and to potentially have more relevance to PLWH than other PROMs. However, the study included only instruments that can be completed within 10 min or that have fewer than 40 items. Additionally, the assessment process of psychometric properties was not systematic enough to provide a concrete conclusion. Clayson et al. [30] conducted reviews with similar aims but in a specific context (in clinical trials and in sub-Saharan Africa) in 2006 and 2010, respectively. Gakhar et al. conducted a nonsystematic review of the literature on quality of life assessment after ART in developed countries in 2013 [31].

However, previous systematic reviews have mainly focused on the content of HRQoL PROMs and have not reported their psychometric properties, which has made it difficult for healthcare professionals to select one of the existing PROMs to evaluate HRQoL in research and clinical practice [29–31]. Accurate and reliable PROMs are a prerequisite for obtaining robust results. It is critical to choose an acceptable PROM with good psychometric properties [32]. Therefore, to obtain reliable evidence regarding the psychometric properties of HRQoL PROMs, we conducted a systematic review to identify and assess the psychometric properties of PROMs of HRQoL in PLWH. This conclusion may provide a scientific basis for researchers to choose PROMs for future scientific research and clinical practice measuring HRQoL in PLWH.

**Methods**

**Aims and design**

The aim of this study was to identify and assess the psychometric properties of PROMs of HRQoL in PLWH. This systematic review was performed with the guidance of the Joanna Briggs Institute (JBI) methodology for systematic review of psychometric properties and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Additional file 1: PRISMA) statement. The protocol of our review was published in *JBI Evidence Synthesis* [33].

**Search strategy**

We conducted a three-step search. First, a limited search was conducted in PubMed to develop search strategies tailored to each database. Second, researchers implemented the search strategies in PubMed, MEDLINE (Ovid), EMBASE (Ovid), CINAHL (EBSCO), Web of Science, ProQuest Dissertations and Theses, Cochrane Library (Wiley), CNKI, and WanFang. The databases...
were searched for published studies from 1st January 1996 to 1st May 2020. We set the start point 1996 because ART was first used in 1996. Google Scholar and Baidu Scholar were searched for gray literature. We used MeSH terms ("HIV" OR "Acquired Immunodeficiency Syndrome") AND "Quality of Life") combined with ("HIV OR AIDS OR "acquired immunodeficiency syndrome") AND "quality of life" AND "COSMIN search filter"). Additional file 2: Appendix I lists the search strategies used for all databases. Finally, we manually reviewed all references included during the supplemental searches.

Inclusion and exclusion criteria
The inclusion criteria were as follows: (1) studies that targeted HIV-positive adults (≥ 18 years old); (2) studies of any types of self-reported measures, including but not limited to, self-management questionnaires that aimed to measure HRQoL among PLWH; (3) validation studies or studies that aimed to develop PROMs or assess one or more measurement properties; and (4) studies published in either English or Chinese. The exclusion criteria included the following: (1) studies that aimed to validate measures assessing only a certain domain of HRQoL related to specific comorbidities or treatment side effects and (2) studies that provided indirect evidence of psychometric properties (e.g., comparing one PROM with another instrument).

Study screening and selection
We imported all references identified in the search into Endnote X8 (Clarivate Analytics, PA, USA). After the removal of duplicates, two researchers (HW & ZY) screened the titles, abstracts, and full texts independently to assess whether the studies met the eligibility criteria. Any discrepancies were resolved by the third researcher (ZZ). The reasons for exclusion of studies at the full-text screening stage were recorded.

Quality appraisal
Two reviewers (HW & ZY) assessed the included studies independently by using the COSMIN Risk of Bias Checklist. When there were discrepancies, a third reviewer (ZZ) was included to resolve them. The COSMIN Risk of Bias Checklist consisted of 10 domains (38 items), including PROM development, content validity, structural validity, hypothesis testing of construct validity, cross-cultural validity/measurement invariance, criterion validity, internal consistency, measurement error, test-test reliability, and responsiveness. The options for each item included “very good”, “adequate”, “doubtful”, and “inadequate quality”. The methodological quality of the study was based on the worst score counts.

Data extraction and synthesis
Two researchers (HW & ZY) independently extracted information, including the author, publication year, country/language, study design, target population, sample size, measurement domains, number of items, and total score range. The main findings regarding psychological properties included construct validity, internal consistency, cross-cultural validity/translation, criterion validity, and reliability. Any discrepancies were discussed between the two researchers.

We used the COSMIN criteria to summarize and rate the psychometric properties of each study regarding structural validity, internal consistency, reliability, measurement error, hypothesis testing for construct validity, cross-cultural validity/measurement invariance, criterion validity, and responsiveness. Each measurement property was rated as sufficient (+), insufficient (−), or indeterminate (?). When data were synthesized and the ratings of each study were consistent, the overall rating of the measurement property was rated as sufficient (+) and insufficient (−). If the ratings of each study were all sufficient (+), the overall rating of the measurement property was rated as sufficient (+). If the ratings of each study were all insufficient (−), the overall rating of the measurement property was rated as insufficient (−). If the explanation was reasonable, we provided ratings by subgroup. If the explanation was unreasonable, the overall rating of the measurement property was rated as inconsistent (±). If there was no information to support the rating, the overall rating was rated as uncertain (?).

Assessment of the certainty of the evidence
We used a modified Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system to assess the certainty of the evidence. Each piece of evidence was graded for risk of bias, inconsistency, imprecision, and indirectness. Four reviewers (HW, ZY, ZZ, and SH) graded each measurement property and each PROM separately. Discrepancies were resolved by the fifth reviewer (YH). Based on the methodological quality of each psychometric property, four reviewers finally classified the instruments as strongly
recommended, weakly recommended and not recommended according to the modified GRADE system. The classification results were verified by all authors.

Results

Literature search

The literature screening and selection process is shown in Fig. 1. In the initial search, a total of 13,371 articles were identified in the databases. Twenty-one articles were found through additional supplementary searches. After the removal of duplicates, a total of 10,097 articles were retained, and 10,028 articles were deleted after the review of the titles, abstracts, and full text. We finally included 69 articles [9–28, 34–82]. A total of 30 PROMs were investigated in the included studies.

Study description

Among the 69 included articles, 54 were in English, and 15 were in Chinese; the articles were published from 1996 to 2019. A description of the studies is shown in Table 1. All the included studies were cross-sectional studies. Twenty studies were conducted in China [17, 22, 36–40, 57–62, 74, 77–82], fourteen in the United States [15, 16, 21, 25–27, 35, 42, 64, 65, 67, 72, 73, 75], three in Uganda [24, 41, 46], three in Italy [44, 49, 69], two in Australia [70, 71], two in Vietnam [20, 55], two in Portugal [177, 49].

| Records identified through database searching (n=13371) | Records after duplicates removed (n=10097) |
|---------------------------------------------------------|--------------------------------------------|
| PubMed/Medline   n=3218                                 | Records screened (n=10097)                |
| Medline (Ovid)   n=1791                                | Records not included (n=9806)             |
| EMBASE (Ovid)    n=1429                                | Research topic (n=9193)                   |
| CINAHL (EBSCO)   n=1533                                | Population group (n=165)                  |
| Web of Science   n=1291                                | Study design (n=448)                      |
| PHMC            n=1438                                 |                                          |
| Cochrane Library n=71                                 |                                          |
| CNKI            n=1094                                 |                                          |
| Wan Fang        n=1506                                 |                                          |

Additional records identified through other sources (Google Scholar, and Baidu Scholar) (n=21)

Fig. 1 Flowchart of the identification and selection of studies
Table 1 Overview of the included studies

| References       | PROM                   | Country | PROM language | Study design          | Target population                  | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|------------------------|---------|---------------|------------------------|-------------------------------------|-------------|--------------------------------|----------------------------------------------------------------------------------|----------------|--------------------|
| Akinboro et al.  | WHOQOL-BREF Nigerian version | Nigeria | Nigerian      | Cross-sectional study  | PLWH, mean age: 38.5 ± 9.7 Male: 144, Female: 347 | 491         | Between July 2010 and January 2011 | Physical health; psychological health; level of independence; social relationships; environmental health; spirituality, religion and personal beliefs | 31             | NR                 |
| Ahmed et al.     | WHOQOL-HIV-BREF Urdu version | Pakistan | Urdu          | Cross-sectional study  | PLWH, age: <25 years: 30, 25–50 years: 104, >50 years: 48 Male: 134, Female: 48 | 182         | NR                              | Physical health; psychological health; level of independence; social relationships; environmental health; spirituality, religion and personal beliefs | 31             | (−2)−2             |
| Brown et al.     | PozQoL                 | Australia | English       | Cross-sectional study  | PLWH, age: 18–34: 34, 35–49: 157, 50–64: 208, 65+: 66 Male: 378, Female: 41 Participants who either did not answer the question or indicated some other gender: 73 | 465         | Between March 22 and May 31, 2017 | Health concerns, psychological, social, functional                              | 64             | 1–5                |
| References          | PROM                                      | Country             | PROM language       | Study design  | Target population                                                                 | Sample size | Year of development/ validation | Measurement domain                                                                                           | Number of items | Total score range |
|---------------------|-------------------------------------------|---------------------|---------------------|---------------|-----------------------------------------------------------------------------------|-------------|---------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| Bucciardini et al.  | ISSQoL, Italian version                   | Italy               | Italian             | Cross-sectional study | PLWH, Female: 118 (35.5) Male: 202 (60.8) Missing information: 12 (3.6), age Mean ± SD: 400 ± 7.3 | 332         | NR                              | Satisfaction with quality of life, physical well-being, role well-being, depression and anxiety, energy and vitality, health distress, cognitive functioning, social functioning, sexual life, social support, interaction with medical staff, treatment, impact, body changes, life planning, motherhood/fatherhood | 62              | 0–100            |
| Connell and Skevington [51] | WHOQOL-HIV-BREF                  | Australia, Brazil, Bangalore, New Delhi, Thailand, Zimbabwe, Italy, Ukraine | Brazilian, Bangalore, New Delhi, Thai, Zimbabwe, Italian, Ukrainian | Cross-sectional study | PLWH, mean age: 33.4 ± 98 Male: 1271, Female: 652 | 1923       | NR                              | Physical health, psychological health, level of independence, social relationships, environmental health, spirituality, religion, and personal beliefs | 31              | 4–20             |
| De Boer et al. [14] | HOPES Dutch and English versions         | Netherlands         | Dutch, English      | Cross-sectional study | PLWH Mean age: 38 ± 7.8 Male: 99, Female: 7 | 106         | NR                              | Physical, psychosocial, medical interaction, sexuality, partner                                             | 142             | NR               |
| References          | PROM               | Country                  | PROM language             | Study design     | Target population | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|---------------------|--------------------|--------------------------|---------------------------|------------------|-------------------|-------------|-------------------------------|----------------------------------------------------------------------------------|----------------|------------------|
| Duracinsky et al. [12] | PROQoL-HIV         | Australia, Brazil, Cambodia, China, France, Senegal, Thailand, USA | English, Brazilian, Cambodian, Chinese, French, Senegalese, Thai | Cross-sectional study | PLWH, median age: 41 | 791         | Between July and December 2008 | General health perception, social relationships, emotions, energy/fatigue, sleep, cognitive functioning, physical and daily activity, coping, future, symptoms, and treatment | 67             | 0–4              |
| Fang et al. [22]    | WHOQOL Chinese version | China                    | Chinese                   | Cross-sectional study | PLWH, age (years) ≤ 30: 34, 31–40: 42, >40: 24 Male: 96 Female: 40 | 136         | NR                            | Physical, psychosocial, social, environment                                       | 26             | 1–20             |
| Herrmann et al. [71] | PROQoL-HIV         | Australia                 | English                   | Cross-sectional study | PLWH, mean age: 46 (37–53.8) Male: 87, Female: 15 | 102         | NR                            | Physical health and symptoms, emotional distress, health concerns, body change, intimate relationships, social relationships, stigma | 31             | 1–100            |
| Holmes and Shea [16] | HAT-QoL            | US                        | English                   | Cross-sectional study | PLWH Mean age: 37.8 (8.9) Male: 78, Female: 28 | 106         | Between January and March 1996 | Overall function (physical function, role function and social function), sexual function, disclosure worries, health worries, financial worries, HIV mastery, life satisfaction, medication concerns, provider trust | 42             | 0–100            |
| References       | PROM                        | Country | PROM language | Study design       | Target population | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|-----------------------------|---------|---------------|--------------------|--------------------|--------------|---------------------------------|------------------------------------------------------------------------------------|----------------|--------------------|
| Holmes and Shea [76] | HAT-QoL                     | US      | English       | Cross-sectional study | PLWH Mean age: 37.8 (8.6) Male: 173, Female: 42 | 215          | Between May and August, 1996   | Overall function, sexual function, disclosure worries, health worries, financial worries, HIV mastery, life satisfaction, medication concerns, provider trust | 42             | NR                 |
| Hsiung et al. [57] | WHOQOL-HIV-BREF Chinese version | China  | Chinese       | Cross-sectional study | PLWH in Taiwan Age: 36.3 (10.1) Male: 646, Female: 28 | 674          | NR                              | General health, physical health, level of independence, psychological health, spirituality, religion and personal beliefs, social relations, environmental health | 31             | 4–20               |
| Hughes et al. [35] | MOS-HIV-34                  | US      | English       | Cross-sectional study | Adult males, HIV-infected Mean age: 35.3 | 100          | Between September 14, 1992, and March 16, 1993 | Overall health, pain, physical function, role function, social function, cognitive function, mental health, energy/fatigue, health distress, quality of life, health transition | 34             | NR                 |
| Kaplan et al. [26] | QWB scale                   | US      | English       | Cross-sectional study | PLWH Male: 400, Female: 114 | 514          | NR                              | NR                                                                                                                                          | NR             | NR                 |
| References        | PROM          | Country          | PROM language | Study design       | Target population                                                                 | Sample size | Year of development/ validation | Measurement domain                                                                 | Number of items | Total score range |
|-------------------|---------------|------------------|----------------|--------------------|----------------------------------------------------------------------------------|-------------|-------------------------------|----------------------------------------------------------------------------------|----------------|--------------------|
| Kemmler et al. [10] | MQoL-HIV German version | Germany          | German         | Cross-sectional study | PLWH, mean age: 37.8 ± 9.5 Male: 118, Female: 89 | 207         | NR                            | Physical, emotional, cognitive, social and financial aspects, sexual functioning, medical care | 40             | 0–100              |
| Kohli et al. [23]  | MOS Indic version | India            | Indic          | Cross-sectional study | PLWH, age < 20: 1, 20–29: 28, 30–39: 52, 40–49: 13, > 50: 6, Male: 66, Female: 34 | 100         | Between February 2002 and March 2003 | Physical health, work and earnings, daily routine, social activities, cognitive function, feelings and emotions, pain, sleep, food and appetite, sexual life | 29             | 0–100              |
| Kusterer et al. [19] | SF-36v2 Brazilian-Portuguese version | Brazil           | Brazilian-Portuguese | Cross-sectional study | PLWH, mean age: 44 ± 11.3 Male: 219 (55.9), Female: 173 (44.1) | 392         | NR                            | Physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, mental health | 36             | NR                 |
| Lau et al. [36]    | MOS-HIV Chinese version | China            | Chinese        | Cross-sectional study | PLWH, age: (mean = 38.38, SD = 9.75) Male: 213 Female: 29 | 242         | Between January and April 2000 | General health, physical function, role function, social function, cognitive function, pain, mental health, energy/fatigue, health distress, quality of life | 35             | NR                 |
| References          | PROM                  | Country         | PROM language | Study design                | Target population                | Sample size | Year of development/validation | Measurement domain                                                                                                                                                                                                                                                                                                                                 | Number of items | Total score range |
|---------------------|-----------------------|-----------------|----------------|----------------------------|----------------------------------|-------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------|
| Leplège et al. [11] | HIV-QL31 French version | France          | French         | Cross-sectional study      | PLWH, Male: 76, Female: 26       | 102         | NR                            | Sex, socioprofessional status, CMV, work status, mode of contamination                                                                                                                                                                                                                                                                                                                                     | 118            | NR                 |
| Liu et al. [37]     | MOS-HIV Chinese version | China           | Chinese        | Cross-sectional study      | PLWH, age (years) < 20: 15, 20–30: 195, 30–40: 158, > 40: 267, Male: 447, Female: 188 | 635         | Between May 2015 and March 2016 | General health, physical functioning, cognitive function, pain, mental health, energy/fatigue, health distress, social function, quality of life, health transition                                                                                                                                                                                                                                               | 35             | 44.1–85.2          |
| Mast et al. [41]    | MOS-HIV Lugandan version | Uganda          | Ugandan        | Cross-sectional study      | HIV-positive women               | 803         | NR                            | Perceived health, bodily pain, QoL, role functioning, social functioning, vitality, mental health, health distress, cognitive functioning, physical functioning, health transition                                                                                                                                                                                                                                         | 35             | 0–100              |
| McDonnell et al. [42]| MOS-HIV               | US              | English        | Cross-sectional study      | HIV-positive nonpregnant women, mean age: 33 | 287         | Between April 1993 and June 1995 | Cognitive functioning, physical functioning, social functioning, role functioning, mental health, health distress, overall QoL                                                                                                                                                                                                                                                                          | 17             | 0–100              |
| References          | PROM                  | Country     | PREM language | Study design      | Target population                                                                 | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|---------------------|-----------------------|-------------|---------------|-------------------|----------------------------------------------------------------------------------|-------------|-------------------------------|----------------------------------------------------------------------------------|----------------|--------------------|
| Meemon et al. [50]  | WHOQOL-HIV-BREF Thai version | Thailand    | Thai          | Cross-sectional study | PLWH, mean age: 41.95 ± 7.82 Male: 146, Female: 183                            | 329         | Between August and October 2014 | Physical health, psychological health, level of independence, social relationships, environmental health, spirituality, religion, and personal beliefs | 31             | 4–20               |
| Namisango et al. [24] | MVQoLI Uganda version | Uganda      | Ugandan       | Cross-sectional study | Advanced AIDS Age (years) 18–29: 39, 30–39: 97, 40+: 64, Male: 78, Female: 122 | 200         | NR                            | Symptoms, functional status, interpersonal relations, emotional well-being, transcendence | 25             | NR                 |
| Nosyk et al. [28]   | HU13                  | Canada      | English       | Cross-sectional study | Patients with advanced HIV/AIDS Mean age: 48 years (SD: 8.5) Male: 361, Female: 7 | 368         | Between June 2006 and December 2007 | NR                                                               | NR             |                    |
| Patel et al. [18]   | SF-12 Kiswahili version | Kenya       | Kiswahili     | Cross-sectional study | Kiswahili-speaking PLWH Male: 76, Female: 26                                 | 102         | Between May 2007 and October 2009 | Overall health, pain, physical functioning, role functioning, social functioning, mental health, energy/fatigue, health distress, cognitive functioning, quality of life, health transition | 12             | 0.35–1             |
| Paton et al. [43]   | MOS-HW English and Chinese versions | Singapore    | English, Chinese | Cross-sectional study | HIV-infected patients Mean age: 38 Male: 156, Female: 7                     | 163         | Between April and August 1998  | Overall health, pain, physical functioning, role functioning, social functioning, mental health, energy/fatigue, health distress, cognitive functioning, quality of life, health transition | 30             | 0–100              |
| References                     | PROM                        | Country  | PROM language | Study design  | Target population                                                                 | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|--------------------------------|-----------------------------|----------|----------------|---------------|-----------------------------------------------------------------------------------|-------------|-------------------------------|-----------------------------------------------------------------------------------|----------------|--------------------|
| Pereira et al. [52]            | WHOQOL-HIV-Bref Portuguese version | Portugal | Portuguese     | Cross-sectional study | HIV-infected patients aged 50 years and older. Mean age: 57.84 (6.79, 50–81). Male: 120, Female: 65 | 185         | NR                            | Six domains (physical, psychological, independence, social relationships, environment, spirituality) and 29 specific facets | 31             | NR                 |
| Pereira and Canavarro [75]     | EUROHIS-QoL-8 Portuguese version | Portugal | Portuguese     | Cross-sectional study | PLWH, mean age: 40.72 (SD = 9.71, range: 18–81). Male: 808, Female: 389          | 1197        | Between September 2007 and July 2008 | Overall QoL, general health, energy, daily activities, self-esteem, relationships, financial resources, living place | 8              | NR                 |
| Pereira and Canavarro [75]     | BSI Portuguese version      | Portugal | Portuguese     | Cross-sectional study | PLWH, mean age: 40.72 (SD = 9.71, range: 18–81). Male: 808, Female: 389          | NR          | NR                            | 53 0–4                                                                                     |                |                    |
| Peterman et al. [15]           | FAHI                        | US       | English        | Cross-sectional study | PLWH, Male: 307, Female: 54                                                      | 361         | NR                            | Physical well-being, function and global well-being, emotional well-being/living with HIV, social well-being, cognitive functioning | 44             | 0–176              |
Table 1 (continued)

| References       | PROM                  | Country       | PROM language | Study design         | Target population                  | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|-----------------------|---------------|----------------|-----------------------|------------------------------------|-------------|-------------------------------|------------------------------------------------------------------------------------|----------------|-------------------|
| Remple et al. [66] | MQoL-HIV              | Canada        | English        | Cross-sectional study | HIV-infected Women Mean age: 36.5 years (SD = 9.5) | 85          | NR                            | Mental health, physical functioning, physical health, social support, social functioning, cognitive functioning, financial status, partner intimacy, sexual functioning, medical care | 40             | 4–28              |
| Reychler et al. [48] | WHOQOL-HIV French version | France, the francophone part of Belgium | French | Cross-sectional study | PLWH Male: 32 (64.0) Female: 18 (36.0) | 50          | NR                            | Six domains (physical, psychological, level of dependence, social relationships, environment and spirituality) and 29 facets | 120 items and 37 important questions | NR                |
| Riley et al. [72]  | SF-36                 | US            | English        | Cross-sectional study | PLWH, mean age: 39 Male: 274, Female: 56 | 330         | NR                            | General health perceptions, physical functioning, role limitations due to physical problems, role limitations due to emotional problems, social functioning, bodily pain, vitality, mental health | 36             | NR                |
| Saddikia et al. [9] | WHOQOL Malay version | Malaysia      | Malay          | Cross-sectional study | PLWH, mean age (years): 35.7 (7.50) Male: 94 (59.9) Female: 63 (40.1) | 157         | Between August and December 2007 | Physical, psychological, level of independence, social relationships, environment, spirituality | 31             | 4–20              |
| References          | PROM                          | Country                | PROM language | Study design     | Target population                                      | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|---------------------|-------------------------------|------------------------|----------------|------------------|--------------------------------------------------------|-------------|-------------------------------|-----------------------------------------------------------------------------------|----------------|------------------|
| Salehi et al. [53]  | WHOQOL-HIV BREF Persian version | Islamic Republic of Iran | Persian        | Cross-sectional study | PLWH, mean age: 38.06 (9.32) Male: 44, Female: 17 | 61          | NR                            | Physical, psychological, level of independence, social relationship, environmental, spiritual | 29             | 1.6–6.6          |
| Schifano et al. [44]| MOS-HIV Italian version       | Italy                  | Italian        | Cross-sectional study | PLWH Males: 135, Females: 50 Age (years) 21–30: 35, 31–35: 65, > 35: 85 | 185         | Between October 1994 and April 1996 | Physical functioning, social functioning, role functioning, bodily pain, mental health, health distress, cognitive functioning, vitality, general health, health perception | 35             | 0–100            |
| Schnall et al. [25] | PROMIS-29 US English          | US                     | English        | Cross-sectional study | PLWH, mean age (years) (SD): 485 (11.70) Male: 933, Female: 359 Transgender male/Trans- man/FTM: 2 Transgender female/trans- woman/MTF: 8 Genderqueer individual 4 | 1306        | Between February and July 2016 | Physical functioning, anxiety, depression, fatigue, sleep disturbance, satisfaction with participation in social roles, pain interference and pain intensity | 29             | 1–5              |
Table 1 (continued)

| References       | PROM       | Country     | PROM language | Study design          | Target population                  | Sample size | Year of development/ validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|------------|-------------|---------------|-----------------------|------------------------------------|-------------|---------------------------------|-----------------------------------------------------------------------------------|----------------|-------------------|
| Shim et al. [45] | MOS-HIV Korean version | South Korea | Korean        | Cross-sectional study | PLWH, age ≤40: 54, 41–60: 107, >60: 40, Male: 179, Female: 22 | 201          | Between December 2016 and June 2017 | General health perception, pain, physical functioning, role functioning, social functioning, energy/fatigue, mental health, health distress, cognitive functioning, quality of life, health transition | 35             | 0–100             |
| Smith et al. [65] | MOS SF-20  | US          | English       | Cross-sectional study | Women with HIV, Mean age: 33.5 (± 7.69) | 202          | NR                              | Physical functioning, role functioning, social functioning, mental health, general health perceptions, pain | 20             | 0–100             |
| Smith et al. [67] | MQoL-HIV   | US          | English       | Cross-sectional study | PLWH, Male: 95, Female: 26        | 121         | Between July 1994 and December 1995 | Mental health, physical health, physical functioning, social functioning, social support, cognitive functioning, financial status, partner intimacy, sexual functioning, medical care | 40             | NR                |
| Sousa et al. [26] | HAQ-DI     | US          | English       | Cross-sectional study | PLWH, mean age: (39.35 ± 8.13) (61.57 ± 12.46) Male: 917, Female: 901 | 1818        | NR                              | Usual activities, reaching, grip, eating, dressing/grooming, hygiene, walking, arising | 20             | 0–3               |
| References         | PROM                  | Country        | PROM language | Study design      | Target population                                                                 | Sample size | Year of development/ validation | Measurement domain                                                                 | Number of items | Total score range |
|-------------------|-----------------------|----------------|----------------|-------------------|----------------------------------------------------------------------------------|-------------|---------------------------------|---------------------------------------------------------------------------------|----------------|--------------------|
| Stangl et al. [46] | MOS-HIV Ugandan version | Uganda         | Ugandan        | Cross-sectional study | PLWH, Male: 237, Female: 710 Age 18–30: 159 31–40: 434, 41+: 354               | 947         | Between May 2003 and May 2004  | Physical function, role function, general health perceptions, bodily pain, health transition, mental health, cognitive function, health distress, social function, vitality | NR             |                    |
| Starce et al. [49] | WHOQOL-HIV Italian version | Italy          | Italian        | Cross-sectional study | PLWH Male: 105, Female: 46                                                         | 151         | NR                              | Physical, psychological, level of independence, social relationships, environment, spirituality, religion, personal beliefs of PLWH | 28             | 0–100              |
| Stasinopoulou et al. [34] | MOS-HIV Greek version | Greece         | Greek          | Cross-sectional study | PLWH, mean age (SD): 42.6 (9.4) Male: 118, Female: 36                            | 154         | NR                              | Quality of life, pain, physical functioning, role functioning, social functioning, mental health, energy/fatigue, cognitive function, health distress, health transition | 3.5            | 0–100              |
| References | PROM | Country | PROM language | Study design | Target population | Sample size | Year of development/validation | Measurement domain | Number of items | Total score range |
|-----------|------|---------|----------------|--------------|-------------------|-------------|-------------------------------|-------------------|---------------|------------------|
| Taylor et al. [47] | HAT-QoL Shona version | Zimbabwe | Shona | Cross-sectional study | Patients with HIV-related opportunistic infections Teens: 32, 20–29: 164 30–39: 136, 40–49: 52, 50–59: 20, 60–69: 4 Female: 232, Male: 168 | 400 | NR | Overall function (physical, role, and social function), sexual function, disclosure worries, health worries, financial worries, HIV mastery, life satisfaction, medication worries, provider trust | 34 | 0–100 |
| Taylor et al. [47] | MOS-HIV-35 Shona version | Zimbabwe | Shona | Cross-sectional study | Patients with HIV-related opportunistic infections Teens: 32, 20–29: 164 30–39: 136, 40–49: 52, 50–59: 20, 60–69: 4 Female: 232, Male: 168 | 400 | NR | General health perceptions, physical function, role function, social function, cognitive function, pain, mental health, energy/fatigue, health distress, overall QoL | 35 | NR |
| Tesfaye et al. [54] | WHOQOL-HIV-BREF Ethiopian version | Ethiopia | Ethiopian | Cross-sectional study | PLWH Mean age: 32.5 (7.9) Male: 38, Female: 62 | 100 | NR | Physical, psychological, independence, social relationships, environment, spirituality | 27 | NR |
| Thompson et al. [64] | WHOQOL-BREF | US | English | Cross-sectional study | PLWH | 312 | NR | Physical health, psychological health, social relationships, environmental conditions | 24 | 26–130 |
| References       | PROM                                      | Country        | PROM language | Study design | Target population                                                                 | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|-------------------------------------------|----------------|----------------|--------------|-----------------------------------------------------------------------------------|-------------|---------------------------------|------------------------------------------------------------------------------------|----------------|-----------------|
| Tran [55]        | WHOQOL-HIV-BREF Vietnamese version        | Vietnam        | Vietnamese     | Cross-sectional study | PLWH, age ≤ 35 years old: 584; > 35 years old: 432; Male: 648, Female: 368           | 1016        | NR                              | Physical, morbidity, social, spirituality, performance, environment                 | 31             | 4–20            |
| Tran et al. [20] | EQ-5D-5L Vietnamese version               | Vietnam        | Vietnamese     | Cross-sectional study | PLWH, age ≤ 35 years old: 584; > 35 years old: 432; Male: 648, Female: 368          | 1016        | NR                              | Mobility, self-care, usual activities, pain/discomfort and anxiety/depression       | 25             | NR              |
| Turner-Bowker et al. [73] | SF-36                                     | US             | English        | Cross-sectional study | PLWH; Male: 117, Female: 84                                                        | 201         | NR                              | Physical function, role function (without physical or emotional attribution), bodily pain, general health, vitality, social function, mental health | 36             | NR              |
| Watanabe et al. [68] | MQoL-HIV Japanese version                 | Japan          | Japanese       | Cross-sectional study | PLWH, mean age (years) 36.5 ± 10.3; Male: 344, Female: 31                          | 375         | Between January and May 2000    | Mental health, physical health, physical functioning, social functioning, social support, cognitive functioning, financial status, partner intimacy, sexual functioning, medical service | 40             | 12–84           |
| WHOQOL-HIV Group [13] | WHOQOL-HIV Australian, Indic, Brazilian, Thai, and Zimbabwean versions | Australia, India, Brazil, Thailand, Zimbabwe | Australian, Indic, Brazilian, Thai, Zimbabwean | Cross-sectional study | PLWH, mean age 32.3 (79.4); Male: 569, Female: 331                               | 900         | NR                              | Physical, psychological, independence, social, environmental and spirituality       | 25             | 4–20            |
| References  | PROM       | Country | PROM language | Study design         | Target population | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------|------------|---------|---------------|----------------------|-------------------|-------------|-------------------------------|----------------------------------------------------------------------------------|----------------|------------------|
| Wu et al. [21] | EQ-SD     | US      | English       | Cross-sectional study | PLWH Male: 931, Female: 59 Mean age: 38.5 (SD: 7.8) | 990         | NR                            | Anxiety/depression, mobility, usual activities, pain/discomfort and self-care    |                | 0–100            |
| Wu et al. [21] | MOS-HIV   | US      | English       | Cross-sectional study | PLWH Male: 931, Female: 59 Mean age: 38.5 (SD: 7.8) | 990         | NR                            | General health perceptions, cognitive functioning, pain, physical functioning, role functioning, health distress, quality of life, mental health and energy/fatigue | 35             | 0–100            |
| Zhu et al. [58] | WHOQOL HLV BREF Chinese version | China | Chinese       | Cross-sectional study | PLWH, mean age: 39.62 (12.73) Male: 965, Female: 135 | 1100        | NR                            | General QoL, general health status, physical, psychological, independence, social relationships, environment, spirituality | 31             | 4–20             |
| Cai et al. [59] | WHOQOL HLV BREF Chinese version | China | Chinese       | Cross-sectional study | PLWH, mean age: 36.8 Male: 105, Female: 33 | 138         | NR                            | Physical, psychological, level of independence, social relationship, environmental, spiritual | 31             | 4–20             |
| Chen et al. [60] | WHOQOL HLV BREF Chinese version | China | Chinese       | Cross-sectional study | PLWH, mean age: 38.29 ± 10.92 Male: 72, Female: 30 | 102         | NR                            | Physical, psychological, level of independence, social relationship, environmental, spiritual | 31             | NR               |
| References | PROM | Country | PROM language | Study design | Target population | Sample size | Year of development/validation | Measurement domain | Number of items | Total score range |
|------------|------|---------|---------------|--------------|-------------------|-------------|-------------------------------|-------------------|----------------|-----------------|
| Dong et al. [38] | MOS-HIV Chinese version | China | Chinese | Cross-sectional study | PLWH, Male: 185, Female: 44 | 229 | Between April 2012 and April 2013 | Physical function, role function, general health perceptions, bodily pain, health transition, mental health, cognitive function, health distress, social function, vitality | 35 | 0–100 |
| Guo et al. [82] | HIV QoL Scale-4 | China | Chinese | Cross-sectional study | PLWH, mean age: 42.67 ± 7.67 Male: 40, Female: 68 | 108 | NR | Physical function, psychological function, social function, general health | 49 | 1–5 |
| Liu et al. [62] | WHOQOL-HIV Chinese version | China | Chinese | Cross-sectional study | PLWH, mean age: 43.83 ± 7.44 Male: 32, Female: 56 | 88 | NR | Physical, psychological, level of independence, social relationship, environmental, spiritual | 31 | NR |
| Luo et al. [61] | WHOQOL-HIV-BREF Chinese version | China | Chinese | Cross-sectional study | PLWH, mean age: 18 – 78 (38.29 ± 12.90) Male: 93 Female: 31 | 124 | Between September 2012 and June 2013 | Physical, psychological, level of independence, social relationship, environmental | 31 | NR |
| References     | PROM                        | Country | PROM language | Study design        | Target population                          | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|----------------|-----------------------------|---------|---------------|---------------------|---------------------------------------------|-------------|-------------------------------|-----------------------------------------------------------------------------------|----------------|------------------|
| Meng et al. [80] | HIV QoL Scale-2            | China   | Chinese       | Cross-sectional study | PLWH, mean age: 35.9 Male: 292, Female: 151  | 443         | Between July 2005 and October 2006 | Mental status, concerns of health and responsibility, family social support, hostile psychological trends, vitality, appetite and pain, economic concerns, doctor support, alienation, life satisfaction | 44             | 0–100            |
| Su et al. [81]  | HIV QoL Scale-3            | China   | Chinese       | Cross-sectional study | PLWH, mean age: 42.67 ± 7.67 Male: 40, Female: 68 | 108         | Between October 2004 and December 2006 | Physical function, psychological function, social function, general health          | 49             | 1–5              |
| Xiang et al. [77–79] | HIV QoL Scale-1            | China   | Chinese       | Cross-sectional study | PLWH, mean age: 40 ± 9 Male: 195, Female: 162 | 353         | NR                            | Physical, psychological, social                                                  | 55             | NR               |
| Yang et al. [39] | MOS -HIV Chinese version    | China   | Chinese       | Cross-sectional study | PLWH, mean age: 35.2 Male: 80, Female: 37     | 117         | NR                            | Physical function, role function, general health perceptions, bodily pain, health transition, mental health, cognitive function, health distress, social function, vitality | 35             | NR               |
| References       | PROM                          | Country | PROM language | Study design     | Target population                                                                 | Sample size | Year of development/validation | Measurement domain                                                                 | Number of items | Total score range |
|------------------|-------------------------------|---------|---------------|------------------|-----------------------------------------------------------------------------------|-------------|-------------------------------|-----------------------------------------------------------------------------------|----------------|------------------|
| Yu et al. [40]   | MOS-HIV Chinese version      | China   | Chinese       | Cross-sectional study | PLWH, mean age: 40.77 ± 8.81 Male: 422, Female: 336                             | 758         | NR                            | Physical function, role function, general health perceptions, bodily pain, health transition, mental health, cognitive function, health distress, social function, vitality | 35             | NR               |
| Zhang et al. [17]| HIV/AIDSQoL-46 Chinese version | China   | Chinese       | Cross-sectional study | PLWH                                              | 240         | NR                            | Physical function, psychological function, social function, general feeling         | 46             | NR               |
| Zhang et al. [74]| SF-36 Chinese version        | China   | Chinese       | Cross-sectional study | PLWH, age < 35: 98, ≥ 35: 141; ≥ 45: 55 Male: 227, Female: 67                 | 294         | NR                            | Physical function, role function, bodily pain, general health, vitality, social function, mental health | 35             | NR               |
[52, 75], and two in Canada [28, 66]. A total of 28,480 participants were included, with sample sizes ranging from 50 to 1923 [9–28, 34–82]. One study was conducted with adult males [35]. Four studies were conducted with HIV-positive women [41, 42, 65, 66]. One study was conducted with HIV-infected patients aged 50 years and older [52], and two studies were conducted with people with advanced AIDS [24, 28]. One study involved transgender male, transgender female, and genderqueer individuals [25]. One study was conducted in patients with HIV-related opportunistic infections [47].

The characteristics of all 30 HRQoL PROMs, including the items, domains, and score range, are shown in Table 1. The total number of items ranged from 8 to 142 [9–28, 34–82]. A total of 10 PROMs had multiple language versions, and the remaining 18 had only one language version. Tables 4 and 5 summarize the psychometric properties of the HIV-specific and generic instruments.

Quality assessment
Methodological quality assessment
Tables 2 and 3 show the methodological quality of the 69 included studies based on the COSMIN checklist. All studies were considered to have sufficient methodological quality for further study. Table 2 presents an overview of the COSMIN ratings of the HIV-specific instruments, and Table 3 presents the generic instruments. Limited information was retrieved on cross-cultural validity/translation (58 studies) [11–14, 16–23, 25–28, 35–40, 42–44, 47, 48, 50–56, 58–64, 66–82], criterion validity (59 studies) [9–12, 15–17, 19–26, 34, 37–50, 52–67, 69–79, 81, 82], reliability (49 studies) [11, 13–21, 23–28, 34–36, 38, 39, 41–47, 49–55, 57, 59, 62–65, 68, 69, 72–76], hypothesis testing (18 studies) [11, 16, 17, 34, 38, 39, 41, 53, 61, 67, 68, 71, 77–82] and responsiveness (62 studies) [9–16, 18–20, 22–27, 34–45, 47–57, 59–64, 66, 68–82]. No data were identified on error and interpretability.

Quality of measurement properties of assessments
Table 4 presents the quality of the psychometric properties retrieved from the 69 included studies for all 30 measures. Fifteen PROMs were rated as insufficient (-) for content validity [11, 17, 48, 49, 53, 57, 59–61, 77–82]. There were 19 PROMs [19, 24, 26, 37–40, 45, 51–54, 57, 59, 60, 64, 70, 74, 75] rated as sufficient (+) for construct validity, and 31 [10–12, 14–17, 21, 34–36, 41, 42, 44, 46–48, 50, 53, 55, 56, 58, 59, 67, 68, 76–79, 81, 82] were rated as insufficient (−). The internal consistency was rated as sufficient (+) for 59 PROMs [9–19, 22–25, 34, 36–49, 51–72, 74, 76–82] and as insufficient (−) for 4 PROMs [20, 21, 35, 50].

Certainty of evidence
Table 5 shows the overall quality score for each measurement property of the HIV-specific and generic instruments. Five PROMs were strongly recommended based on the methodological quality of each psychometric property, including MOS-HIV, WHOQoL-HIV-BREF, SF-36, MQol-HIV, and WHOQoL-HIV. Among the seven language versions of the MOS-HIV [21, 34–47], six were rated as “high” for internal consistency [21, 34, 35, 41–47], and one was rated as “moderate” [36–40]. There were three versions rated as “high” for cross-cultural validity/translation [34, 41, 44, 46]. Among the eight versions of the WHOQoL-HIV-BREF [50–61], five were rated as “high” for internal consistency [50–52, 54, 56], and one was rated as “moderate” [53]. In total, more studies of the MOS-HIV were rated as “high” than studies of the WHOQoL-HIV-BREF, and more studies of the WHOQoL-HIV-BREF were rated as “very low” than studies of the MOS-HIV.

Discussion
This systematic review identified and assessed the psychometric properties of 30 HRQoL PROMs in PLWH and evaluated the certainty of the evidence provided for each PROM. To the best of our knowledge, this is the first and most comprehensive systematic review summarizing all psychometric properties of HRQoL PROMs for PLWH. The results may provide quantitative evidence for researchers and healthcare professionals to choose PROMs measuring HRQoL in PLWH in future scientific research and clinical practice.

Our systematic review found that compared to other HIV-specific and generic PROMs, the MOS-HIV has the best psychometric properties. The MOS-HIV is the most widely used HIV-specific instrument. In total, we searched fourteen validation studies to evaluate the psychometric properties of eight different language versions of MOS-HIV. Chinese included both simplified and traditional versions. Only one version was rated as “moderate” in internal consistency, and the other was rated as “high”. The MOS-HIV also has good construct validity, criterion validity, and hypothesis testing for construct validity. Overall, the expert group classified MOS-HIV as strongly recommended based on the GRADE system. Our results were in line with previous studies. Cooper and colleagues conducted umbrella reviews and found that the MOS-HIV was also recommended as a suitable measure for assessing HRQoL in PLWH from a content perspective [29]. In general, the MOS-HIV was considered to have good psychometric properties. Good internal consistency was generally reported, and its reliability was considered adequate [83, 84]. Acceptable convergent
### Table 2  Methodological quality assessment of the HIV-specific instruments

| References                  | PROM                                                                 | Measurement property: methodological quality per study                                      |
|-----------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|                             | PROM development                                                     | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity | Measurement invariance | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness |
| Ahmed et al. [56]           | WHO-QOL-HIV-BREF Urdu version                                        | Inadequate | NR                | NR                | Inadequate        | Very good            | NR                        | NR                      | Doubtful          | Very good    | NR                             | NR              |
| Connell and Skevington [51] | WHO-QOL-HIV-BREF                                                      | Inadequate | NR                | NR                | Very good         | Very good            | NR                        | Very good              | Very good          | Very good    | NR                             | NR              |
| De Boer et al. [14]         | HOPES Dutch and English versions                                     | Inadequate | NR                | NR                | Inadequate        | Very good            | NR                        | NR                      | Very good          | Very good    | NR                             | NR              |
| Duracinsky et al. [12]      | PROQoL-HIV English, Brazilian, Cambodian, Chinese, French, Senegalese, and Thai versions | Inadequate | NR                | NR                | Adequate          | Very good            | NR                        | Very good              | Doubtful          | Very good    | NR                             | NR              |
| Herrmann et al. [71]        | PROQoL-HIV                                                             | Inadequate | NR                | NR                | NR                | Very good            | NR                        | NR                      | Doubtful          | NR            | NR                             | NR              |
| Holmes and Shea [16]        | HAT-QoL                                                               | Inadequate | NR                | NR                | Adequate          | Very good            | NR                        | NR                      | NR                | NR            | NR                             | NR              |
| Holmes and Shea [76]        | HAT-QoL                                                               | Inadequate | NR                | NR                | Very good         | Very good            | NR                        | NR                      | Very good          | Very good    | NR                             | NR              |
| Hsiung et al. [57]          | WHO-QOL-HIV-BREF Chinese version                                      | Inadequate | Doubtful          | Doubtful          | Doubtful          | Very good            | Very good                | Very good              | NR                | NR            | Very good                       | NR              |
| Hughes et al. [35]          | MOS-HIV                                                               | Inadequate | NR                | NR                | Inadequate        | Very good            | NR                        | NR                      | NR                | NR            | Very good                       | NR              |
| Kemmler et al. [18]         | MQol-HIV German version                                               | Inadequate | Doubtful          | Doubtful          | Adequate          | Very good            | Doubtful                 | Inadequate             | Very good          | Very good    | NR                             | NR              |
| References          | PROM                      | Measurement property: methodological quality per study |
|---------------------|---------------------------|------------------------------------------------------|
|                     | PROM development          | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity | Measurement invariance | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness |
| Lau et al. [36]     | MOS-HIV Chinese version   | Inadequate | NR                | NR                | Adequate           | Very good           | NR                    | Very good           | NR              | Very good | NR                                      | NR             |
| Leplege et al. [11] | HIV-QL31 French version   | Inadequate | Doubtful          | Doubtful          | Doubtful           | Inadequate          | Very good           | NR                  | NR              | NR         | NR                                      | NR             |
| Liu et al. [37]     | MOS-HIV Chinese version   | Inadequate | NR                | NR                | Adequate           | Very good           | Very good           | NR                  | NR              | Doubtful   | Very good                                | NR             |
| Mast et al. [41]    | MOS-HIV Ugandan version   | Inadequate | NR                | NR                | Adequate           | Very good           | Very good           | NR                  | NR              | NR         | NR                                      | NR             |
| McDonnell et al. [42]| MOS-HIV                  | Inadequate | NR                | NR                | Adequate           | Very good           | NR                  | NR                  | NR              | NR         | Very good                                | NR             |
| Meremon et al. [50] | WHO-QOL-HIV-BREF Thai version | Inadequate | NR                | NR                | Adequate           | Very good           | NR                  | NR                  | NR              | NR         | Very good                                | NR             |
| Paton et al. [49]   | MOS-HIV                  | Inadequate | NR                | NR                | NR                 | Very good           | NR                  | NR                  | NR              | NR         | NR                                      | NR             |
| Pereira et al. [52] | WHO-QOL-HIV-Brief Portuguese version | Inadequate | NR                | NR                | Adequate           | Very good           | NR                  | NR                  | NR              | NR         | Very good                                | NR             |
| Peterman et al. [15]| FAHI                     | Inadequate | NR                | NR                | Adequate           | Inadequate          | Doubtful            | NR                  | NR              | NR         | Very good                                | NR             |
| Remple et al. [60]  | MQoL-HIV                 | Inadequate | Doubtful          | Doubtful          | Doubtful           | NR                  | Very good           | NR                  | NR              | Doubtful   | Very good                                | NR             |
| Rechler et al. [48] | WHO-QOL-HIV French version | Inadequate | NR                | NR                | Inadequate         | Inadequate          | NR                  | NR                  | Doubtful | Very good                                | NR             |
| Salehi et al. [53]  | WHO-QOL-HIV-BREF Persian version | Inadequate | Doubtful          | Doubtful          | Inadequate         | Very good           | NR                  | NR                  | NR              | NR         | NR                                      | NR             |
Table 2  (continued)

| References                          | PROM Development | Methodological Quality per Study |
|--------------------------------------|------------------|----------------------------------|
|                                      | PROM             | Measurement Property              |
|                                      | Development      | Relevance                         |
|                                      |                  | Comprehensiveness                 |
|                                      |                  | Comprehensibility                 |
|                                      |                  | Construct Validity                 |
|                                      |                  | Internal Consistency               |
|                                      |                  | Cross-cultural Validity            |
|                                      |                  | Measurement Invariance             |
|                                      |                  | Criterion Validity                 |
|                                      |                  | Reliability                        |
|                                      |                  | Hypothesis Testing for Construct Validity |
|                                      |                  | Responsiveness                     |
| Schifano et al. [44]                | MOS-HIV Italian version | Inadequate (NR, NR, NR, Adequate, Very good, NR, NR, NR, Very good) |
| Shim et al. [45]                    | MOS-HIV Korean version | Inadequate (NR, NR, NR, Adequate, Very good, Very good, NR, NR, Very good) |
| Smith et al. [67]                   | MQoL-HIV          | Inadequate (Doubtful, Doubtful, Doubtful, Adequate, Very good, Adequate, NR, Adequate, NR) |
| Stangl et al. [46]                  | MOS-HIV Ugandan version | Inadequate (Doubtful, Doubtful, Doubtful, Adequate, Very good, Very good, NR, NR, Inadequate) |
| Starce et al. [49]                  | WHO-QOL-HIV Italian version | Inadequate (Doubtful, Doubtful, Doubtful, Inadequate, Very good, Inadequate, NR, NR, NR) |
| Stasinopoulou et al. [34]           | MOS-HIV Greek version | Inadequate (NR, NR, NR, Adequate, Very good, Very good, NR, NR, NR) |
| Taylor et al. [47]                  | HAT-QoL Shona version | Inadequate (Doubtful, Doubtful, Doubtful, Inadequate, Very good, Inadequate, NR, NR, Inadequate) |
| Taylor et al. [47]                  | MOS-HIV Shona version | Inadequate (Doubtful, Doubtful, Doubtful, Inadequate, Very good, Inadequate, NR, NR, Inadequate) |
| Tesfaye et al. [54]                 | WHO-QOL-HIV-BREF Ethiopian version | Inadequate (NR, NR, NR, Very good, Very good, NR, NR, NR, Very good) |
| Tran [55]                           | WHO-QOL-HIV-BREF Vietnamese version | Inadequate (NR, NR, NR, Adequate, Inadequate, NR, NR, NR, Very good) |
| Watanabe et al. [68]                | MQoL-HIV Japanese version | Inadequate (NR, NR, NR, Adequate, Very good, NR, NR, NR, NR) |
| WHOQOL-HIV Group [13]               | WHO-QOL-HIV       | Inadequate (NR, NR, NR, NR, Very good, NR, Very good, NR, Very good) |
| Wu et al. [21]                      | MOS-HIV          | Inadequate (NR, NR, NR, Inadequate, Inadequate, NR, NR, NR, Very good) |
| References       | PROM Development          | Measurement property: methodological quality per study |
|------------------|---------------------------|-------------------------------------------------------|
| Zhu et al. [58]  | WHOQOL HIV BREF Chinese version | Inadequate  | NR | NR | NR | Very good | Very good | NR | NR | Very good | Very good | NR |
| Cai et al. [59]  | WHOQOL HIV BREF Chinese version | Inadequate  | Doubtful | Doubtful | Doubtful | Adequate | Inadequate | NR | NR | NR | Very good | NR |
| Chen et al. [60] | WHOQOL HIV BREF Chinese version | Inadequate  | NR | NR | NR | Inadequate | Inadequate | NR | NR | Inadequate | NR | NR |
| Dong et al. [38] | MOS—HIV Chinese version    | Inadequate  | NR | NR | NR | Very good | Inadequate | NR | NR | NR | NR | NR |
| Guo et al. [82]  | HIVQoL Scale-4             | Inadequate  | NR | NR | NR | Very good | Inadequate | NR | NR | Very good | NR | NR |
| Liu et al. [62]  | WHOQOL Chinese version     | Inadequate  | NR | NR | NR | Doubtful | Inadequate | NR | NR | NR | NR | NR |
| Luo et al. [61]  | WHOQOL HIV-BREF Chinese version | Inadequate  | NR | NR | NR | Adequate | Inadequate | NR | NR | Very good | NR | NR |
| Meng et al. [80] | HIVQoL Scale-2             | Inadequate  | NR | NR | NR | Very good | Inadequate | NR | NR | Very good | Very good | NR |
| Su et al. [81]   | HIVQoL Scale-3             | Inadequate  | Doubtful | Doubtful | Doubtful | Very good | Inadequate | NR | NR | Very good | NR | NR |
| Xiang et al. [77–79]  | HIVQoL Scale-1             | Inadequate  | Doubtful | Doubtful | Doubtful | Adequate | Inadequate | Doubtful | Very good | Very good | Very good | NR |
| Yang et al. [39] | MOS—HIV Chinese version    | Inadequate  | Doubtful | Doubtful | Doubtful | Adequate | Inadequate | NR | NR | NR | NR | NR |
| Yu et al. [40]   | MOS HIV Chinese version    | Inadequate  | NR | NR | NR | Adequate | Inadequate | NR | NR | Very good | NR | NR |
Table 2 (continued)

| References | PROM | Measurement property: methodological quality per study |
|------------|------|-------------------------------------------------------|
|            | PROM development | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity | Measurement invariance | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness |
| Zhang et al. [17] | HIV/AIDS-QoL-46 Chinese version | Inadequate | NR | NR | NR | Very good | Inadequate | NR | NR | Very good | NR | Very good |

FAHI, Functional Assessment of HIV Infection; HAT-QoL, HIV/AIDS Targeted Quality of Life; HIV-QL31, HIV Disease Quality of Life 31-Item Instrument; HIV/AIDS-QoL, HIV/AIDS Quality of Life Questionnaire; HOPES, HIV Overview of Problems Evaluation Scale; MQoL-HIV, Multidimensional Quality of Life Questionnaire for Persons with HIV/AIDS; MOS-HIV, Medical Outcomes Study HIV Health Survey; NR, not reported; PROM, Patient-reported outcome measure; PROQoL-HIV, Patient-Reported Outcomes Quality of Life-HIV instrument; WHOQoL-HIV, World Health Organization's Quality of Life Instrument in HIV Infection; WHOQoL-HIV-BREF, The brief version of the World Health Organization's Quality of Life Instrument in HIV Infection.
| References                      | PROM Development | Measurement property: methodological quality per study |
|---------------------------------|------------------|-------------------------------------------------------|
|                                 | PROM development | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity/measurement invariance | Criterion validity | Reliability testing for construct validity | Responsiveness |
| Akinboro et al. [63]            | WHOQOL-BREF Nigerian version | Inadequate | NR | NR | NR | NR | Very good | NR | NR | NR | NR | NR | NR | NR | NR |
| Brown et al. [70]               | ParnoQoL         | Inadequate | NR | NR | NR | Very good | NR | NR | NR | Doubtful | Very good | NR | NR | NR |
| Buccialini et al. [69]          | ISSQoL Italian version | Inadequate | NR | NR | NR | Inadequate | Very good | NR | NR | NR | NR | NR | NR | NR |
| Fang et al. [22]                | WHOQOL Chinese version | Inadequate | NR | NR | NR | Adequate | Very good | NR | NR | Doubtful | Very good | NR | NR | NR |
| Kaplan et al. [27]              | QWB scale        | Inadequate | NR | NR | NR | NR | NR | NR | Very good | NR | NR | NR | NR | NR |
| Kohli et al. [23]               | MOS Indic        | Inadequate | NR | NR | NR | Inadequate | Very good | NR | NR | NR | NR | NR | NR | NR |
| Kusterer et al. [19]            | SF-36v2 Brazilian-Portuguese version | Inadequate | NR | NR | NR | Very good | NR | NR | NR | NR | NR | NR | NR | NR |
| Namisango et al. [24]           | MVQoLI Uganda version | Inadequate | Doubtful | Doubtful | Doubtful | Very good | Very good | Very good | Very good | Doubtful | Very good | NR |
| Nosyk et al. [28]               | HUI3             | Inadequate | NR | NR | NR | NR | NR | NR | Adequate | NR | Very good | NR | NR | NR |
| Patel et al. [18]               | SF-12 Kiswahili version | Inadequate | Doubtful | Doubtful | Doubtful | Very good | NR | NR | Very-good | NR | NR | NR | NR | NR |
| Pereira and Canavarro [75]      | EUROQOL-8 Portuguese version | Inadequate | NR | NR | NR | Very good | NR | NR | NR | NR | Very good | NR |
| Riley et al. [72]               | SF-36            | Inadequate | NR | NR | NR | Very good | Very good | NR | NR | NR | Very good | NR |
| Saddikia et al. [9]             | WHOQOL Malay version | Inadequate | NR | NR | Adequate | Very good | Adequate | NR | Doubtful | Very good | NR | NR | NR | NR |
| Schnall et al. [25]             | PROMIS-29        | Inadequate | NR | NR | NR | Adequate | Very good | NR | NR | Doubtful | NR | NR | NR | NR |
| Smith et al. [65]               | MOS SF-20        | Inadequate | Doubtful | Doubtful | Inadequate | Inadequate | Adequate | Very good | Doubtful | Very good | NR |
| Sousa et al. [26]               | HAQ-DI           | Inadequate | Doubtful | Doubtful | Adequate | Inadequate | Very good | Very good | Doubtful | Very good | NR |
Table 3 (continued)

| References          | PROM                  | Measurement property: methodological quality per study |
|---------------------|-----------------------|--------------------------------------------------------|
| Thompson et al. [64]| WHOQoL-BREF           | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: NR; Construct validity: Very good; Internal consistency: Inadequate; Cross-cultural validity/ measurement invariance: NR; Criterion validity: NR; Reliability: NR; Hypothesis testing for construct validity: Very good; Responsiveness: NR |
| Tran et al. [20]    | EQ-5D-5L Vietnamese version | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: NR; Construct validity: Inadequate; Internal consistency: Inadequate; Cross-cultural validity/ measurement invariance: Very good; Criterion validity: Very good; Reliability: NR; Hypothesis testing for construct validity: Very good; Responsiveness: NR |
| Turner-Bowker et al. [73] | SF-36 | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: NR; Construct validity: Inadequate; Internal consistency: NR; Cross-cultural validity/ measurement invariance: NR; Criterion validity: NR; Reliability: NR; Hypothesis testing for construct validity: Very good; Responsiveness: NR |
| Wu et al. [21]      | EQ-5D                 | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: NR; Construct validity: Inadequate; Internal consistency: Inadequate; Cross-cultural validity/ measurement invariance: Very good; Criterion validity: Very good; Reliability: NR; Hypothesis testing for construct validity: Very good; Responsiveness: NR |
| Liu et al. [82]     | WHOQoL Chinese version | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: Doubtful; Construct validity: Inadequate; Internal consistency: NR; Cross-cultural validity/ measurement invariance: NR; Criterion validity: Very good; Reliability: NR; Hypothesis testing for construct validity: NR; Responsiveness: NR |
| Zhang et al. [74]   | SF-36 Chinese version | PROM development: Inadequate; Relevance: NR; Comprehensiveness: NR; Comprehensibility: NR; Construct validity: Inadequate; Internal consistency: NR; Cross-cultural validity/ measurement invariance: NR; Criterion validity: Very good; Reliability: NR; Hypothesis testing for construct validity: Very good; Responsiveness: NR |

EQ-SD: EuroQol-5 Dimensions; EUROHIS-QoL-8, European health interview surveys-quality of life-8; HAQ-DI, Health Assessment Questionnaire Disability Index; HUI3, Health Utility Index 3; ISSQoL, The Italian National Institute of Health Quality of Life; MOS, Medical Outcomes Study; MVQoL, Missoula-Vitas Quality-of-Life Index; NR, Not reported; PROM, Patient-reported outcome measure; PROMIS, Patient-Reported Outcomes Measurement Information System; QWB, Quality of Well-Being scale; SF, Short Form Health Survey; WHOQoL, World Health Organization’s Quality of Life; WHOQoL-BREF, The brief version of the World Health Organization’s Quality of Life
Table 4 Rating of the measurement properties of the instruments

| PROM                  | References                        | Construct validity (CFI) | Internal consistency (Cronbach’s alpha) | Reliability (ICC) | Measurement error | Hypothesis testing for construct validity | Cross-cultural validity/measurement invariance | Criterion validity | Responsiveness |
|-----------------------|-----------------------------------|--------------------------|----------------------------------------|-------------------|-------------------|------------------------------------------|-----------------------------------------------|-------------------|----------------|
| WHOQOL-HIV            | WHOQOL-HIV Group [13]             | NR                       | +(0.87–0.94)                           | NR                | NR                | ?                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV French version | Reychler et al. [48]            | –                        | +(0.94)                                | −(0.42–0.74)      | NR                | ?                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV Italian version | Starce et al. [49]              | NR                       | +(0.53–0.89)                           | NR                | NR                | ?                                        | +                                                            | NR                | NR             |
| WHOQOL-HIV-BREF       | Connell and Skevington [51]      | +(0.97)                   | +(0.74–0.82)                           | NR                | NR                | +                                        | NR                                                           | −                 | NR             |
| WHOQOL-HIV-BREF Thai version | Meemon et al. [50]              | –                        | +(0.91)                                | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Portuguese version | Pereira et al. [52]          | +(0.97)                   | +(0.65–0.86)                           | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Persian version | Salehi et al. [53]            | –                        | +(0.87)                                | NR                | NR                | NR                                       | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Ethiopian version | Tesfaye et al. [54]          | +(0.82)                   | +(0.93)                                | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Vietnamese version | Tran [55]                       | –                        | +(0.67–0.89)                           | NR                | NR                | ?                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Urdu version | Ahmed et al. [56]              | –                        | +(0.93)                                | +(0.87–0.99)      | NR                | ?                                        | NR                                                           | NR                | NR             |
| WHOQOL-HIV-BREF Chinese version | Hsiung et al. [57]           | +(0.95)                   | +(0.67–0.80)                           | NR                | NR                | +                                        | +                                                            | NR                | NR             |
|                       | Zhu et al. [58]                  | −(0.81)                  | +(0.93)                                | +(0.72–0.82)      | NR                | +                                        | NR                                                           | NR                | +              |
|                       | Cai et al. [59]                  | −                        | +(0.60–0.82)                           | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
|                       | Chen et al. [60]                 | −                        | +(>0.60)                               | −(>0.50)          | NR                | +                                        | NR                                                           | NR                | NR             |
|                       | Luo et al. [61]                  | −                        | +(0.60–0.76)                           | +0.47–0.68        | NR                | NR                                       | NR                                                           | NR                | NR             |
| MOS-HIV               | Hughes et al. [35]               | −                        | −(0.57–0.89)                           | NR                | NR                | +                                        | NR                                                           | −                 | NR             |
|                       | McDone et al. [42]               | −                        | +(0.64–0.89)                           | NR                | NR                | ?                                        | NR                                                           | NR                | NR             |
|                       | Paton et al. [43]                | NR                       | +(>0.70)                               | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
|                       | Wu et al. [21]                   | −                        | −                                      | NR                | NR                | ?                                        | NR                                                           | NR                | +              |
| MOS-HIV Greek version | Stasinopoulos et al. [34]       | −                        | +(>0.80)                               | NR                | NR                | +                                        | NR                                                           | NR                | NR             |
| PROM                     | References          | Construct validity (CFI) | Internal consistency (Cronbach’s alpha) | Reliability (ICC) | Measurement error | Hypothesis testing for construct validity | Cross-cultural validity/ measurement invariance | Criterion validity | Responsiveness |
|-------------------------|---------------------|--------------------------|------------------------------------------|-------------------|-------------------|-------------------------------------------|-----------------------------------------------|-------------------|---------------|
| MOS-HIV Chinese version | Lau et al. [36]     | -                        | + (0.78–0.90)                            | + (0.50–0.84)     | NR                | NR                                        | NR                                                            | NR                | NR            |
|                         | Liu et al. [37]     | + (0.97)                 | + (0.79–0.93)                            | + (0.87–0.89)     | NR                | +                                         | NR                                                            | NR                | NR            |
|                         | Dong et al. [38]    | –                        | + (0.81)                                 | NR                | NR                | NR                                        | NR                                                            | NR                | NR            |
|                         | Yang et al. [39]    | –                        | + (0.67–0.86)                            | NR                | NR                | NR                                        | NR                                                            | NR                | NR            |
|                         | Yu et al. [40]      | –                        | + (0.69–0.87)                            | + (0.73–0.88)     | NR                | +                                         | NR                                                            | NR                | NR            |
| MOS-HIV Lugandan version| Mast et al. [41]    | –                        | + (0.51–0.84)                            | NR                | NR                | +                                         | NR                                                            | NR                | NR            |
| MOS-HIV Italian version | Schifano et al. [44]| –                        | + (> 0.80)                               | NR                | NR                | ?                                         | NR                                                            | NR                | NR            |
| MOS-HIV Korean version  | Shim et al. [45]    | + (0.97)                 | + (0.78–0.95)                            | NR                | NR                | +                                         | +                                                             | NR                | NR            |
| MOS-HIV Ugandan version | Stangl et al. [46]  | –                        | + (0.79–0.91)                            | NR                | NR                | ?                                         | +                                                             | NR                | –             |
| MOS-HIV Shona version   | Taylor et al. [47]  | –                        | + (0.60–0.86)                            | NR                | NR                | +                                         | NR                                                            | NR                | NR            |
| MQoL-HIV                | Remple et al. [66]  | NR                      | + (0.43–0.92)                            | + (0.60–0.96)     | NR                | +                                        | NR                                                            | NR                | NR            |
|                         | Smith et al. [67]   | –                        | + (0.56–0.86)                            | + (0.64–0.88)     | NR                | NR                                        | NR                                                            | NR                | +             |
| MQoL-HIV German version | Kemmler et al. [10] | –                        | + (0.61–0.85)                            | + (0.74–0.89)     | NR                | +                                        | NR                                                            | NR                | NR            |
| MQoL-HIV Japanese version| Watanabe et al. [68]| –                        | + (0.47–0.85)                            | NR                | NR                | NR                                        | NR                                                            | –                 | NR            |
| FAHII                   | Peterman et al. [15]| –                        | + (0.91)                                 | NR                | NR                | ?                                         | +                                                             | NR                | NR            |
| HAT-QoL                 | Holmes and Shea et al. [76] | –                      | + (> 0.80)                               | NR                | NR                | ?                                         | NR                                                            | NR                | NR            |
|                         | Holmes and Shea et al. [16] | –                      | + (0.80–0.89)                            | NR                | NR                | NR                                        | NR                                                            | NR                | NR            |
| HAT-QoL Shona version   | Taylor et al. [47]  | –                        | + (0.63–0.85)                            | NR                | NR                | ?                                         | NR                                                            | NR                | NR            |
| HIV/AIDSQoL Chinese version | Zhang et al. [17]   | –                        | + (0.94)                                 | + (0.80)          | NR                | NR                                        | NR                                                            | NR                | +             |
| HIV-QL31 French version | Leplège et al. [11] | –                        | + (0.93)                                 | NR                | NR                | NR                                        | NR                                                            | NR                | NR            |
| PROM                                      | References                                           | Construct validity (CFI) | Internal consistency (Cronbach’s alpha) | Reliability (ICC) | Measurement error | Hypothesis testing for construct validity | Cross-cultural validity/measurement invariance | Criterion validity | Responsiveness |
|-------------------------------------------|------------------------------------------------------|--------------------------|-----------------------------------------|-------------------|-------------------|-------------------------------------------|-----------------------------------------------|-------------------|----------------|
| HOPES Dutch, English version              | De Boer et al. [14]                                  | —                        | +(0.80–0.92)                            | NR                | NR                | ?                                         | NR                                                           | —                 | NR             |
| HOPES PROQoL-HIV                           | Herrmann et al. [71]                                 | NR                       | +(0.94)                                 | + (0.86)          | NR                | NR                                        | NR                                                           | NR                | NR             |
| HOPES PROQoL-HIV English, Brazilian, Cambodian, Chinese, French, Senegalese, and Thai versions | Duracinsky et al. [12]                              | —                        | +(0.77–0.89)                            | + (0.86)          | NR                | ?                                         | NR                                                           | NR                | NR             |
| HIV QoL Scale-1                           | Xiang et al. [77–79]                                 | —                        | +(0.65–0.7)                             | + (> 0.7)         | NR                | NR                                        | NR                                                           | NR                | NR             |
| HIV QoL Scale-2                           | Meng et al. [80]                                     | NR                       | +(0.90)                                 | + (0.80)          | NR                | NR                                        | NR                                                           | NR                | NR             |
| HIV QoL Scale-3                           | Su et al. [81]                                       | —                        | +(0.94)                                 | + (0.80)          | NR                | NR                                        | NR                                                           | NR                | NR             |
| HIV QoL Scale-4                           | Guo et al. [82]                                      | —                        | +(0.94)                                 | + (0.97)          | NR                | NR                                        | NR                                                           | NR                | NR             |
| WHOQOL Chinese version                    | Fang et al. [22]                                     | —                        | +(0.74–0.85)                            | + (0.51–0.78)     | NR                | ?                                         | NR                                                           | NR                | NR             |
| WHOQOL Chinese version                    | Liu et al. [62]                                      | —                        | —                                       | NR                | NR                | NR                                        | NR                                                           | NR                | NR             |
| WHOQOL Chinese version                    | Saddkia et al. [9]                                   | —                        | +(0.93)                                 | + (0.87)          | NR                | +                                         | +                                                            | NR                | NR             |
| WHOQOL Chinese version                    | Akinboro et al. [63]                                 | NR                       | +(0.85)                                 | NR                | NR                | NR                                        | NR                                                           | NR                | NR             |
| WHOQOL Chinese version                    | Thompson et al. [64]                                 | + (0.89)                 | +(0.65–0.78)                            | NR                | NR                | +                                         | NR                                                           | NR                | NR             |
| MOS Indic version                         | Kohli et al. [23]                                    | —                        | +(> 0.75)                               | NR                | NR                | NR                                        | NR                                                           | NR                | NR             |
| MOS SF-20                                 | Smith et al. [65]                                    | —                        | +(0.76–0.89)                            | NR                | NR                | +                                         | NR                                                           | +                 |               |
| MVQoL Uganda version                      | Namisango et al. [24]                                | NR                       | +(0.85)                                 | NR                | NR                | +                                         | +                                                            | NR                | NR             |
| EQ-SD                                     | Wu et al. [21]                                       | —                        | —                                       | NR                | NR                | ?                                         | NR                                                           | NR                | +              |
| EQ-SD-Vietnamese version                   | Tran et al. [20]                                     | —                        | +(0.85)                                 | NR                | NR                | ?                                         | NR                                                           | NR                | NR             |
| EUROHIS-Qol-8 Portuguese version           | Pereira and Canavarro [75]                           | +(0.89)                  | +(0.85)                                 | NR                | NR                | +                                         | NR                                                           | NR                | NR             |
| HAQ-DI                                    | Sousa et al. [26]                                    | +(0.974)                 | NR                                      | NR                | NR                | NR                                        | NR                                                           | NR                | NR             |
| HUI3                                      | Nosyk et al. [28]                                    | NR                       | NR                                      | NR                | NR                | +                                         | NR                                                           | —                 | +              |
validity and discriminant validity were reported in several reviews [31, 32]. As one of the earliest HIV-specific HRQoL PROMs, MOS-HIV has been translated into at least 14 languages. The reliability and validity of the instrument were likely to decrease in the different translated versions due to their cultural adjustment. For these versions, mixed findings on the hypothesis testing of the MOS-HIV were reported [34–47]. As data on the psychometric properties of many studies were missing or indeterminate, we can draw only preliminary conclusions. More research is needed to fill the gap in the research on the psychometric properties of the existing instruments on HRQoL in PLWH.

Our review found that, in addition to MOS-HIV, the WHOQoL-HIV-BREF was reported to have good psychometric properties. Seven of eight different language versions of the WHOQoL-HIV-BREF were rated as "high" in hypothesis testing for construct validity. The WHOQoL-HIV-BREF was reported to have better reliability and internal consistency than other instruments except the MOS-HIV. Two language versions of the WHOQoL-HIV-BREF were rated as "very low" in internal consistency. Three language versions were rated as "very low", and two were rated as "moderate" in construct validity. Connell and Skevington published a study to report the development and psychometric properties of the WHOQoL-HIV-BREF [51]. The results showed very good discriminant validity, which suggested the important role of the WHOQoL-HIV-BREF in distinguishing different stages of HIV disease progression [51].

Although the MOS-HIV showed good psychometric properties, a major advantage of the WHOQoL-HIV-BREF is its brevity. It contains only 31 items, and most participants can complete the instrument in 8 min. The WHOQoL-HIV-BREF is increasingly being used in HIV research. From a practical perspective, the MOS-HIV and WHOQoL-HIV-BREF focus on different dimensions and are based on different theoretical perspectives. The MOS-HIV is a multidimensional assessment measure that assesses physical, psychological, and social

---

**Table 4** (continued)

| PROM references | Construct validity (CFI) | Internal consistency (Cronbach's alpha) | Reliability (ICC) | Measurement error | Hypothesis testing for construct validity | Cross-cultural validity/masurement invariance | Criterion validity | Responsiveness |
|------------------|--------------------------|----------------------------------------|------------------|------------------|----------------------------------------|---------------------------------------------|------------------|--------------|
| ISSQoL Italian version | Bucciardini et al. [69] | – | (+0.70) | NR | NR | NR | NR | NR | NR |
| PozQoL | Brown et al. [70] | (+0.95) | (+0.95) | NR | + | NR | NR | NR | NR |
| PROMIS-29 | Schnall et al. [25] | – | (+0.87–0.97) | (+0.61–0.81) | NR | NR | NR | NR | NR |
| QWB scale | Kaplan et al. [27] | NR | NR | NR | NR | NR | – | NR | NR |
| SF-36v2 Brazilian-Portuguese version | Kusterer et al. [19] | + (0.95) | NR | NR | NR | NR | NR | NR | NR |
| SF-36 | Riley et al. [72] | – | (+0.77–0.90) | NR | NR | ? | NR | NR | NR |
| Turner-Bowker et al. [73] | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| SF-36 Chinese version | Zhang et al. [74] | – | + (0.928) | NR | NR | + | NR | NR | NR |
| SF-12 Kiswahili version | Patel et al. [18] | – | NR | NR | NR | ? | NR | – | NR |

*+* , sufficient; “−” , insufficient; “?” , indeterminate; CFI, Comparative fit index; EQ-5D, EuroQol-5 Dimensions; EUROHIS-QoL-8, European health interview surveys-quality of life-8; FAHI, Functional Assessment of HIV Infection; HAT-QoL, HIV/AIDS Targeted Quality of Life; HAQ-DI, Health Assessment Questionnaire Disability Index; HIV-QL31, HIV Disease Quality of Life 31-item Instrument; HIV/AIDSQoL, HIV/AIDS Quality of Life Questionnaire; HOPES, HIV Overview of Problems Evaluation Scale; HUI3, Health Utility Index 3; ICC, Intra-class correlation coefficients; ISSQoL, The Italian National Institute of Health Quality of Life; MQoL-HIV, Multidimensional Quality of Life Questionnaire for Persons with HIV/AIDS; MOS, Medical Outcomes Study; MOS-HIV, Medical Outcomes Study HIV Health Survey; MVQoL, Missoula-Vitas Quality-of-Life Index; NR, not reported; PLWH, people living with HIV; PROM, Patient-reported outcome measure; PROMIS Patient-Reported Outcomes Measurement Information System; PROQoL-HIV, Patient-Reported Outcomes Quality of Life-HIV instrument; QWB, Quality of Well-Being scale; SF, Short Form Health Survey; WHOQoL, World Health Organization’s Quality of Life; WHOQoL-BREF, The brief version of the World Health Organization’s Quality of Life. WHOQoL-HIV, World Health Organization's Quality of Life Instrument in HIV Infection; WHOQoL-HIV-BREF, The brief version of the World Health Organization's Quality of Life Instrument in HIV Infection.
| Recommendation | PROM Version | Measurement property: methodological quality per study |
|----------------|--------------|------------------------------------------------------|
| Strongly recommended | MOS-HIV | Relevance | Comprehensiveness | Construct validity | Internal consistency | Cross-cultural validity | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness | Measurement error | Interpretability |
| MOS-HIV Greek version | NR | NR | NR | Very low | High | NR | NR | NR | High | NR | NR | NR |
| MOS-HIV Chinese version | NR | NR | NR | Moderate | High | High | NR | NR | NR | High | NR | NR | NR |
| MOS-HIV Ugandan version | Low | Low | Low | High | High | High | NR | Very low | Moderate | NR | NR | NR |
| MOS-HIV English and Chinese versions | NR | NR | NR | NR | High | NR | NR | NR | High | NR | NR | NR |
| MOS-HIV Italian version | NR | NR | NR | Moderate | High | NR | NR | NR | High | NR | NR | NR |
| MOS-HIV Korean version | NR | NR | NR | Moderate | High | High | NR | High | High | NR | NR | NR |
| MOS-HIV Shona version | Low | Low | Low | Very low | High | Very low | NR | Very low | NR | NR | NR | NR |
| WHO-QOL-HIV-BREF | NR | NR | NR | High | High | NR | High | NR | High | NR | NR | NR |
| WHO-QOL-HIV-BREF Thai version | NR | NR | NR | High | High | NR | High | NR | High | NR | NR | NR |
| WHO-QOL-HIV-Bref Portuguese version | NR | NR | NR | Moderate | High | NR | NR | NR | High | NR | NR | NR |
| Recommendation PROM | Version                      | Measurement property: methodological quality per study |
|---------------------|------------------------------|--------------------------------------------------------|
|                     |                             | Relevance Comprehensiveness Comprehensibility Construct validity Internal consistency Cross-cultural validity Measurement property: methodological quality per study | |
|                     |                             | Construct validity | Internal consistency | Cross-cultural validity | Criterion | Reliability | Hypothesis testing for construct validity | Responsiveness | Measurement error | Interpretability |
|                     |                             | Very low | Very low | Very low | Moderate | NR | NR | NR | NR | NR | NR | NR | NR |
| WHO-QOL-HIV-BREF Persian version | | NR | NR | NR | High | High | NR | NR | NR | High | NR | NR | NR |
| WHO-QOL-HIV-BREF Ethiopian version | | NR | NR | NR | Moderate | Very low | NR | NR | NR | High | NR | NR | NR |
| WHO-QOL-HIV-BREF Vietnamese version | | NR | NR | NR | Very low | High | NR | NR | Low | High | NR | NR | NR | NR |
| WHO-QOL-HIV-BREF Urdu version | | High | High | High | Very low | Very low | High | NR | Very low | High | NR | NR | NR |
| SF-36 | | NR | NR | NR | High | High | NR | NR | NR | NR | NR | NR | NR | NR |
| SF-36 Brazilian-Portuguese version | | NR | NR | NR | Moderate | High | NR | NR | NR | High | NR | NR | NR | NR |
| SF-36 Chinese version | | NR | NR | NR | High | Very low | High | NR | High | NR | NR | NR | NR | NR |
| MQol-HIV | | Moderate | Moderate | Moderate | | | | | | | | | | |
| Recommendation | PROM | Measurement property: methodological quality per study |
|----------------|------|------------------------------------------------------|
|                |      | Relevance | Comprehensiveness | Construct validity | Internal consistency | Cross-cultural validity | Measurement invariance | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness | Interpretability | |
| Weak recommended |      |           |                      |                       |                       |                           |                           |                          |             |                                 |               |                     | |
| FAHI           | FAHI | NR        | NR                   | NR                    | NR                    | NR                        | NR                        | NR                        | NR          | NR                               | NR            | NR                   | |
| HAT-QoL        | HAT-QoL | NR       | NR                   | NR                    | NR                    | NR                        | NR                        | NR                        | NR          | NR                               | NR            | NR                   | |
| HAT-QoL Shona  |      | NR        | NR                   | NR                    | NR                    | NR                        | NR                        | NR                        | NR          | NR                               | NR            | NR                   | |
| HIV/AIDS-SQoL  | HIV/AIDS-SQoL | NR | NR | NR | NR | High | Very low | Low | NR | NR | High | NR | NR | NR |
| HIV-QL31       | HIV-QL31 | Low | Low | Low | Very low | High | Very low | NR | NR | NR | Very low | NR | NR | NR |
| HOPES          | HOPES Dutch and English versions | NR | NR | NR | Very low | High | NR | NR | NR | High | NR | NR | NR |
Table 5 (continued)

| Recommendation PROM | Version                  | Measurement property: methodological quality per study | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity/ measurement invariance | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness | Measurement error | Interpretablity |
|---------------------|-------------------------|-------------------------------------------------------|-----------|------------------|-------------------|-------------------|---------------------|-----------------------------------------------|------------------|-------------|------------------------------------------|----------------|----------------|-----------------|
| PROMOL-HIV          | PROMOL-HIV              | NR                                                   | NR        | NR               | NR                | Moderate          | High                | NR                                             | NR               | Low         | Low                         | NR             | NR            | NR              |
| WHOQOL              | WHOQOL Chinese version  | NR                                                   | NR        | NR               | NR                | Low               | Very low            | NR                                             | High             | Low         | Low                         | NR             | NR            | NR              |
|                    | WHOQOL Malay version    | NR                                                   | NR        | NR               | NR                | Moderate          | High                | Moderate                         | NR               | NR         | Low                         | NR             | NR            | NR              |
|                    | WHOQOL BREF             | NR                                                   | NR        | NR               | NR                | High              | Very low            | NR                                             | NR               | NR         | NR                         | NR             | NR            | NR              |
| WHOQOL BREF Nigerian version | | NR                                                   | NR        | NR               | NR                | High              | High                | Moderate                         | NR               | NR         | NR                         | NR             | NR            | NR              |
| MOS                 | MOS Indic version       | NR                                                   | NR        | NR               | NR                | Very low          | Moderate            | NR                                             | NR               | NR         | NR                         | NR             | NR            | NR              |
| MOS SF-20           | MOS SF-20               | Low                                                  | Low       | Low              | Low               | Very low          | Very low            | Moderate                         | High             | Low         | Low                         | NR             | NR            | NR              |
| MVQoLI              | MVQoLI Ugandan version  | Low                                                  | Low       | Low              | Low               | High              | High                | High                            | High             | High        | High                        | NR             | NR            | NR              |
| EQ-SD               | EQ-SD                   | NR                                                   | NR        | NR               | NR                | Very low          | Very low            | NR                                             | High             | NR         | NR                         | NR             | NR            | NR              |
| EQ-SD-5L VEtimianese version | | NR                                                   | NR        | NR               | NR                | Very low          | Very low            | High                            | High             | NR         | NR                         | NR             | NR            | NR              |
| EUROHIS-QoL-8       | EUROHIS-QoL-8 Portuguese version | NR                                                   | NR        | NR               | NR                | High              | NR                  | NR                                             | NR               | NR         | NR                         | NR             | NR            | NR              |
| HAQ-DI              | HAQ-DI                  | Low                                                  | Low       | Low              | Low               | Moderate          | Very low            | High                            | High             | Low         | High                        | NR             | NR            | NR              |
| HUI3                | HUI3                    | NR                                                   | NR        | NR               | NR                | NR                | NR                  | Moderate                         | NR               | NR         | NR                         | NR             | NR            | NR              |
| Recommendation | PROM Version | Measurement property: methodological quality per study |
|----------------|--------------|------------------------------------------------------|
|                |              | Relevance | Comprehensiveness | Comprehensibility | Construct validity | Internal consistency | Cross-cultural validity | Criterion validity | Reliability | Hypothesis testing for construct validity | Responsiveness | Measurement error | Interpretability |
| ISSQoL         | ISSQoL Italian version | NR        | NR               | NR               | Very low           | High                | NR                 | NR             | NR          | NR                  | NR            | NR            | NR               |
| PozQoL         | PozQoL       | NR        | NR               | NR               | High               | High                | NR                 | NR             | Low         | High                | NR            | NR            | NR               |
| PROMIS-29      | PROMIS-29    | NR        | NR               | NR               | Moderate           | High                | NR                 | NR             | Low         | High                | NR            | NR            | NR               |
| QWB            | QWB          | NR        | NR               | NR               | NR                 | NR                 | High               | NR             | NR          | NR                  | NR            | NR            | NR               |
| SF-12          | SF-12 Kiswahili version | Low       | Low              | Low              | High               | NR                 | High               | High           | NR          | NR                  | NR            | NR            | NR               |
| HIV QoL Scale 4 (Guo et al) | HIV QoL Scale 4 (Guo et al) | NR        | NR               | NR               | High               | Very low            | NR                 | NR             | NR          | NR                  | NR            | NR            | NR               |
| HIV QoL Scale 2 (Meng et al) | HIV QoL Scale 2 (Meng et al) | NR        | NR               | NR               | High               | Very low            | NR                 | High           | High        | High                | NR            | NR            | NR               |
| HIV QoL Scale 3 (Su et al) | HIV QoL Scale 3 (Su et al) | Low       | Low              | Low              | High               | Very low            | NR                 | NR             | NR          | NR                  | NR            | NR            | NR               |
| HIV QoL Scale 1 (Xiang et al) | HIV QoL Scale 1 (Xiang et al) | Low       | Low              | Moderate          | Low                | Very low            | NR                 | High           | NR          | NR                  | NR            | NR            | NR               |

EQ-5D, EuroQol-5 Dimensions; EURODIS-Qol-4, European health interview surveys-quality of life-4; FAHI, Functional Assessment of HIV Infection; HAT-Qol, HIV/AIDS Targeted Quality of Life; HAQ-DI, Health Assessment Questionnaire Disability Index; HIV-QL31, HIV Disease Quality of Life 31-Item Instrument; HIV/AIDSQoL, HIV/AIDS Quality of Life Questionnaire; HOPES, HIV Overview of Problems Evaluation Scale; HUI3, Health Utility Index 3; ISSQoL, The Italian National Institute of Health Quality of Life; MQol-HIV, Multidimensional Quality of Life Questionnaire for Persons with HIV/AIDS; MOS, Medical Outcomes Study; MOS-HIV, Medical Outcomes Study HIV Health Survey; MVQoLI, Missoula-Vitas Quality-of-Life Index; PROM, Patient-reported outcome measure; PROMIS, Patient-Reported Outcomes Measurement Information System; PROQoL-HIV, Patient-Reported Outcomes Quality of Life-HIV instrument; QWB, Quality of Well-Being scale; SF, Short Form Health Survey; WHOQoL, World Health Organization’s Quality of Life; WHOQoL-BREF, The brief version of the World Health Organization’s Quality of Life. WHOQoL-HIV, World Health Organization’s Quality of Life Instrument in HIV Infection; WHOQoL-HIV-BREF, The brief version of the World Health Organization’s Quality of Life Instrument in HIV Infection.
functioning. The MOS-HIV consists of 35 items across 11 domains: physical functioning, pain, social functioning, role functioning, emotional well-being, energy/fatigue, cognitive function, health distress, health transition, general health, and overall quality of life [8]. The WHOQoL-HIV-BREF has 31 items across six domains: physical functioning, psychological functioning, levels of independence, social relationships, environment, and spirituality [9].

The SF-36 is an internationally used generic instrument that can provide a comprehensive assessment of HRQoL in various populations. Although the SF-36 is also widely used in PLWH, only four validation studies were found in PLWH [19, 72–74]. The number of validation studies of different language versions was fewer than that of WHOQoL-HIV-BREF and MOS-HIV. From a global perspective, a better PROM should report decent psychometric properties in all language versions. Future studies are warranted to conduct validation studies evaluating the psychometric properties of the SF-36 in PLWH in various contexts. In addition, other aspects, such as scoring methods and content of items, may also restrict the wide usage of PLWH [85, 86]. Skevington et al. concluded that the SF-36 includes several different scoring scales and response options, which may complicate scoring and thus limit the widespread clinical use of the SF-36 [85]. Abbasi-Ghahramanloo et al. showed that the SF-36 may lack the ability to measure self-reported subjective HRQoL [86].

This study strongly recommends four HIV-specific and one generic PROM. Generic PROMs can be used to measure the HRQoL of general or HIV-infected populations. However, they may lack the sensitivity to detect subtle changes specific to PLWH, including stigma, relationship issues, and comorbidities [87]. HIV-specific PROMs are more closely related to the disease than generic PROMs and have the sensitivity and specificity needed for HIV-specific domains. Nonetheless, they are not conducive to use in comparisons across populations [88, 89]. It is highly recommended that when selecting instruments, researchers need to consider more aspects, including psychometric properties, instrument content coverage, ease of use, and scoring methods. Therefore, the choice of PROMs should be based on the specific aims of assessments and the response burden for participants.

Overall, we acknowledge that there are some limitations to this study. First, this study included only articles published in English or Chinese. Therefore, some studies published in other languages may not have been included, which may have affected the conclusions of this review. Second, we included only studies that aimed to evaluate the measurement properties of PROMs in PLWH. Some cross-sectional studies that aimed to explore the level of HRQoL in PLWH also reported the reliability and validity of PROMs. These types of studies were not included in this study. Third, we included four PROMs in Chinese that did not report a specific name. We used “unknown” to describe the names of these PROMs in all tables.

Conclusions
This systematic review identified and described the psychometric properties of 30 instruments and 69 studies. The findings from the included studies highlighted that compared to other HIV-specific and generic HRQoL PROMs, the MOS-HIV had the best psychometric properties and could be recommended as the most suitable for use in research and clinics. We also strongly recommended using WHOQoL-HIV-BREF, SF-36, MQoL-HIV, and WHOQoL-HIV to evaluate HRQoL in PLWH. We suggest that the choice of PROMs should be based on the specific aims of assessments and the response burden for participants.

Abbreviations
ART: Antiretroviral therapy; COSMIN: Consensus-based standards for the selection of health measurement instruments; EQ-SD: EuroQol-5 dimensions; EUROHIS-Qol-8: European health interview surveys-quality of life-8; FAH: Functional assessment of HIV infection; HAT-Qol: HIV/AIDS targeted quality of life; GRADE: Grading, recommendations, assessment, development, and evaluation; HAQ-DI: Health Assessment Questionnaire Disability Index; HIV-QL31: HIV disease quality of life 31-item instrument; HIV/AIDSQoL: HIV/AIDS quality of life questionnaire; HOPES: HIV Overview of Problems Evaluation Scale; HRQoL: Health-related quality of life; HUI3: Health Utility Index 3; ISSQoL: The Italian National Institute of Health Quality of Life; MQoL-HIV: Multidimensional quality of life questionnaire for persons with HIV/AIDS; MOS: Medical outcomes study; MOS-HIV: Medical outcomes study HIV health survey; MVQoL: Missoula-Vitas Quality-of-Life Index; PLWH: People living with HIV; PROM: Patient-reported outcome measure; PROMIS: Patient-reported outcomes measurement information system; PROQol-HIV: Patient-reported outcomes quality of life-HIV instrument; QWB: Quality of well-being scale; SF: Short form health survey; WHOQol: World Health Organization’s Quality of Life; WHOQoL-BREF: The brief version of the World Health Organization’s Quality of Life; WHOQoL-HIV: World Health Organization’s Quality of Life Instrument in HIV Infection; WHOQoL-HIV-BREF: The brief version of the World Health Organization’s Quality of Life Instrument in HIV Infection.

Supplementary Information
The online version contains supplementary material available at https://doi.org/10.1186/s12955-021-01910-w.

Additional file 1. Searching Strategies and Results.
Additional file 2. PRISMA 2020 Checklist.

Acknowledgements
Not applicable.

Authors’ contributions
Performed the search, provided initial tables, and wrote the original draft version. HW, critically evaluated the manuscript and tables, project administration, ZZ, supervised the literature search, helped in writing, ZY, writing–reviewing and editing, SH, YH, LZ. All authors read and approved the final manuscript.
Funding
This work is supported by the Ministry of Education of Humanities and Social Science Project (20YJC622047), Shanghai Soft Science Research Program (214019511), and National Natural Science Foundation of China (21278043). The funders had no involvement in or influence on this systematic review.

Availability of data and materials
Not applicable.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
All participants provided written informed consent to publication.

Competing interests
The authors declare that they have no competing interests.

Author details
1 Fudan University School of Public Health, Shanghai, China. 2 School of Nursing, Fudan University, Shanghai, China. 3 Fudan University Centre for Evidence-Based Nursing, A Joanna Briggs Institute Centre of Excellence, 305 Fenglin Rd, Shanghai 200032, China. 4 Peking University School of Nursing, Beijing, China. 5 Shanghai Public Health Clinical Center, Shanghai, China.

Received: 7 July 2021   Accepted: 14 December 2021

Published online: 10 January 2022

References
1. Hays RD, Reeve BB. Measurement and modeling of health-related quality of life. In: Killewo J, Heggenhougen KH, Quah SR, editors. International Encyclopedia of public health. 2nd ed. San Diego: Academic Press; 2017.
2. Torrance GW. Utility approach to measuring health-related quality of life. J Chronic Dis. 1987;40(16):593–600.
3. Jang HJ, Satre DD, Leyden W, Leibowitz A, Silverberg MJ. Mental and physical quality of life by age groups in people living with HIV. J Assoc Nurses AIDS Care. 2019;30(5):500–10.
4. Lazarus JV, Safreed-Harmon K, Barton SE, Costagliola D, Dedes N, del Amo VJ, et al. Beyond viral suppression of HIV—the new quality of life frontier. BMC Med. 2016;14(1):94–8.
5. Webster P. UNAIDS survey aligns with so-called fourth 90 for HIV/AIDS. Lancet. 2019;393(10187):2188.
6. The Lancet HIV Living well with HIV. Lancet HIV. 2019;6(12):e807.
7. Kall M, Marcellin F, Harding R, Lazarus JV, Carriere P. Patient-reported outcomes to enhance person-centred HIV care. Lancet HIV. 2019;7(1):e59–68.
8. Wu AW, Revicki DA, Jacobson D, Malitz FE. Evidence for reliability, validity and usefulness of the medical outcomes study HIV health survey (MOS-HIV). Qual Life Res. 1997;6(6):481–93.
9. Saddki N, Noor MM, Norbanee TH, et al. Validity and reliability of the Malay version of WHOQOL-HIV-BREF in patients with HIV infection. AIDS Care. 2009;21(10):1271–8.
10. Kemmler G, Schmed B, Shetty-Lee A, et al. Quality of life of HIV-infected patients: psychometric properties and validation of the German version of the MOQL-HIV. Qual Life Res. 2003;12(8):1037–50.
11. Leplege A, Rude N, Ecosse E, Ceinros N, Dohin E, Pouchot J. Measuring quality of life from the point of view of HIV-positive subjects: the HIV-QL31. Qual Life Res. 1997;6(6):585–94.
12. Duransky M, Lalanne C, Le Coeur S, et al. Psychometric validation of the PROQOL-HIV questionnaire, a new health-related quality of life instrument-specific to HIV disease. J Acquir Immune Defic Syndr. 2012;59(5):506–15.
13. O’Connell K, Skevington S, Saxena S, WHOQOL HIV Group. Preliminary development of the World Health Organisation’s Quality of Life HIV instrument (WHOQOL-HIV): analysis of the pilot version. Soc Sci Med. 2003;57(7):1259–75.
14. De Boer JB, Sprangers MA, Aaronson NK, Lange JM, van Dam FS. A study of the reliability, validity and responsiveness of the HIV overview of problems evaluation system (HOPEs) in assessing the quality of life of patients with AIDS and symptomatic HIV infection. Qual Life Res. 1996;5(3):339–47.
15. Peterman AH, Cella D, Mo F, McCain N. Psychometric validation of the revised Functional Assessment of Human Immunodeficiency Virus Infection (FAHI) quality of life instrument. Qual Life Res. 1997;6(6):572–84.
16. Holmes WC, Shea JA. Performance of a new, HIV/AIDS-targeted quality of life (HAT-QOL) instrument in asymptomatic seropositive individuals. Qual Life Res. 1997;6(6):561–71.
17. Zhang ML, Wei JY, Wu YM, et al. Evaluation of HIV/AIDS qol-46. Chin Med Res. 2009;22(011):10–3.
18. Patel AR, Lester RT, Marra CA, et al. The validity of the SF-12 and SF-6D instruments in people living with HIV/AIDS in Kenya. Health Qual Life Outcomes. 2017;15(1):143.
19. Lins-Kusterer L, Valdetamar J, Aguilar CVN, Menezes MS, Netto EM, Brites C. Validity and reliability of the 36-item short form health survey questionnaire version 2 among people living with HIV in Brazil. Braz J Infect Dis. 2019;23(5):313–21.
20. Tran BX, Ohnmiaa A, Nguyen LT. Quality of life profile and psychometric properties of the EQ-5D-SL in HIV/AIDS patients. Health Qual Life Outcomes. 2012;10:132.
21. Wu AW, Jacobson KL, Frick KD, et al. Validity and responsiveness of the euroqol as a measure of health-related quality of life in people enrolled in an AIDS clinical trial. Qual Life Res. 2002;11(3):273–82.
22. Fang CT, Hsiung PC, Yu CF, Chen MY, Wang JD. Validation of the World Health Organization quality of life instrument in patients with HIV infection. Qual Life Res. 2002;11(8):753–62.
23. Kohli RM, Sane S, Kumar K, Pananjape RS, Mehdendale SM. Modification of medical outcome study (MOS) instrument for quality of life assessment & its validation in HIV infected individuals in India. Indian J Med Res. 2005;122(4):297–304.
24. Namisango E, Katabira E, Karamagi C, Baguma P. Validation of the Missoula Vital-qualities of Life Index among patients with advanced AIDS in urban Kampala, Uganda. J Pain Symptom Manag. 2007;33(2):189–202.
25. Schnall R, Liu J, Cho H, Hirshfeld S, Olsender S. A Health-related quality-of-life measure for use in patients with HIV: a validation study. AIDS Patient Care STDs. 2017;31(1):51–42.
26. Kaplan RM, Patterson TL, Kerner DN, Atkinson JH, Heaton RK, Grant I. The quality of well-being scale in asymptomatic HIV-infected patients. HRQOL. 2017;5(1):1–2.
27. Clayson DJ, Wild DJ, Quarterman P, Duprat-Lomon I, Kubin M, Coons SJA. A comparative review of health-related quality-of-life measures for use in HIV/AIDS clinical trials. Pharmacoeconomics. 2006;24(8):751–65.
28. Gakhar H, Kamali A, Holodniy M. Health-related quality of life assessment instruments for outcomes included in a “core outcome set”: a systematic review of reviews. Health Qual Life Outcomes. 2017;15(1):143.
29. Cooper V, Clatworthy J, Harding R, Whetham J, Emerge Consortium. Measuring quality of life among people living with HIV: a systematic review of reviews. Health Qual Life Outcomes. 2017;15(1):220–39.
30. Clayson DJ, Wild DJ, Quarterman P, Duprat-Lomon I, Kubin M, Coons SJA. A comparative review of health-related quality-of-life measures for use in HIV/AIDS clinical trials. Pharmacoeconomics. 2006;24(8):751–65.
31. Gakhar H, Kamali A, Holodny M. Health-related quality of life assessment after antiretroviral therapy: a review of the literature. Drugs. 2013;73(7):651–72.
32. Prinsen CAC, Vohra S, Rose MR, Al E. How to select outcome measurement instruments for outcomes included in a “core outcome set”: a practical guideline. Trials. 2016;17(1):1499–58.
33. Yang Z, Zhu Z, Wen H, et al. Psychometric properties of self-reported measures of health-related quality of life in people living with HIV: a systematic review protocol. JBI Evid Synth. 2021;19(10):2829–38.
34. Stasinopoulu PG, Tzavara C, Dimitrakaki C, et al. Reliability and validity of the Greek translation of the MOS-HIV health survey in HIV-infected individuals. Qual Life Res. 2010;19(2):199–205.
35. Hughes TE, Kaplan RM, Coons SJ, Draugalis JR, Johnson JA, Patterson TL. Construct validities of the quality of well-being scale and the
36. Lau JT, Tsui HY, Patrick LC, Rita CW, Molassiotis A. Validation of a Chinese version of the Medical Outcomes Study HIV Health Survey (MOS-HIV) among Chinese people living with HIV/AIDS in Hong Kong. Qual Life Res. 2006;15(6):1079–89.

37. Liu J, Zhu Y, Qu B. Reliability and validity of the Chinese version of the Medical Outcomes Study HIV Health Survey (MOS-HIV) in people living with HIV/AIDS (PLWHA) in China. PLoS ONE. 2018;13(7):e0201177.

38. Dong XJ, Lou LQ, Chen L, et al. Reliability and validity analysis of Chinese version of MOS-HIV scale. China Health Stat. 2015;32(4):619–620623.

39. Yang F, Liu Q, Jia WD, et al. Reliability and validity of MOS-HIV scale. China Public Health. 2007;23(8):981–2.

40. Yu D, Liu M, Ming QZ. Translation and revision of simplified Chinese version of MOS-HIV scale and evaluation of its reliability and validity. AIDS STD China. 2008;14(5):454–6.

41. Mast TC, Chapman CA, Chan SP, et al. Validation of the Medical Outcomes Study HIV Health Survey as a measure of quality of life in HIV-infected patients in Singapore. Int J STD AIDS. 2002;13(7):456–61.

42. Schifano P, Borgia P, Wu AW, Spadea T, Milanes G, Perucci CA. Validity and reliability of the Italian translation of the MOS-HIV health survey in persons with AIDS. Qual Life Res. 2003;12(8):1137–46.

43. Shim EI, Ha H, Lee SH, et al. Psychometric properties of the Korean version of the medical outcomes study HIV health survey: results from a multicenter survey in Korea. Health Qual Life Outcomes. 2018;16(1):92.

44. Stangl AL, Bunnell R, Wamai N, Masaba H, Mermin J. Measuring quality of life in rural Uganda: reliability and validity of summary scores from the medical outcomes study HIV health survey (MOS-HIV). Qual Life Res. 2012;21(9):1655–63.

45. Taylor TN, Dolezal C, Tross S, Holmes WC. Reliability and validity of two HIV/AIDS-specific quality of life instruments adapted for use in HIV-positive Zimbabweans. AIDS Care. 2009;21(5):598–607.

46. Reychler G, Caty G, Vincent A, Billo S, Yombi JC. Validation of the French version of the World Health Organization quality of life instrument. PLoS ONE. 2013;8(9):e73180.

47. Barcena F, Cafaro L, Abrescia N, et al. Quality of life assessment in HIV-infected patients living with HIV/AIDS in Hong Kong. Qual Life Res. 2006;15(6):1079–89.

48. Dong XJ, Lou LQ, Chen L, et al. Reliability and validity analysis of Chinese version of MOS-HIV scale. China Health Stat. 2015;32(4):619–620623.

49. Yang F, Liu Q, Jia WD, et al. Reliability and validity of MOS-HIV scale. China Public Health. 2007;23(8):981–2.

50. Yu D, Liu M, Ming QZ. Translation and revision of simplified Chinese version of MOS-HIV scale and evaluation of its reliability and validity. AIDS STD China. 2008;14(5):454–6.

51. Mast TC, Chapman CA, Chan SP, et al. Validation of the Medical Outcomes Study HIV Health Survey as a measure of quality of life in HIV-infected patients in Singapore. Int J STD AIDS. 2002;13(7):456–61.

52. Schifano P, Borgia P, Wu AW, Spadea T, Milanes G, Perucci CA. Validity and reliability of the Italian translation of the MOS-HIV health survey in persons with AIDS. Qual Life Res. 2003;12(8):1137–46.

53. Shim EI, Ha H, Lee SH, et al. Psychometric properties of the Korean version of the medical outcomes study HIV health survey: results from a multicenter survey in Korea. Health Qual Life Outcomes. 2018;16(1):92.

54. Stangl AL, Bunnell R, Wamai N, Masaba H, Mermin J. Measuring quality of life in rural Uganda: reliability and validity of summary scores from the medical outcomes study HIV health survey (MOS-HIV). Qual Life Res. 2012;21(9):1655–63.

55. Taylor TN, Dolezal C, Tross S, Holmes WC. Reliability and validity of two HIV/AIDS-specific quality of life instruments adapted for use in HIV-positive Zimbabweans. AIDS Care. 2009;21(5):598–607.

56. Reychler G, Caty G, Vincent A, Billo S, Yombi JC. Validation of the French version of the World Health Organization quality of life instrument. PLoS ONE. 2013;8(9):e73180.

57. Barcena F, Cafaro L, Abrescia N, et al. Quality of life assessment in HIV-infected patients living with HIV/AIDS in Hong Kong. Qual Life Res. 2006;15(6):1079–89.
80. Meng YJ, Li NX, Chen JH, Song YC, Qian ZH. Development of a quality of life measure specific for Chinese people living with HIV/AIDS. China Epidemiol. 2007;28(1):1081–4.
81. Su FJ. Development of quality of life scale for HIV/AIDS patients. Henan: Henan College of Traditional Chinese Medicine. 2007.
82. Guo XX, Zhang ML, Xu LR, et al. Preliminary development of HIV/AIDS quality of life scale. In: International symposium on prevention and treatment of AIDS. Chinese society of traditional Chinese medicine. 2007.
83. Davis EA, Pathak DS. Psychometric evaluation of four HIV disease-specific quality-of-life instruments. Ann Pharmacother. 2001;35(5):546–52.
84. Carabin H, Sonleitner NK, Keesee M, Shinault K. Quality of life measurement tools for people living with HIV/AIDS. J HIV/AIDS Soc Serv. 2008;7(1):71–83.
85. Skevington SM, Carse MS, Williams A. Validation of the WHOQOL-100. pain management improves quality of life for chronic pain patients. Clin J Pain. 2001;17(3):264–75.
86. Abbasi-Ghahramanloo A, Soltani-Kermanshahi M, Mansori K, et al. Comparison of SF-36 and WHOQOL-BREF in measuring quality of life in patients with type 2 diabetes. Int J Gen Med. 2020;13:497–506.
87. O’Brien N, Chi YL, Krause KR. Measuring Health outcomes in HIV: time to bring in the patient experience. Ann Glob Health. 2021;87(1):2.
88. von Steinbuechel N, Covic A, Polinder S, et al. Assessment of health-related quality of life after TBI: comparison of a disease-specific (QOLIBRI) with a generic (SF-36) instrument. Behav Neurol. 2016;2016:7928014.
89. Pequeno NP, de Araújo Cabral NL, Marchioni DM, Lima SC, de Oliveira LC. Quality of life assessment instruments for adults: a systematic review of population-based studies. Health Qual Life Outcomes. 2020;18(1):1–3.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.