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REVIEW

Patient-reported factors influencing the treatment decision-making process of older women with non-metastatic breast cancer: a systematic review of qualitative evidence

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Abstract

Purpose Older women (≥ 70 years old) with breast cancer undergo different treatments than young women. Studies have examined factors that influence this disparity, but synthesized patient-reported data are lacking in the literature. This study aims to identify, appraise, and synthesize the existing qualitative evidence on patient-reported factors influencing older women's decision to accept or decline breast cancer treatment.

Methods A systematic review was performed in accordance with Preferred Reporting Items for Systematic Review and Meta-analysis Protocols (PRISMA) principles. Medline, Embase, CINAHL, and PsycINFO were searched for qualitative studies describing patient-reported factors influencing the decision-making process of older women (≥ 70 years old) with non-metastatic invasive breast cancer. Quality was assessed using the Standards for Reporting Qualitative Research (SRQR) criteria. Common ideas were coded, thematically organized, and synthesized within a theoretical framework.

Results Of 5998 studies identified, 10 met eligibility criteria. The median SRQR total score was 13.04 (IQR 12.84–13.81). The studies represented a range of cancer treatments; most of the studies focused on surgery and primary endocrine therapy. Our data show that the most common patient-reported factors in the decision-making process included treatment characteristics, personal goals/beliefs, patient characteristics, physician's recommendation, and personal/family experience. These factors led the patient to either accept or decline treatment, and were not consistent across all studies included. Studies used different interview guides, which may have affected these results.

Conclusions This systematic review highlights the complexity of factors that influence an older woman's treatment decision-making process. Acknowledging and addressing these factors may improve discussions about treatment choices between older women and their health care providers, and encourage maximization of a patient-centered approach.

Keywords Breast cancer · Treatment · Clinical decision making · Aged · Older women

Abbreviations

ENTREQ	Enhancing Transparency in Reporting the Synthesis of Qualitative Research
HCP	Health care professionals
HT	Hormone therapy
PET	Primary endocrine therapy
PICOS	Population, Intervention, Comparison, Outcome, and Study type
PRISMA	Preferred Reporting Items for Systematic Review and Meta-analysis Protocols
RT	Radiation therapy
SRQR	Standards for Reporting Qualitative Research

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Introduction

Older women (≥ 70 years old) experience higher breast cancer incidence than young women [1]. Approximately 40% of cases are diagnosed in older women [2]. Moreover, with the 5-year survival rate at > 80% and the 20-year survival rate at > 60% [3], there are increasing numbers of women

who are breast cancer survivors. Consequently, the number of older women living with newly diagnosed tumors and a long-term risk of breast cancer recurrence will increase as the population continues to age.

Breast cancer in older women typically presents with favorable histology (e.g., low-grade and hormone-sensitivity), but larger size and more frequent lymph node involvement [4]. Age-related biological changes of the breast, such as increased estrogen sensitivity, epithelial cell alterations, immune senescence, and tumor microenvironment modifications are postulated contributors [4].

Several studies demonstrate substantial differences in treatment of older women with breast cancer compared to young women [5]. They are less likely to undergo curative surgery, chemotherapy, radiation therapy (RT), and breast reconstruction, while more likely to receive primary endocrine therapy (PET) [5–10]. Whether these approaches are adequate is yet to be determined, as current clinical practice is based on level 1 evidence from clinical trials in which older women were often excluded [11, 12]. Instead, cohort studies have been the main source of data for treatment-related outcomes in older women [7, 13, 14].

Treatment decision-making in older women with breast cancer is challenging, as this group is heterogeneous. While some patients are functional, independent, and healthy, many frequently have concomitant comorbidities, baseline cognitive impairment, compromised mobility, decreased functional capacity, sensory deficits, and reduced physiological reserve [15, 16]. Therefore, competing mortality risk from causes other than breast cancer increases with age and treatment approaches for breast cancer are often correspondingly tailored [17]. Management decisions are further complicated by the varying social support systems, lack of independence, and social isolation that afflicts some of these women and can hinder postoperative care, compliance with medication and appointments, and mobilization to treatment sessions. Additionally, older women have different priorities than young women, and they may be less willing to sacrifice quality of life for survival prolongation [18].

To understand the treatment decision-making process, researchers have studied patient, physician, and system factors. Both increasing age [19–21] and concurrent comorbidities [19, 20, 22] have classically proven to be strong determinants of the breast cancer treatment older women receive. Other modifiers include race [23, 24] and physical functioning [25]. Treatment also appears to be influenced by physician characteristics, namely, specialty, gender, type of medical degree, country of training, and practice volume [25–27]. System-related factors include distance to nearest RT facility, size of the metropolitan area, and the availability of RT and geriatric supports [28, 29].

Quantitative studies cannot comprehensively describe why patients make treatment choices. To that extent, a growing body of qualitative research has focused on understanding this phenomenon through patient-reported studies [30]. However, systematically synthesized data are limited [31, 32]. Understanding these factors is clinically relevant to health care professionals (HCP) as it can help individualize the discussion with patients, enhance treatment adherence, tailor educational strategies, reduce misinformation, and improve outcomes and patient satisfaction. Therefore, we conducted a systematic review to identify, appraise, and synthesize the existing qualitative evidence on patient-reported factors influencing older women's decision to accept or decline breast cancer treatment.

Methods

Approach

A systematic review was performed in accordance with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) [33] and the Preferred Reporting Items for Systematic Review and Meta-analysis Protocols (PRISMA) [34] guidelines for reporting systematic reviews.

There is no consensus on what categorically defines "older" women. We set the age threshold at 70 years, as proposed by the Breast International Group [35]. Patient-reported factors are patient-reported outcome and experience measures that are defined as any aspect of a patient's health status that comes directly from the patient [36].

Article search

Articles were identified using an electronical search in Medline, Embase, CINAHL, and PsycINFO (1/1/2000–1/1/2017). Studies prior to 2000 were excluded because the aim was to focus on current breast cancer treatment practices in a contemporary population. A comprehensive search strategy was devised in consultation with a medical librarian. Each database was systematically searched using keyword descriptors and database subject headings used to index and catalog biomedical information (Appendix 1). Screening of references from included articles and relevant existing reviews was performed.

Selection of studies

One reviewer (FAA) independently screened the titles and abstracts. After removing duplications, full texts of potential studies were then screened. If a final decision could not be made from the title and abstract, the full text was analyzed.

Eligibility criteria

The Population, Intervention, Comparison, Outcome, and Study type (PICOS) framework was used to develop eligibility criteria [37]. Eligibility criteria were as follows: (1) female patients aged ≥ 70 years old diagnosed with first clinically non-metastatic invasive breast cancer who were considering or had considered or completed surgery, chemotherapy, RT, hormone therapy (HT), and/or breast reconstruction; (2) patient-reported factors that influenced treatment decision-making; (3) primary qualitative methodology or mixed methods studies that reported qualitative findings; and (4) studies published in English peer-reviewed journals. We excluded narrative and systematic reviews, meta-analyses, protocols, abstracts, conference proceedings, editorials, and expert opinion papers, as well as studies solely focusing on care-givers, partners, and/or family members. If a study involved other age groups or patients with other cancer stages (in situ or metastatic), the study was included, provided it contained a subgroup analysis for the population of intereset.

Data extraction

Reviewers were not blinded to author or publication source. One reviewer (FAA) independently reviewed selected studies and performed abstraction of the following data: study characteristics, participant characteristics, information that provided context where the study was conducted (e.g., country and clinical setting), and all patient-reported factors related to decision-making. If any aspect of the study design was unclear, the authors of the study were contacted. If two articles represented the same study cohort, the most current article or the one that most comprehensively assessed the outcomes of interest was used.

Quality assessment

To determine the quality of the individual studies, two reviewers (FAA and ME) independently scored studies using the Standards for Reporting Qualitative Research (SRQR) tool, which was developed as a framework for reporting qualitative research while preserving the flexibility to accommodate various paradigms, approaches, and methods [38]. The SRQR scoring system consists of 21 items and associated sub-items, each selected through a rigorous peer-reviewed synthesis of prior recommendations and concepts from published sources. For each sub-item, the answer categories were 'yes' (if they met the criteria), 'no' (if they did not meet the criteria), or 'unclear' (if it was unclear whether they met the criteria) followed by comments. Each of the 21 quality items was scored based on the presence and quality of sub-item criteria and given an individual score of up to 1.0. Scores were summed, with a maximum score of 21 points. Scores were averaged over both reviewers. Study quality was rated as 'high' (score = 16–21), 'medium' (score = 11–15), or 'low' (score = < 11).

Data synthesis and analysis

Two authors (FAA and NLH) iteratively analyzed the studies and discussed the similarities and differences between them. Thematic synthesis as described by Thomas and Harden [39] was performed. Thematic synthesis is a transparent method for integrating qualitative evidence in a systematic review that has been used to assess various behaviors [40–42]. The synthesis involves three stages: (1) free line-by-line coding; (2) grouping of the codes into descriptive themes; and (3) the formation of analytical conceptual ideas. The synthesis was conducted by one researcher (FAA) and checked by a second independent reviewer with experience in thematic analysis (NLH).

Results

Study selection

A total of 5998 studies were identified through database searching and an additional 2 articles by cross-referencing (Fig. 1). After removing duplicates, 3812 articles remained of which 3750 failed to meet inclusion criteria based on title and abstract alone. Sixty-two articles were assessed for eligibility by review of the full text. After excluding 52 studies, 10 studies [43–52] remained for analysis. Study characteristics are summarized in Table 1.

Study quality

The comprehensiveness of reporting was variable (Table 2 and Appendix 2). Nine studies were missing general items in the SRQR checklist. The quality of all the studies was medium with a median SRQR total score of 13.04 (IQR 12.84–13.81).

Participant characteristics

Median study sample size was 28 patients (range: 16–58, total: 288). Patients' age ranged from 79 to 99. Study populations were heterogeneous. The percentage of married women ranged from 37.5 to 38.6% [43–45, 47, 48]. One study [47] reported data on patients' domestic situation, showing that the majority (72.2%) lived with someone. Comorbidity details were reported in four studies [43–45, 47] with 23.8–83.3% of women reporting a comorbidity. Race was collected in four studies [43, 44, 47, 48] of which Caucasian

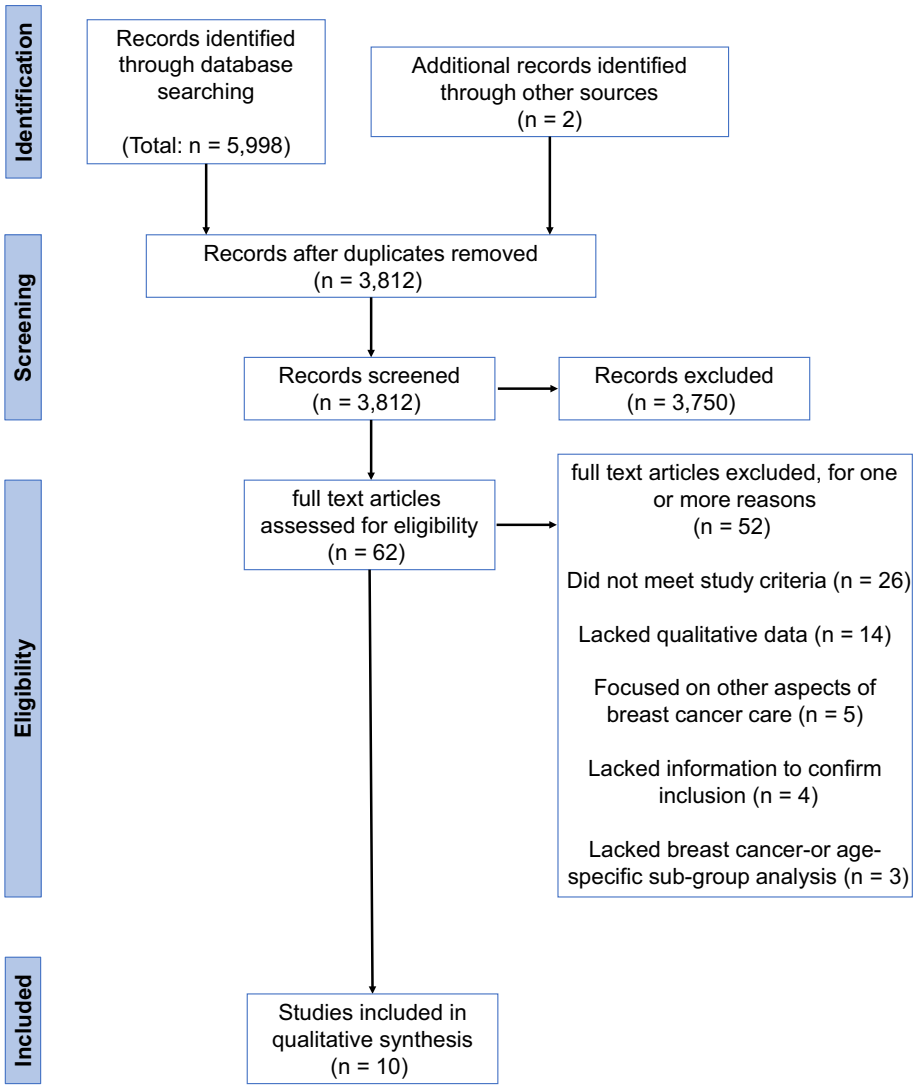

Fig. 1 PRISMA flow diagram of the systematic review

was the most common (61–100%). Highest degree obtained was collected in three studies [43, 44, 48], with most patients having education greater than high school (55.2%-100%).

Four studies [43, 45, 47, 48] explicitly recruited patients with stage 1–3 breast cancer. Only one study provided detailed information about tumor size with the majority (48.3%) being T2 [48]. Three studies [46, 49, 51] provided details on hormone receptor status with the majority being positive (55.2%-100%). Of note, some studies used this as an inclusion criterion.

Treatment characteristics

All studies retrospectively interviewed women who had already been counseled regarding breast cancer treatment and had either decided or completed their treatment. One study did not report if patients had completed treatment [46] while in the remaining nine studies participants had already received treatment [43–45, 47–52]. Four studies reported on women who either underwent surgery or PET [43, 49–51]; two studies described women who completed some form of breast cancer treatment [44, 47]; one study described women who completed RT [45]; one study explored participants who had surgery and were offered adjuvant chemotherapy [48]; and one study described women who declined surgery and were on PET [52].

Treatment decision-making styles

Three types of decision-making styles were described: (1) physician-based [43, 48, 49, 51, 52]; (2) patient-based [43, 47–50, 52]; and (3) shared [48, 49, 51]. Women who preferred the physician-based style feared making the 'wrong' decision and felt that treatment should be decided by the doctors who had specialist knowledge of breast cancer [43, 48, 49]. Women who made their own decisions felt satisfied with their choices [43, 47, 49, 50], confident to complete the task [47, 50], and support from their physicians throughout

Table 1 Study characteristics

First author (year of publication) [Reference]	Country	Study period	Study aim	Sample size	Study population	Age (years old), median (range)	Treatment details	Number of centers	Source of recruitment	Data collection	Data analysis
Husain (2008) [43]	UK	N.S	To identify the factors that influenced older women's treatment choice, the attitudes of older women to PET and surgery; and the experiences of older women having undergone treatment with PET or surgery	21	Women > 70 years old diagnosed within previous 15 years with primary operable breast cancer stage 1 or 2	78 (71–90)	Surgery ($n=8$ mastectomy and ALND, $n=1$ WLE and ALND) and PET ($n=12$)	Single	Teaching hospital	In-depth interview	Framework analysis
Pieters (2011) [44]	USA	N.S	To describe the experiences of older women regarding barriers to care for breast cancer in their prediagnostic period and throughout their diagnoses, treatments, and beyond	18	Women > 70 years old who had completed treatment for primary breast cancer within the prior 3–15 months	76 (70–94)	N.S	Multiple	Health care center	Interview	Grounded theory analysis

Table 1 (continued)

First author (year of publication) [Reference]	Country	Study period	Study aim	Sample size	Study population	Age (years old), median (range)	Treatment details	Number of centers	Source of recruitment	Data collection	Data analysis
Wong (2011) [45]	Canada	March–May 2009	To investigate the information needs of women 70 years and older with early-stage breast cancer in relation to adjuvant treatment post lumpectomy	16	Women > 70 years old with stage 1 ER/PR-positive invasive breast cancer who completed RT	76 (70–84)	N.S	Single	Academic cancer center	Focus group and individual interview	N.S
Fenlon (2012) [46]	UK	2008–2009	To explore older women's experience of living with breast cancer alongside other health conditions, and to identify their information and support needs and preferences	28	Women > 70 years old with breast cancer	N.S. (70–90)	N.S	Multiple	City-wide	Focus group and individual interview	Thematic analysis

Table 1 (continued)

First author (year of publication) [Reference]	Country	Study period	Study aim	Sample size	Study population	Age (years old), median (range)	Treatment details	Number of centers	Source of recruitment	Data collection	Data analysis
Pieters (2012) [47]	USA	N.S	To understand how women 70 years and older who recently had recently undergone treatment for early-stage breast cancer experienced treatment decision-making	18	Women > 70 years old with stage 1–3 who completed treatment for primary breast cancer within 3–15 months	N.S. (70–94)	N.S	Multiple	Health care centers and private oncologists' office	Individual interview	Constructivist grounded theory
Harder (2013) [48]	UK	N.S	To explore the attitudes to adjuvant chemotherapy of the women who were offered chemotherapy, their experiences with information provision, and factors that influenced their treatment choice	58	Women > 70 years old with newly diagnosed stage 1–3 breast cancer who were offered adjuvant chemotherapy	73 (70–83)	Surgery ($n = 55$) and adjuvant chemotherapy (accepted $n = 38$, declined $n = 16$, had not decided $n = 4$)	Multiple	Health care centers and breast units	Individual interview	Thematic analysis

Table 1 (continued)

First author (year of publication) [Reference]	Country	Study period	Study aim	Sample size	Study population	Age (years old), median (range)	Treatment details	Number of centers	Source of recruitment	Data collection	Data analysis
Burton (2015) [49]	UK	April–December 2013	To determine the information needs and preferences for elderly women relating to the choice between surgery and PET	33	Women > 75 years old diagnosed with invasive breast cancer in the preceding 60 m and offered an initial treatment choice between PET and surgery	82 (75–95)	Surgery ($n=9$ mastectomy and $n=2$ WLE) and PET ($n=22$)	Multiple	Hospitals	Individual interview	Framework analysis
Lifford (2015) [50]	UK	N.S	To gain insight into decision-making and coping processes in a group of older women who have faced breast cancer treatment decisions	35	Women > 75 years old diagnosed with ER + breast cancer in the last 5 year who had been offered a choice of PET or surgery with HT	83 (75–98)	Surgery ($n=12$) and PET ($n=23$)	Multiple	Hospitals and breast units	Individual interview	Framework analysis

Table 1 (continued)

First author (year of publication) [Reference]	Country	Study period	Study aim	Sample size	Study population	Age (years old), median (range)	Treatment details	Number of centers	Source of recruitment	Data collection	Data analysis
Morgan (2015) [51]	UK	April–December 2013	To explore the interaction between HCPs and older patients in the DM process, as well as the concordance between HCP and patient views regarding the process of DM about treatment of operable breast cancer	33	Women > 75 years old with operable breast cancer, diagnosed within 5y and who were offered a choice of either surgery or PET at initial diagnosis	83 (75–94)	Surgery ($n=11$) and PET ($n=22$)	Multiple	Breast unit	Individual interview	Framework analysis
Sowerbutts (2015) [52]	UK	N.S	To study explores reasons why older women are not having surgery for breast cancer	28	Women > 70 years old with operable breast cancer	N.S. (76–99)	N.S	Multiple	Breast unit	Individual interview	Framework analysis

ALND axillary lymph node dissection, *ER* estrogen receptor, *HCP* health care provides, *HT* hormone therapy, *N.S.* not specified, *PET* primary endocrine therapy, *PR* progesterone receptor, *RT* radiation therapy, *WLE* wire localized excision

Table 2 Quality assessment using the Standards for Reporting Qualitative Research (SRQR) tool

Item, mean score[a]	Husain (2008) [43]	Pieters (2011) [44]	Wong (2011) [45]	Fenlon (2012) [46]	Pieters (2012) [47]	Harder (2013) [48]	Burton (2015) [49]	Lifford (2015) [50]	Morgan (2015) [51]	Sowerbutts (2015) [52]	Overall, median (IQR)
Item 1: Title	0.83	0.58	0.42	0.42	0.50	0.58	1.0	0.50	0.42	0.88	0.54 (0.42–0.84)
Item 2: Abstract	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0 (1.0–1.0)
Item 3: Problem formulation	0.88	1.0	1.0	1.0	1.0	0.88	1.0	1.0	1.0	1.0	1.0 (0.97–1.0)
Item 4: Purpose or research question	1.0	1.0	1.0	1.0	0.75	1.0	1.0	1.0	1.0	0.63	1.0 (0.93–1.0)
Item 5: Quality approach and research paradigm	0.42	0.75	0.08	0.21	0.38	0.08	0.08	0.0	0.40	0.13	0.17 (0.08–0.40)
Item 6: Researcher characteristics and reflexivity	0.0	0.03	0.13	0.13	0.25	0.0	0.06	0.13	0.16	0.0	0.09 (0.0–0.137)
Item 7: Context	0.50	0.50	0.83	0.66	0.42	0.17	0.17	0.17	0.17	0.83	0.46 (0.17–0.70)
Item 8: Sampling strategy	0.50	0.50	0.88	0.50	0.75	0.50	0.63	0.50	0.38	0.50	0.50 (0.50–0.66)
Item 9: Ethical issues pertaining to human subjects	0.70	0.80	0.60	0.80	0.80	0.70	0.70	0.70	0.70	0.50	0.70 (0.67–0.80)
Item 10: Data collection methods	0.41	0.41	0.46	0.41	0.42	0.41	0.41	0.50	0.75	0.33	0.41 (0.41–0.47)
Item 11: Data collection instruments and technologies	0.83	0.83	0.66	0.83	0.66	0.50	0.83	0.83	0.83	0.67	0.83 (0.66–0.83)
Item 12: Units of study	0.88	0.88	1.0	0.88	0.88	0.88	0.63	0.75	0.67	0.75	0.88 (0.73–0.88)
Item 13: Data processing	0.41	0.41	0.41	0.25	0.63	0.33	0.16	0.50	0.33	0.50	0.41 (0.31–0.50)
Item 14: Data analysis	0.90	0.80	0.37	0.47	0.90	0.47	0.63	0.67	0.63	0.65	0.64 (0.47–0.82)
Item 15: Techniques to enhance trustworthiness	0.50	0.50	0.50	0.25	0.50	0.50	0.25	0.75	0.50	0.63	0.50 (0.44–0.53)
Item 16: Synthesis and interpretation	0.50	0.50	0.50	0.50	0.88	0.50	0.50	0.50	0.50	0.50	0.50 (0.50–0.50)
Item 17: Links to empirical data	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0 (1.0–1.0)
Item 18: Integration with prior work and contributions to the field	0.75	1.0	0.88	0.88	1.0	0.88	0.88	0.75	0.88	0.75	0.88 (0.75–0.91)
Item 19: Limitations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.50	1.0	1.0	1.0 (1.0–1.0)
Item 20: Conflict of interest	0.0	0.0	0.0	0.75	0.0	0.5	0.0	0.75	0.0	0.75	0.0 (0.0–0.75)
Item 21: Funding	0.0	0.50	0.0	0.50	0.50	1.0	0.0	0.50	0.75	0.75	0.50 (0.0–0.75)
Total	13.01	13.99	12.72	13.44	14.22	12.88	11.93	13.00	13.07	13.75	13.04 (12.84–13.81)

[a]Score ranges from 0.0 to 1.0

the process [47, 52]. One study described how the level of participation in decision-making was associated with treatment decision [48]. Patients who preferred a physician-based style were more likely to initiate chemotherapy while women who preferred patient-based or shared decision-making styles declined treatment. Additionally, those who followed the doctor's recommendation often chose to learn very little about alternative options, highlighting the trust they put in their health care team [50].

Patient-reported factors that influence decision-making

Table 3 shows patient-reported factors that influence decision-making along with selected participant quotations. Analytical themes and the conceptual links are provided in Fig. 2.

Patient-reported factors for accepting treatment were as follows: (1) to leave more radical options as a final option, as in the case of women who chose PET over surgery because it left them with additional options should PET be unsuccessful [43, 49, 50, 52]; (2) to avoid other treatments, as in the case of women who chose mastectomy instead of breast-conserving surgery to avoid RT [49, 50, 52]; (3) ease of compliance with treatment as in the case of PET, which would have minimal disturbance in their lives [43, 49]; (4) desire to get rid of tumor, which was particularly noted in the surgery patients who wanted to fully remove the tumor as quickly as possible [49, 50]; (5) previous positive family experience [47, 51]; (6) to prolong their life [48]; (7) motivation from family [48]; (8) physician's recommendation [48] ; (9) fear of recurrence [48]; and (10) preserve ideal body image as in the case of breast reconstruction [46].

Patient-reported factors to decline treatment included the following: (1) prior family experience [43, 44, 46, 50, 52]; (2) perception of being a burden on others because they lack social support or desire to retain their current level of independence [45, 48, 49, 52]; (3) clinical comorbidities, that would increase the risk of adverse effects and/or limit their ability to access care as in the case of RT [44, 46, 52]; (4) impact on quality of life, as patients prioritized this over quantity [48, 50, 51]; (5) fear of surgery and/or anesthesia [49, 50, 52]; (6) prior negative personal experiences [43, 51]; (7) impact on body image, in particular disfigurement and hair thinning/loss [43, 50]; (8) duration of treatment, particularly for adjuvant treatment [48, 52]; (9) lack of survival benefit as women believed they had a limited life span and did not want to live longer [48, 52]; (10) complexity of care particularly for women who are caretakers of frail husbands or rely on others to get to appointments [44]; (11) desire to not undergo further treatment, particularly for women offered breast reconstruction [46]; (12) after-effects of surgery, such as dealing with bandages [52]; and (13) lack of worrying about new body such as in the case of women offered breast reconstruction [46].

Chronologic and biologic age both played a role in decision-making, as women believed they were too old for treatment and recognized they had more comorbidities, shorter life span, and decreased mental and physical capacities [43, 46, 48, 51, 52]. One study reported that women felt there was a lack of discussion of breast reconstruction due to their age [46].

Discussion

This systematic review is the first to solely focus on patient-reported factors that influence older women with breast cancer to accept or decline treatment. The reviewed studies represented a diverse range of cancer treatments; however, most focused on surgery and PET. The most common patient-reported factors included individual goals/beliefs, physician's recommendations, age and comorbidities, treatment characteristics, and family members' experience. Individual study questions, and associated factors associated with treatment decision-making, were heterogenous. Interaction of these factors is illustrated in Fig. 2.

Personal goals and beliefs influenced women to accept or decline treatment. The view of some older women towards their cancer was of fear for spread or recurrence [48–50]. This is a concern and cause of significant psychological stress [53] for many women with breast cancer [53, 54]. Research has found older patients who are anxious or want to prolong their life want treatment [55, 56]. In contrast, desire to maintain independence is a strong motivator for women to decline treatment [57]. Generally, women who express this belief led active lives prior to diagnosis [43, 58].

Older women are concerned about their body image. Women decline surgery and chemotherapy because it changes their body image [43–50]. They fear how treatment will lead to disfigurement [46, 59], which appears to be the same fear of young women. Studies comparing this fear between both age groups is lacking. Older women are concerned that breast cancer can change the way they view their bodies and how partners view them as well [46, 59]. These changes can lead to problems in their relationships, some even reporting a change in their sexual relationships [46, 59, 60]. It should not be surprising that older women have these issues as many of them continue to be in relationships at this age. Interestingly, only one study discussed breast reconstruction in older women [46]. Although many older women did not want breast reconstruction, there was a perception that it had not been offered because of their age [46]. The reluctance to discuss breast reconstruction may derive from surgeons' judgments of operative risk, the unfounded belief that reconstruction is unnecessary in

Table 3 Patient-reported factors influencing the treatment decision-making process of older women with breast cancer

Patient-reported factor	Illustrative quote (age) [Reference]	Contributing studies
Accept Treatment		
Motivation from family	"Because people depend on me." (72 years old) [48]	[48]
Physician's recommendation	"The doctor suggested it and I agreed. It is a lifeline […]" (70 years old) [48]	[43, 48]
To prolong life	"I'm quite active […] want to get on with a few more years of life." (80 years old) [48]	[48]
Getting rid of tumor	"…straight away I just said 'take it off' and I meant take the lot off … they gave me a choice of treatments, and I said 'just take it off, cut it out'." (84 years old) [50]	[49, 50]
Fear of recurrence	"To help to make [sure] it's all gone […] prevent it from coming back again." (76 years old) [48]	[48]
Prior positive family experience	"Do what you've got to do, "we lost a daughter-in-law with breast cancer, she was only 26, and that's 30 years ago[…]. Cancer is the most frightening word." (82 years old) [51]	[47, 51]
Preserve ideal body image	"I mean if I was the sort of person who just sat around and wore high neck sweaters I really wouldn't worry about clothes and things, but I do, and I'm not giving up yet…I mean really, I'm 80 but […] this is me and my life and the way we live it. I didn't want it to change." (N.A.) [46]	[46]
Avoid other treatments	'Right, I said, 'let' s get rid of it, at my age,' so I went for a full [mastectomy]. "But if I [h]adn't have had a [mastectomy] I'd have to have had radiotherapy […]." (75 years old) [49]	[49, 50, 52]
Leave more radical options for last	"I'd say well if I had a choice I'd rather try a tablet first and then if nothing, if it wasn't successful then I would have surgery." (N.A.) [50]	[43, 49, 50, 52]
Ease	"Are they (the tablets) any trouble to take? Oh no." (78 years old) [43]	[43, 49]
Decline treatment		
Prior personal experience	N.A	[43, 51]
Impact on body image	"I thought; my clothes, you know, will they look awful." (74 years old) [43]	[43, 50]
Duration of treatment	"It's not the surgery I was keen to avoid, it's the two or three times a week treatment that you have to endure." (85 years old) [52]	[48, 52]
Fear of surgery and/or anesthesia	N.A	[49, 50, 52]
Lack of survival benefit	"Something's going to get you. So what is the good of prolonging it when you get to this age?" (83 years old) [52]	[48, 52]
Prior negative family experience	"My daughter died when she was 37 of breast cancer and she had a miserable 2 years following the diagnosis with various operations and radiotherapy and then finally chemotherapy […]. I felt that all that she had done did no good." (90 years old) [43]	[43, 44, 46, 50, 52]
Complexity of care	"The thing when you're over seventy, and you have something like the cancer happen, one of the worst things, which has nothing to do with the cancer, is the logistics of you getting in the positions they want you to, climbing up on tables and […] turning here and turning there. When you're old, that isn't easy. You don't bend like other people, like when you're younger. That's the very reason I didn't take radiation, because it's a 5-day, 6-week thing. That is wear and tear on me and I probably would collapse at the end of the week." (N.A.) [44]	[44]
Desire to not undergo further treatment	N.A	[46]
After effects of surgery	N.A	[52]
Lack of worrying about new body	N.A	[46]
Complex clinical comorbidities	"I could not have [general anaesthetic] because it affects my heart, you see." (89 years old) [52]	[44, 46, 52]
Impact on quality of life	"[…]I said, 'I don't want to live any longer, but I do want to stay in my own house as long as I possibly can'[…] what I insisted on was, trying to give me the best quality of life they could give me […]." (85 years old) [50]	[48, 50, 51]
Dependence on others	"I live on my own, sons live away, not very close if I needed them." (71 years old) [48]	[45, 48, 49, 52]
Age	"Well I am too old, 91 to go to a big operation like that." (91 years old) [51]	[43, 46, 48, 51, 52]

N.A none available

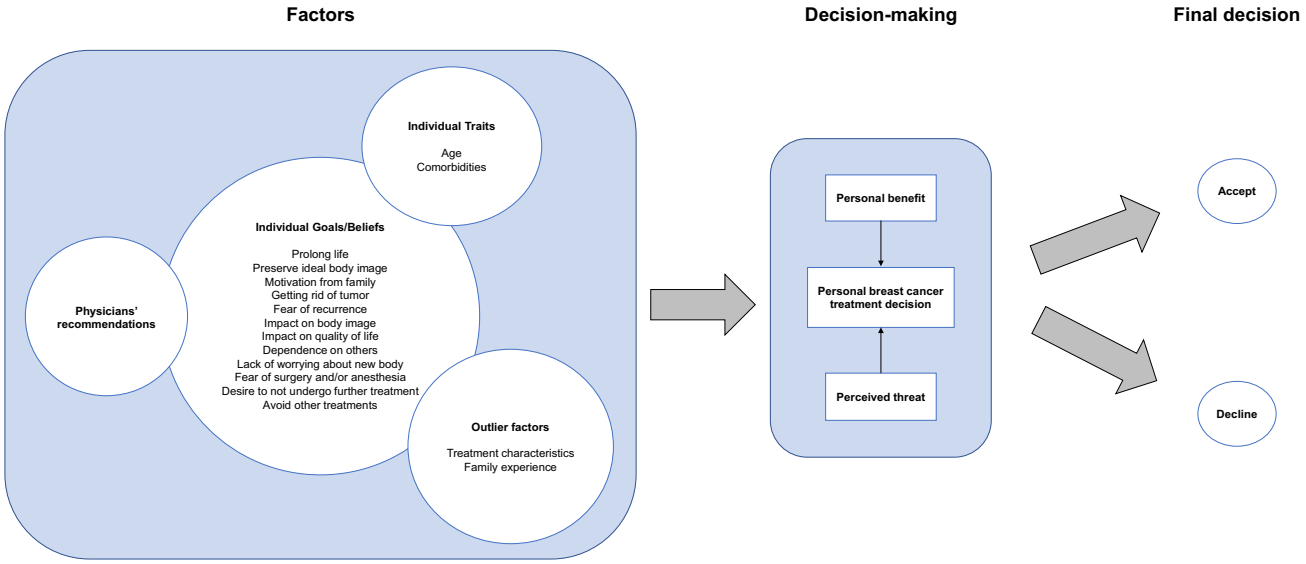

Fig. 2 Overview of analytical conceptual ideas from thematic synthesis

the older, and patient concerns about operative complications [61]. As data continue to emerge showing advanced age is not a predictor for complication rates after immediate breast reconstruction [8, 62, 63], surgeons will become better equipped to counsel and inform patients regarding the true risks of breast reconstruction.

Our data showed that a physician's recommendation impacts older women's decision-making process. Studies show that even when a treatment choice is offered to older women with breast cancer, they are more likely to defer to their physician's advice [64, 65]. Several reasons explain why physician-based decision-making plays a large role among older women.

First, the physician's preconceived treatment choice may lead the conversation. As women age, fewer choices are provided and the way treatments are presented changes [51, 66, 67]. Second, these women state they find it difficult to make treatment decisions they know less about and prefer to defer their decisions [67, 68]. Third, this behavior can stem from diminished cognitive and intellectual capacity, poor literacy and comprehension of information, and impaired hearing and eyesight, cumulatively impacting the ability to assimilate information [69, 70]. Fourth, older women place trust in their physicians. Women trust their HCP's recommendations, which may be a product of a perceived paternalistic view of HCPs in this generation [43, 44, 46, 49, 50].

Treatment characteristics determine patients' decision-making. RT and chemotherapy require multiple hospital visits, which can be cumbersome for those who have difficulties with transportation or take care of other family members. Appointments involve waiting, which can be challenging for older women who do not have their own transportation and are reluctant to trouble family members [38, 71]. Treatments such as PET offer women a sense of control. The presence of the lump can serve as a self-monitoring mechanism by which they can feel the mass decrease in size or remain constant, reassuring them that their cancer was under control [43]. For some, PET was their preference as a first option as it allows them to have surgery as a backup should the tumor progress [43, 52]. What is unclear is how much information these patients understood about the effectiveness of PET. A meta-analysis of patients on aromatase inhibitors or tamoxifen reported a rate of disease progression of 31% and 46%, respectively [72]. HT adherence rates are generally low among breast cancer patients and older women are not an exception. Adherence levels for tamoxifen or aromatase inhibitor decrease among these women from 67% in the first year to 30% in the fifth year [73].

Age was frequently cited as a reason to decline treatment. Interestingly, in half of the studies included, age was not mentioned by patients as a reason to affect their treatment choice [44, 45, 47, 49, 50]. Older women who decline treatment because of age tend to be older and express they have a limited life span, do not want to prolong their life either because of comorbidities or the perception of "having nothing left to do" [52, 74]. When older women view themselves at the end of their lives, they question the survival impact of surgery due to competing mortality risks [52]. Women acknowledge that age alone can drive their decision. In fact, some studies describe how women express they would have surgery if they were younger [52, 75]. Although women who decline treatment are not fatalistic and do not want an immediate death, they are not interested in prolonging their lives

if possible. These beliefs are what some authors refer to as a "sense of completeness that life has run its course" [76].

While older women frequently have other comorbidities [77], patients rarely make this the main reason to decline treatment [67]. This may be explained by the selection bias in the studies, as women with many or complex comorbidities may have already been excluded from participation. Certainly, comorbidities are important issues when deciding on treatment as they can preclude treatments altogether, increase the treatment complexity (e.g., conflicting treatments and drug interactions), or impede return to baseline function [78–80].

Experiences of family and friends proved to be important for women in this systematic review as they played a role mainly in preconceptions of treatment side effects and effectiveness. Depending on the outcome of their family member, these experiences either encouraged or discouraged patients to accept treatments. Their experiences were often far in the past but still vivid and influential. The misconceptions that may derive from these experiences are of importance because they can open the discussion to teach patient about the realities and evolution of modern breast cancer treatment.

The patient-reported factors summarized in this systematic review are important for both HCPs and patients to improve breast cancer treatment decision-making. HCP can improve their clinical practice by actively seeking information about these issues, which have shown to be frequently important to most older women with non-metastatic invasive breast cancer. HCPs should highlight how treatments will impact patient's daily activities, functional status, dependency, self-esteem, and body image. Patients can also feel unhindered to discuss certain aspects of their private life, such as fear of dependency or change in their body image, which they may think their HCPs do not think are relevant. HCPs can proactively discuss treatment options with patients and help them achieve their ideal treatment, which would maximize their personal benefit or mitigate the perceived threat to their wellbeing.

There are limitations to our study. Our findings may not reflect the experiences of a larger population as the included studies focused on women with treatable invasive breast cancer, aged 70 and older, who were assessed in Western centers, and had social support. Our findings are also limited by the methodological quality and study design of the included studies. The studies may have been affected by recall bias. The studies also omitted their interviewer topic guide; therefore, it is unclear if factors that were not reported were not important for the interviewers to ask or if patients did not talk about them despite being prompted.

Conclusion

Key factors influencing the treatment decision-making of older women with non-metastatic invasive breast cancer vary considerably. This systematic review highlights the heterogeneity of this patient population and the complexity and interaction of factors between patient and HCP. With the increasing older population, developing a comprehensive understanding of their treatment decision-making needs is important. Addressing these factors may improve discussions about treatment choices between older women and their HCP, and encourage maximization of a patient-centered approach.

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Compliance with ethical standards

Conflict of interest Fernando A. Angarita, MD, MSc declares that he has no conflict of interest. Maryam Elmi, MD, FRCS(C) declares that she has no conflict of interest. Yimeng Zhang, MD declares that she has no conflict of interest. Nicole J. Look Hong, MD, MSc, FRCS(C) declares that she has no conflict of interest.

Ethical approval This article does not contain any studies with human participants performed by any of the authors.

Appendix 1: Search strategy

- Breast neoplasms OR breast cancer.
- Aged OR frail OR old OR elderly OR geriatric OR senior OR geriatric patient.
- Patient decision making OR decision making OR patient participation OR patient preference OR patient attitude OR treatment refusal OR treatment termination OR treatment compliance OR choice behavior OR patient acceptance of health care OR decision make/making.
- Treatment OR surgery OR surgical OR drug OR medication OR chemo OR adjuvant OR neoadjuvant therapy OR therapy OR breast reconstruction.
- Refusal OR accept OR stop OR prefer OR decide OR decision.

Appendix 2: Detailed quality assessment using the Standards for Reporting Qualitative Research (SRQR) tool

Item (mean score)[a]	Hussain (2008) [43]	Pieters (2011) [44]	Wong (2011) [45]	Fenlon (2012) [46]	Pieters (2012) [47]	Harder (2013) [48]	Burton (2015) [49]	Lifford (2015) [50]	Morgan (2015) [51]	Sowerbutts (2015) [52]	Overall, median (IQR)
Item 1: Title	0.83	0.58	0.42	0.42	0.50	0.58	1.0	0.50	0.42	0.88	0.54 (0.42–0.84)
Concise description of nature and topic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Identifies study as qualitative or indicating approach or data collection method	Yes	No	No	No	No	No	Yes	No	No	Yes	
Item 2: Abstract	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0 (1.0–1.0)
Summary of key elements: background, purpose, methods, results, conclusions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Item 3: Problem formulation	0.88	1.0	1.0	1.0	1.0	0.88	1.0	1.0	1.0	1.0	1.0 (0.97–1.0)
Description of problem/phenomenon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Significance of problem/phenomenon	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Review of relevant theory and empirical work	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Problem statement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Item 4: Purpose or research question	1.0	1.0	1.0	1.0	0.75	1.0	1.0	1.0	1.0	0.63	1.0 (0.93–1.0)
Purpose of study	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Specific objectives or questions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Item 5: Quality approach and research paradigm	0.42	0.75	0.08	0.21	0.38	0.08	0.08	0.0	0.40	0.13	0.17 (0.08–0.40)
Qualitative approach	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	
Guiding theory	No	No	No	No	No	No	No	No	No	No	
Identifies the research paradigm	No	Yes	No	No	Yes	No	No	No	No	No	
Rationale for prior criteria	Yes	Yes	No	No	Yes	No	No	No	Yes	No	
Item 6: Researcher characteristics and reflexivity	0.0	0.03	0.13	0.13	0.25	0.0	0.06	0.13	0.16	0.0	0.09 (0.0–0.137)
Characteristics that may influence research	No	No	Yes	Yes	No	No	No	Yes	Yes	No	
Interaction between researcher characteristics and research methodology	No	No	No	No	No	No	No	No	No	No	
Item 7: Context	0.50	0.50	0.83	0.66	0.42	0.17	0.17	0.17	0.17	0.83	0.46 (0.17–0.70)
Setting/site	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Salient contextual factors	No	No	No	No	No	No	No	No	No	Yes	
Rationale for prior criteria	No	No	Yes	Yes	No	No	No	No	No	No	
Item 8: Sampling strategy	0.50	0.50	0.88	0.50	0.75	0.50	0.63	0.50	0.38	0.50	0.50 (0.50–0.66)
How and why participants, documents, or events were selected	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Criteria for deciding when no further sampling was necessary	Yes	No	Yes	No	No	No	No	No	No	Yes	
Recruitment procedure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
Rationale for prior criteria	No	No	No	No	Yes	No	Yes	Yes	No	Yes	

Item (mean score)[a]	Hussain (2008) [43]	Pieters (2011) [44]	Wong (2011) [45]	Fenlon (2012) [46]	Pieters (2012) [47]	Harder (2013) [48]	Burton (2015) [49]	Lifford (2015) [50]	Morgan (2015) [51]	Sowerbutts (2015) [52]	Overall, median (IQR)
Item 9: Ethical issues pertaining to human subjects	0.70	0.80	0.60	0.80	0.80	0.70	0.70	0.70	0.70	0.50	0.70 (0.67–0.80)
Documentation of approval by an ethics review board or explanation for lack	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Documentation of participant consent or explanation for lack	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	
Documentation of confidentiality	No	No	No	No	No	No	No	No	No	No	
Documentation of data security issues	No	No	No	No	No	No	No	No	No	No	
Compensation or incentives	No	Yes	No	Yes	Yes	No	No	No	No	No	
Item 10: Data collection methods	0.41	0.41	0.46	0.41	0.42	0.41	0.41	0.50	0.75	0.33	0.41 (0.41–0.47)
Type of data collected	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Start and stop dates of data collection and analysis	No	No	Yes	Yes	No	No	Yes	No	Yes	No	
Iterative process	No	No	No	No	No	No	No	No	No	No	
Triangulation of sources/methods	No	No	No	No	No	No	No	No	No	No	
Modification of procedures in response to evolving study findings	No	No	No	No	No	No	No	No	No	No	
Study period (start/end date for data collection/analysis)	No	No	Yes	Yes	No	No	Yes	No	Yes	No	
Characteristics of interviewers and methods used to train them	No	No	No	Yes	No	No	No	Yes	Yes	Yes	
Rationale for prior criteria	No	No	No	No	No	No	No	No	No	No	
Item 11: Data collection instruments and technologies	0.83	0.83	0.66	0.83	0.66	0.50	0.83	0.83	0.83	0.67	0.83 (0.66–0.83)
Description of instruments used for data collection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Description of devices used for data collection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Description if/how instruments changed over the course of the study	No	No	No	No	No	No	No	No	No	No	
Item 12: Units of study	0.88	0.88	1.0	0.88	0.88	0.88	0.63	0.75	0.67	0.75	0.88 (0.73–0.88)
Number and relevant details of participants, documents, or events	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Level of participation	No	No	Yes	Yes	Yes	No	No	No	No	Yes	
Item 13: Data processing	0.41	0.41	0.41	0.25	0.63	0.33	0.16	0.50	0.33	0.50	0.41 (0.31–0.50)
Transcriptions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Data entry	No	No	No	No	No	No	No	Yes	No	Yes	
Data management and security	No	No	No	No	No	No	No	No	No	No	

Item (mean score)[a]	Hussain (2008) [43]	Pieters (2011) [44]	Wong (2011) [45]	Fenlon (2012) [46]	Pieters (2012) [47]	Harder (2013) [48]	Burton (2015) [49]	Lifford (2015) [50]	Morgan (2015) [51]	Sowerbutts (2015) [52]	Overall, median (IQR)
Verification of data integrity	No	No	No	No	Yes	No	No	Yes	Yes	No	
Data coding	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	
Anonymization/de-identification of excerpts	No	No	No	No	No	No	No	No	No	No	
Item 14: Data analysis	0.90	0.80	0.37	0.47	0.90	0.47	0.63	0.67	0.63	0.65	0.64 (0.47–0.82)
Process by which inferences and themes were identified and developed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
References a specific paradigm or approach	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Rationale for prior criteria	Yes	No	No	No	Yes	No	No	Yes	No	No	
People performing analysis	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	
Software	No	Yes	No	No	Yes	No	No	No	No	Yes	
Item 15: Techniques to enhance trustworthiness	0.50	0.50	0.50	0.25	0.50	0.50	0.25	0.75	0.50	0.63	0.50 (0.44–0.53)
Techniques to enhance trustworthiness and credibility of data analysis	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	
Rationale for prior criteria	No	No	No	No	No	No	No	Yes	No	No	
Item 16: Synthesis and interpretation	0.50	0.50	0.50	0.50	0.88	0.50	0.50	0.50	0.50	0.50	0.50 (0.50–0.50)
Main findings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Development of a theory or model	No	No	No	No	Yes	No	No	No	No	No	
Integration with prior research or theory	No	No	No	No	No	No	No	No	No	No	
Item 17: Links to empirical data	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0 (1.0–1.0)
Evidence to substantiate analytic findings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Item 18: Integration with prior work and contributions to the field	0.75	1.0	0.88	0.88	1.0	0.88	0.88	0.75	0.88	0.75	0.88 (0.75–0.91)
Short summary of main findings	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	
Explanation of how findings integrate with earlier scholarship	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Discussion of scope of application/generalizability	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Identification of unique contributions to scholarship in a discipline or field	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	
Item 19: Limitations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.50	1.0	1.0	1.0 (1.0–1.0)
Trustworthiness and limitations of findings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	
Item 20: Conflict of interest	0.0	0.0	0.0	0.75	0.0	0.5	0.0	0.75	0.0	0.75	0.0 (0.0–0.75)
Potential sources of influence or perceived influence on study	No	No	No	Yes	No	No	No	Yes	No	Yes	
How they were managed	No	No	No	No	No	No	No	No	No	No	
Item 21: Funding	0.0	0.50	0.0	0.50	0.50	1.0	0.0	0.50	0.75	0.75	0.50 (0.0–0.75)

Item (mean score)[a]	Hussain (2008) [43]	Pieters (2011) [44]	Wong (2011) [45]	Fenlon (2012) [46]	Pieters (2012) [47]	Harder (2013) [48]	Burton (2015) [49]	Lifford (2015) [50]	Morgan (2015) [51]	Sowerbutts (2015) [52]	Overall, median (IQR)
Sources of funding and other support	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	
Role of funders in data collection, interpretation, and reporting	No	No	No	No	No	Yes	No	Yes	Yes	Yes	
Total	13.01	13.99	12.72	13.44	14.22	12.88	11.93	13.00	13.07	13.75	13.04 (12.84–13.81)

[a] "Yes" denotes that the individual item was included in the manuscript while "No" denotes it was not included in the manuscript. Score ranges from 0.0 to 1.0

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