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Reproductive Concerns Among Young Adult Women With Breast Cancer: A Systematic Review and Meta-Analysis

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ABSTRACT

Objectives: Systemic cancer treatments pose threats to fertility, leading to concerns regarding fertility and parenthood in young adult women with breast cancer (YAWBC). This systematic review aimed to synthesize existing evidence on reproductive concerns (RCs) among YAWBC and identify areas where further research is needed.

Methods: A systematic review was conducted. Nine English and Chinese databases were searched for studies from inception to June 2023. A meta-analysis was employed to pool RC levels measured using the Reproductive Concerns After Cancer scale (RCAC scale; possible total scores: 18–90). Narrative synthesis was conducted in cases where a meta-analysis could not be performed.

Results: Twenty-four cross-sectional studies across seven countries were included in this review. The prevalence of RCs among YAWBC ranged from 21.75% to 80%. The pooled mean total score on the overall RCAC scale was 55.84 (95% confidence interval: 53.26–58.43). “Personal health,” “child’s health,” and “fertility potential” were the top three types of RCs among YAWBC. Sociodemographic, clinical, and psychosocial factors were found to be associated with RCs among YAWBC. Additionally, significant correlations among RCs, nonadherence to treatment, depression, and quality of life were also identified among YAWBC.

Conclusion: RCs are a common issue among YAWBC, and age, parenthood status, fertility desire, and chemotherapy treatment are important factors associated with RCs among these women. Further research is needed to clarify RC-related factors to provide evidence aimed at tailoring interventions to mitigate RCs among YWBC.

1 | Background

Breast cancer is the most common type of cancer among women, with more than 2.26 million new cases worldwide in 2020, representing 25.84% of all cancer cases in women [1]. Although breast cancer is more common in women aged over

50 years, it is also the most prevalent type of cancer among younger women aged under 49 years [2, 3]. With improvements in screening and treatments, the breast cancer survival rate has gradually increased [4–7], drawing public attention to the survivorship issues of breast cancer survivors, including reproductive concerns (RCs). Young adult women with breast cancer

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(YAWBC) face fertility challenges due to the side effects of chemotherapy and endocrine therapy [8]. Research has shown that women with breast cancer are less likely to become pregnant compared to the general population [9]. However, many YAWBC would not have fulfilled their fertility goals at the time of diagnosis and still desire to have children [10]. Consequently, YAWBC may experience RCs.

RCs represent a multidimensional concept encompassing various aspects of concerns related to fertility and parenthood [11–14]. The understanding of RCs has evolved over time, as research and knowledge in the field have progressed. In 2005, Wenzel et al. defined RCs as concerns about infertility and losing control over reproductive health [15]. Subsequently, qualitative evidence revealed that RCs extended beyond concerns about fertility capacity to worries about children's health, cancer recurrence, the impact of infertility on intimate relationships, and the care of children [12, 16, 17]. To assess RCs, Gorman et al. developed and validated the Reproductive Concerns After Cancer scale (RCAC scale), which covers six domains: fertility potential, partner disclosure, personal health, child's health, acceptance of infertility, and becoming pregnant [13].

Unaddressed RCs are a threat to the physical and psychological health of YAWBC. Previous studies have revealed that RCs were associated with poorer quality of life and depression [18–21]. Additionally, the presence of RCs has been found to impact treatment decisions among YAWBC [22–24]. Thus, RCs have emerged as a noteworthy issue that warrants attention. Studies exploring RCs among YAWBC have focused on their prevalence or level [25–29] as well as the influencing factors [22–24] and health-related outcomes associated with them [18, 19, 22]. Summarizing the available evidence would provide valuable insights into the understanding of RCs among YAWBC.

Two prior systematic reviews covered a range of aspects among YAWBC, including RCs, quality of life, behavioral health outcomes, and fertility-related needs [30, 31]. However, due to their broad scope, neither review provided a comprehensive understanding of RCs and their associated factors and health-related outcomes. Importantly, these reviews only included studies published before September 2008 and July 2010, respectively. Consequently, both reviews failed to reflect the current evidence regarding RCs among YAWBC. Recently, Zhao et al. conducted a qualitative synthesis on the perceptions and experience of RCs among YAWBC and revealed the multifaceted nature of RCs [32]. Bártolo et al. conducted a systematic review focused on RCs among young women with various cancer diagnoses and offered valuable insights into factors associated with RCs [33]. However, it lacked information concerning the prevalence/level of RCs and the specific types of RCs that most distressed young women with cancer, hindering an in-depth understanding of RCs and the unique fertility care needs associated with them. This systematic review aimed to synthesize existing evidence on RCs among YAWBC and identify areas where further research is needed. It was guided by three objectives: (1) to quantify the level and prevalence of RCs; (2) to systematically categorize and summarize the various factors reported in the literature that are

associated with RCs; and (3) to summarize the health-related outcomes associated with RCs among YAWBC.

2 | Methods

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [34]. The review protocol was registered on PROSPERO (CRD42022375247) [35]. One modification is the conduct of a meta-analysis. Initially, the protocol stated that no meta-analysis would be conducted due to anticipated heterogeneity. However, upon review, we found sufficient data on the level of RCs measured by the RCAC scale, allowing us to pool the RC levels to provide a more precise and comprehensive understanding of the extent of RCs. As only two studies using the RCAC scale reported the prevalence of RCs, meta-analyses were not conducted to pool the prevalence data. Furthermore, the heterogeneity in studies exploring factors associated with RCs—due to varying methods of categorizing demographic or clinical characteristics and differences in RC measurements—rendered a meta-analysis of these aspects unfeasible.

2.1 | Eligibility Criteria

Following the PICOS (P = population, I = Intervention, C = Comparison, O = Outcome, S = study type) format, studies were included for review if the following criteria were met: (1) studies conducted among women with breast cancer aged 18–49 years (population) [36]; (2) studies reporting one of the following outcomes: the level or prevalence of RCs or the influencing factors or health-related outcomes associated with them (outcomes); (3) quantitative studies (study type); (4) studies published in English or Chinese.

The exclusion criteria include: (1) studies included female with various cancer diagnoses, without focusing on breast cancer; (2) studies focused on psychometric validation of instruments; (3) intervention studies, theses, book chapters, and conference abstracts were excluded. Intervention studies were excluded because they often recruit participants with significant RCs, potentially introducing selection bias to the outcomes. Furthermore, intervention studies primarily aimed at evaluating the effects of interventions on alleviating RCs, which may not comprehensively capture the outcomes of interest in this review.

2.2 | Databases and Literature Search Strategy

A comprehensive search was conducted in nine electronic databases (the China National Knowledge Infrastructure, Wan Fang Data, the VIP Chinese Journal Database, the Chinese Biomedical Database, PubMed, Embase, the Cumulative Index to Nursing and Allied Health Literature, Web of Science, and APA PsycINFO). The reference lists of the studies included in the review were also screened for additional eligible articles. The primary search was performed in December 2022 and again

in June 2023. Supporting Information S1: Supplementary Material S1 presents the details of the search strategy and results in each database.

2.3 | Study Selection

Included studies were managed by EndNote 20. After removing the duplicates, two reviewers (L.H. and B.B.X.) independently scanned the titles and abstracts of the studies for potentially eligible studies. Thereafter, two reviewers (L.H. and B.B.X.) independently read the full texts of the articles to determine whether to include the studies in this review based on the eligibility criteria. Disagreements were addressed by discussion.

2.4 | Data Extraction

A pre-designed extraction table was used to extract the following information: first author, publication year, study design, study setting, study time frame, sample size, participant characteristics (age, marital status, cancer stage, treatments received, parenthood status, desire for children, receipt of fertility information, use of fertility preservation), outcomes and measurements, key findings (the level and prevalence or RCs and the influencing factors and health-related outcomes associated with them). Two reviewers (L.H. and B.B.X.) independently extracted relevant data from the included studies, and disagreements were resolved by discussion.

2.5 | Quality Appraisal

Two reviewers (L.H. and B.B.X.) independently assessed the quality of the included studies using the eight-item Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies [37]. Disagreements were solved through discussion.

2.6 | Data Synthesis

In this review, we primarily provide a descriptive summary of the existing evidence on the level and prevalence of RCs and the influencing factors and health-related outcomes associated with them. For studies employing the RCAC scale, we conducted meta-analyses to pool the mean scores of the RCs using a random-effects model. The results were presented with forest plots of the meta-analyses. The I^2 statistic was used to examine the heterogeneity between the studies. Sensitivity analysis was conducted through the leave-one-out method. Moreover, we conducted subgroup analyses based on study characteristics, including (1) age range (comparing studies comprising participants aged 18–40 years old to those with participants aged 18–45 and 18–49 years old) and (2) the inclusion of chemotherapy-treated individuals (contrasting studies that exclusively recruited chemotherapy-treated participants with those that did not). All analyses were performed through Stata 17.0 (Stata Corporation, College Station, Texas, USA).

3 | Results

3.1 | Study Selection

A total of 9716 records were identified from the databases, with 3630 were removed due to duplications. After screening the titles and abstracts, 6007 records were discarded. The full text of the remaining 79 records were retrieved for eligibility assessment, leading to the exclusion of 54 articles due to ineligible population ($n = 14$), outcomes ($n = 7$), and study type ($n = 33$). Finally, 24 studies involving 25 articles were included in the review. Figure 1 details the study selection process.

3.2 | Study Characteristics

All 24 studies, reported in 25 articles, employed a cross-sectional design, with two articles originating from a single study [28, 38]. The included studies were published from 2010 to 2023 and were conducted in China [19, 26–29, 38–47], the United States of America [18, 48, 49], Portugal [33, 50–52], Sweden [25], Italy and Switzerland [23], and Mexico [24]. Nineteen studies reported on the level of RCs, as indicated by the RCAC scale scores [19, 25–29, 33, 39–47, 50–52]. Twenty-one studies investigated factors associated with RCs [18, 23–29, 33, 38–47, 49, 50, 52], and six studies examined the health-related outcomes associated with RCs [18, 19, 48–51]. Sample sizes ranged from 20 to 515 participants, with the participants' ages ranging from 18 to 49 years. Regarding reproduction-related characteristics, 5.51%–53.50% of participants had no child at diagnosis [27, 45], and 17.90%–100% of them had fertility desire [29, 42]. Supporting Information S1: Supplementary Material S2 summarizes the study and participant characteristics.

3.3 | Study Quality

All 24 studies had clearly defined inclusion criteria, and 14 studies did not provide detailed descriptions of the study subjects and settings [18, 23, 24, 27, 33, 39–41, 44, 45, 49–52]. Six studies [18, 23, 24, 29, 48, 49] used measurement tools with unclear validity or reliability, and seven studies [28, 40, 45, 47, 49, 50, 52] did not show strategies for addressing confounding factors. In addition, the appropriateness of the statistical analysis used in nine studies remained unclear [27, 28, 39–44, 46]. Specifically, while the authors selected an appropriate statistical method (multiple linear regression), whether the approach was used appropriately remained unclear due to the lack of a clear explanation regarding the methodology for assigning values to categorical variables. The results of the study quality appraisal are shown in Supporting Information S1: Supplementary Material S3.

3.4 | The Level and Prevalence of RCs Among YAWBC

3.4.1 | The Level of RCs

Nineteen studies reported the level of RCs, as indicated by the RCAC scale scores [19, 25–29, 33, 38–47, 50–52]. Supporting

Information S1: Supplementary Material S4 presents the detailed outcomes of each study. Based on the most available data from 15 studies, the pooled mean total RC score (95% CI) was 55.84 (53.26–58.43; $I^2 = 99.10\%$). The leave-one-out analysis demonstrated that there was no significant difference either in the pooled mean total scores or heterogeneity when a single study was eliminated. The subgroup analysis revealed that the pooled mean total score was significantly higher in studies comprising YAWBC aged 18–40 than those with participants aged 18–45 and 18–49 (59.18, 95% CI 57.58–60.79 vs. 52.16, 95% CI 46.78–57.54; $p = 0.014$). Additionally, studies exclusively comprising chemotherapy-treated individuals exhibited a significantly higher pooled mean total score than those without this restriction (59.02, 95% CI 56.38–61.67 vs. 53.76, 95% CI 49.75–57.77; $p = 0.032$). The meta-analysis of 13 studies provided the total score of each subscale and revealed that the

pooled mean subscale score (95% CI) for “personal health” was 11.20 (10.66–11.75; $I^2 = 97.80\%$), “child’s health” 10.48 (10.14–10.82; $I^2 = 96.3\%$), “fertility potential” 9.37 (8.75–9.99; $I^2 = 98.70\%$), “becoming pregnant” 9.18 (8.51–9.85; $I^2 = 98.80\%$), “acceptance of infertility” 8.61 (8.21–9.00; $I^2 = 97.30\%$), and “partner disclosure” 8.57 (7.93–9.20; $I^2 = 98.50\%$). The forest plots of the meta-analyses are presented in Supporting Information S1: Supplementary Material S5.

3.4.2 | The Prevalence of RCs

The prevalence of RCs among YAWBC was reported in seven studies, with a range from 21.75% to 80%. Table 1 presents the details of the prevalence and measurements of each study.

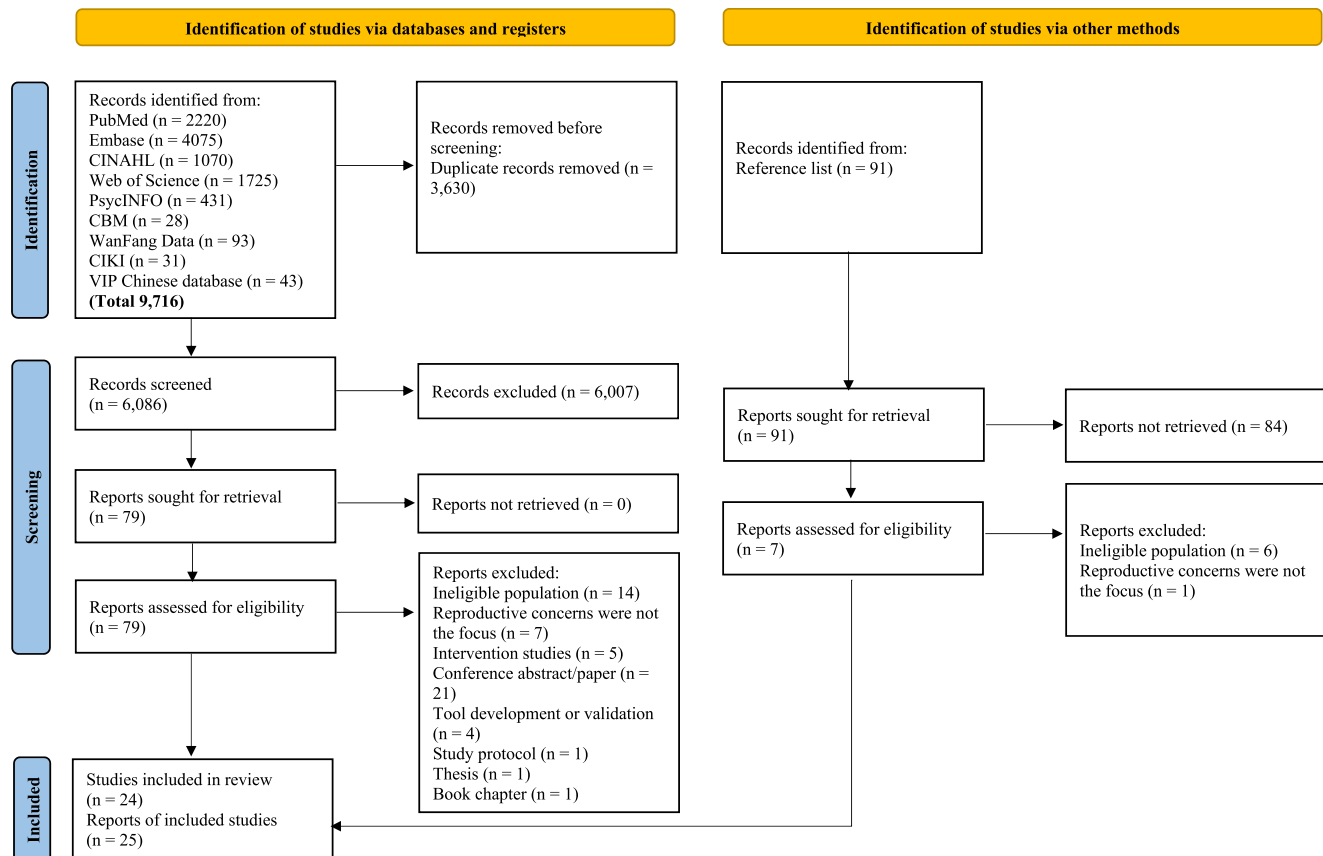


FIGURE 1 | PRISMA flow diagram.

TABLE 1 | The prevalence and measurements of reproductive concerns ($N = 7$).

First author, year	Sample size	Measurement	Prevalence of RCs
Bartolo et al. (2020) [52]	$n = 104$	RCAC scale	35.60%
Ljungman et al. (2018) [25]	$n = 181$	RCAC scale	58.00%
Gorman et al. (2010) [18]	$n = 131$	RCS	55.73%
Ruddy et al. (2011) [49]	$n = 20$	FIS	80.00%
Ruggeri et al. (2019) [23]	$n = 297$	FIS	63.00%
Villarreal-Garza et al. (2017) [24]	$n = 134$	FIS	44.00%
Llarena et al. (2015) [48]	$n = 515$	A single self-reported question	21.75%

Abbreviations: FIS, Fertility Issue Survey; RCAC scale, Reproductive Concerns After Cancer scale; RCS, Reproductive Concern Scale; RCs, Reproductive concerns.

3.5 | Factors Associated With RCs: Reports From the Current Literature

Twenty-one studies explored factors associated with RCs, including those of a sociodemographic, clinical, and psychosocial nature. Supporting Information S1: Supplementary Material S6 presents a summary of the factors associated with RCs.

3.5.1 | Sociodemographic Factors

Of the 13 studies investigating the correlation between age and RCs, three identified higher RC levels in YAWBC of a younger age [26, 39, 41], while the remaining studies reported a statistically non-significant association between age and RCs [18, 23–25, 27, 40, 42–44, 46].

Regarding the association between the education level and RCs (explored in 12 studies), five studies observed higher RC levels among YAWBC with a higher education level [26, 27, 41, 42, 46], while one study demonstrated lower RC levels [39]. The remaining studies did not find a statistically significant association between education level and RCs [23, 25, 28, 40, 43, 44].

In the nine studies examining the association between financial situation and RCs, three of them revealed that lower monthly household income per capita was associated with higher RC levels [39, 41, 42]. However, contradictory findings emerged in one study, where YAWBC with lower monthly household income per capita reported lower RC levels [28]. The remaining studies showed that the relationship between financial status (as indicated by monthly household income per capita [26, 43], personal yearly income [27, 46], or monthly household income [40]) and RCs was not statistically significant.

Eight studies revealed that childlessness was associated with greater RCs [18, 23, 27, 28, 33, 41, 42, 46], while one study found the opposite pattern, with YAWBC who had children reporting higher RC levels [39]. The remaining five studies reported statistically non-significant associations between parenthood status and RCs [24–26, 43, 44].

In the assessment of fertility desire, 11 studies consistently found that a desire to have children was associated with greater RCs among YAWBC [18, 24–28, 42–44, 46, 49]. However, one study reported that fertility desire was not related to concerns about partner disclosure [33]. A single study also revealed a positive correlation between the importance of parenthood and RCs [52].

Among 12 studies exploring the association between marital status and RCs, only one found marital status to be associated with higher RC levels in YAWBC [39]. However, this finding was not replicated in the remaining 11 studies [23–25, 27, 28, 40–43, 46, 52].

One study revealed that blue-collar workers had higher RC levels compared to white-collar workers [39], while another two studies found no statistically significant association between work type and RCs [42, 46].

One study found that YAWBC living in urban areas had lower RC levels than those living in rural areas [41]. However, another two studies found no statistically significant association between residential areas and RCs [27, 39].

One study reported that YAWBC with a religious belief had lower RC levels than those without religious beliefs [43]. However, another three studies reported no statistically significant association between religious beliefs and RCs [26, 27, 41].

A single study identified that Chinese Han women exhibited higher RC levels than women from other Chinese ethnicities [46].

3.5.2 | Clinical Factors

Five studies explored the relationship between cancer stage and RCs, one of which reported that YAWBC at an advanced stage reported higher RC levels [40]. However, the remaining studies did not identify such an association [26, 28, 41, 43].

The association between cancer treatment and RCs was also explored. Three studies revealed that chemotherapy treatment was associated with higher RC levels [25, 39, 42], but one study found no statistically significant relationship between chemotherapy treatment and RCs [26]. Specifically, one study observed that YAWBC receiving more courses of chemotherapy experienced higher RC levels [43]. One study found that the use of cyclophosphamide was associated with higher RC levels [40], but this conclusion was not reached by another study [43]. The correlation between the use of radiotherapy and RCs was contradictory across six studies. One study reported that YAWBC receiving radiotherapy reported higher RC levels [41], while another study indicated lower RC levels [39], and the remaining four studies found statistically non-significant associations [25, 26, 42, 43]. Furthermore, treatment-related ovarian damage was identified as a influencing factor of RCs in one study [18].

Three studies examined the relationship between fertility preservation and RCs among YAWBC. Two of them identified the use of fertility preservation as being associated with lower RC levels [27, 46], and the third did not [25].

One study reported that YAWBC with a lengthier period since surgery demonstrated higher RC levels [39], while another study failed to observe such an association [42]. Additionally, five studies revealed that the association between the length of time since diagnosis and RCs was not statistically significantly [25, 39, 40, 42, 43].

3.5.3 | Psychosocial Factors

Two studies found a positive association between attachment anxiety and RCs [40, 43]. One study revealed that high vigilance regarding reproduction-related cues was associated with higher RC levels [33]. The importance of emotional regulation strategies was also measured. YAWBC who commonly used cognitive reappraisal had lower RC levels, whereas those who frequently

used expressive suppression had higher RC levels [28]. Two studies identified psychological resilience as negatively correlated with RCs among YAWBC [29, 47], and one study revealed that higher self-disclosure was also correlated with reduced RCs, mediated through social relationship quality [38].

The association between social relationship quality and RCs was explored in two studies, both of which showed that better social relationship quality was negatively associated with RCs among YAWBC [28, 42]. Perceptions of partner responsiveness [44], social support [41], and self-efficacy [41] were reported to be negatively associated with RCs. Inversely, social avoidance and distress [45] and having good relationships with partners [39] were found to be positively correlated with RCs.

3.6 | Health-Related Outcomes Associated With RCs

Six studies explored the association between RCs and health-related outcomes among YAWBC and revealed that RCs were associated with treatment decisions, depression, and quality of life (Supporting Information S1: Supplementary Material S7). Gorman et al. revealed that RCs were an independent factor for depressive symptoms among YAWBC [18]. Two studies explored the association between RCs and quality of life, and the results consistently revealed that higher RCs were related to lower quality of life [19, 52]. Two studies found that 22.4% [24] and 39% [23] of YAWBC indicated that RCs affected their treatment decisions regarding chemotherapy and endocrine therapy. A study involving 515 YAWBC found that the presence of RCs was associated with the non-initiation, delayed initiation, and discontinuation of tamoxifen [48].

4 | Discussion

The present systematic review synthesized existing evidence regarding the level and prevalence of RCs and the influencing factors and health-related outcomes associated with them among YAWBC. The review findings enable a comprehensive understanding of RCs among YAWBC.

4.1 | The Level and Prevalence of RCs Among YAWBC

The pooled mean total RC scores measured by the RCAC scale were 55.88 (possible range: 18–90) for the overall scale and ranged from 8.57 to 11.20 (possible range: 3–15) for the six subscales, revealing that “personal health,” “child’s health,” and “fertility potential” were the top three types of RCs among YAWBC. These findings suggest that YAWBC are highly concerned about genetic risks, cancer recurrence due to pregnancy, and infertility risk [16, 53, 54]. This information serves as a crucial foundation for tailoring interventions to mitigate RCs among YAWBC. Interventions such as genetic counseling, information support regarding post-pregnancy prognostic outcomes, and fertility care that enhances fertility preservation before cancer treatment may help alleviate RCs in YAWBC [55].

The further subgroup analyses of the total score on the overall RCAC scale revealed that higher RC levels could be observed in studies involving participants of younger age and those with only chemotherapy-treated YAWBC. It is unsurprising that younger age and the use of chemotherapy were associated with higher RC levels. First, due to the social trend of delayed childbearing, younger women are more likely to be childless and harbor unmet fertility desires, contributing to increased RCs [56]. Furthermore, it is widely acknowledged that chemotherapy negatively impacts fertility [8]. The awareness of the impact of chemotherapy on fertility can amplify RCs [33].

The RCAC scale stands out as the most comprehensive and widely utilized measurement tool for assessing RCs among YAWBC [13]. Compared to other tools that only measure the presence of RCs by a unidimensional scale [15], single item [23, 24, 49] or brief self-report [48], the RCAC scale can capture various aspects of concerns about fertility experienced by women with cancer [12, 16, 17]. Although validated as a reliable measurement, our review identified limitations in using the RCAC scale. First, Gorman et al. originally proposed a mean item score of four or greater on any domain or the total scale to indicate a meaningful RC level, but this recommendation lacks empirical evidence [13]. Second, further study findings from Gorman and colleagues suggest that the RCAC scale may be best represented as a profile of subscale scores rather than a total score [57]. These findings indicate a need for additional research to establish standardized usage of the RCAC scale. It is necessary to further confirm the appropriate approach for using the RCAC scale and subsequently establish cutoff points for the selected method. This would enhance the utility of the RCAC scale as a screening tool and improve the interpretation of findings in existing RC studies.

The present review is the first to report on the prevalence of RCs among YAWBC. The prevalence of RCs among YAWBC varied widely, ranging from 21.75% to 80.00%. This sizable discrepancy may be due to different RC measures, small sample sizes, and different cutoff thresholds. A higher prevalence (44%–80%) was observed in three studies using the Fertility Issue Survey, which employed a single item to evaluate the presence of RCs among YAWBC [23, 24, 49]. Furthermore, it is notable that the study reporting the highest prevalence of 80% only involved 20 participants, suggesting potential biased results due to the small sample size [49]. The use of different cut-off points in studies employing the RCAC scale also contributed to the discrepancies observed. Among two studies utilizing the RCAC scale, one set a mean item score >3 on the overall RCAC scale, indicating that 35.60% of YAWBC experienced moderate to high RC levels [52]. In contrast, another study reported that 58% of YAWBC had high RC levels, defining the threshold as a mean item score >4 on at least one domain of the RCAC scale [25]. In addition to the broad range of RC prevalence, we found limited evidence on the prevalence of RCs, with only seven studies addressing this aspect [18, 23–25, 48, 49, 52]. Specifically, among 19 studies using the RCAC scale, only two reported data on the prevalence of RCs among YAWBC [25, 52]. Thus, the present review may have overestimated the prevalence of RCs among YAWBC. More original studies using standardized RC measurements are required to generate data on RC prevalence among YAWBC. This would contribute to a more comprehensive and accurate

understanding of the severity and significance of the RC issue among YAWBC, raising awareness and attention among healthcare providers.

4.2 | Factors Associated With RCs: Reports From the Current Literature

This review identified several factors associated with RCs among YAWBC, and some of the findings were consistent with those of a prior review on RCs in young women with cancer [33]. Both reviews identified that younger age, being childless, having a fertility desire, and the use of chemotherapy were associated with higher RC levels. The findings indicate that YAWBC who are younger, childless, desire fertility and undergo chemotherapy are more susceptible to RCs. Healthcare professionals can use these insights to conduct early RC assessments for YAWBC and provide timely support to those in need.

The present review also identified several sociodemographic factors that were not reported in the previous review among young women with cancer. Three studies suggested that higher education levels were associated with greater RC levels [27, 41, 46]. Higher education levels have been reported as a factor in delayed childbearing, indicating that women with higher educational levels are more likely to be childless at the time of diagnosis [58]. Consequently, they may experience substantial pressure to start a family and thereby exhibit higher RCs. However, one study contradicted this, indicating that patients with lower education levels reported higher RC levels [39]. This discrepancy might be explained by the limited access to desired information among YAWBC with lower education levels, resulting in unmet fertility information needs. Unmet fertility information needs have been recognized as a factor associated with RCs among women with colorectal cancer [59]. Further investigation is required to confirm the association between educational level and RCs among YAWBC. The association between financial status and RCs was also inconsistent. The association between financial status and RCs was also inconsistent [39, 41, 42]. This result may be attributed to the fact that limited financial resources restricted the access of YAWBC to fertility services, such as fertility preservation, consequently resulting in higher RC levels [60, 61]. Conversely, one study suggested that limited income may lead to prioritizing anti-cancer treatment over fertility, resulting in lower RC levels [28]. Qualitative studies are needed to explore the impact of financial resources on RCs among YAWBC.

Moreover, our review identified factors—including marital status, ethnicity, religious beliefs, residential area, and work type—that have been insufficiently explored in the context of RCs. Each of these factors was found to be associated with RCs in a single study, highlighting a significant gap in the literature and a need for additional research to corroborate these potential associations with RCs, aiding early identification of YAWBC who require special attention for RCs. Although sociodemographic factors have been extensively investigated in relation to RCs, some results remain inconclusive. Disparities in findings may be attributed to several factors. Divergent methodologies across studies may have resulted in varying assessments of RCs

among YAWBC. Additionally, the statistical significance of the associations may not have been detectable in some studies due to insufficient sample sizes. To gain clearer insights into factors related to RCs, future research should prioritize the use of standardized measurement tools and robust study designs.

Additional clinical factors were also identified in this review. The use of fertility preservation was found to be associated with decreased RCs among YAWBC [27, 46]. Fertility preservation strategies allow women to preserve their fertility capacity before cancer treatment [62], which may reduce concerns about potential infertility. However, it is important to note that the use of fertility preservation does not necessarily lead to reduced RCs. For example, a prior study found that the levels of RCs were similar between women with cancer who only received fertility counseling and those who underwent both fertility counseling and a fertility preservation [63]. This finding indicates that undergoing fertility preservation may be not adequate to address RCs, as RCs encompass various aspects of fertility concerns beyond just fertility potential. Therefore, interventions aimed at alleviating RCs should be comprehensive to address the broader spectrum of RCs among YAWBC. Our review found only one study reporting the correlation between longer periods following surgery and increased RC levels among YAWBC. Qualitative evidence suggests that YAWBC shift their focus from survival to family building as their lives normalize [64]. Furthermore, one in six cancer survivors who initially expressed no fertility desire changed their minds within three to 7 years post-diagnosis [65]. Thus, more evidence is needed to explore the association between survivorship length and RCs, to better inform the timing of interventions for RCs. Although statistically significant associations were found between RCs and factors such as cancer stage, the use of cyclophosphamide, more courses of chemotherapy, the use of radiotherapy, and treatment-related ovarian damage among YAWBC, these findings should be corroborated by additional studies. Such research efforts could contribute to a more comprehensive understanding of RCs among YAWBC.

Various psychosocial factors were identified in this review, including attachment anxiety [40, 43], self-disclosure [38], cognitive reappraisal [28], expressive suppression [28], self-efficacy [41], psychological resilience [29, 47], social support [41], social avoidance and distress [45], social relationship quality [28, 42], perceived partner responsiveness [44], and relationship with partners [39]. However, each of these factors was investigated by only one or two studies, indicating a limitation in the existing literature. Given that sociodemographic factors like age and parenthood status are not modifiable, more research is warranted to establish a more substantial evidence base concerning the link between modifiable psychosocial factors and RCs. The findings would be significant in developing effective interventions tailored to the needs of YAWBC facing RCs.

4.3 | Health-Related Outcomes Associated With RCs

Finally, our review demonstrated that RCs were related to nonadherence to treatment, depression, and quality of life

among YAWBC [18, 19, 23, 24, 48, 52]. The impact of RCs on the non-initiation and discontinuation of endocrine therapy highlights that healthcare providers should provide information support to help YAWBC make informed treatment decisions. Survivorship issues, including depression and quality of life, are increasingly important as the number of breast cancer survivors continues to increase [66, 67]. The present findings reinforce the significance of alleviating RCs to improve overall well-being and quality of life in YAWBC.

4.4 | Limitations

The implications of this review should be considered in light of its limitations. First, notable heterogeneity was observed in the pooled mean total scores on the RCAC scale, even in the subgroup analyses, although the leave-one-out analysis demonstrated good stability. Second, the absence of a well-established cutoff point for the RCAC scale limited our ability to gauge the severity of RCs based on the findings. Third, there was insufficient evidence on RC prevalence, and several factors associated with RCs were investigated only once or twice. Fourth, our search was limited to English and Chinese languages and quantitative studies, potentially excluding insights from diverse backgrounds. Moreover, over half of the included studies were conducted in China, potentially affecting the generalizability of the results. Finally, all included studies were cross-sectional, hindering the ability to establish causal relationships and comprehend longitudinal changes in RCs among YAWBC.

4.5 | Implications for Practice and Research

Healthcare professionals should routinely assess RCs among YAWBC and provide support for those grappling with RCs, particularly those who are younger, childless, have a fertility desire, and are undergoing chemotherapy. There are four recommendations for future studies. First, longitudinal studies are encouraged to investigate RCs among YAWBC, which will identify the changing patterns of RCs across various stages of a post-cancer diagnosis. Second, there is a need for studies aimed at exploring the appropriate use of the RCAC scale and establishing an effective cut-off value for it. This will aid in the clinical use of the scale to identify YAWBC who require support for their RCs. Additionally, future studies should use standardized measurements and reporting formats for assessing RCs among YAWBC to enable comparisons across studies. Finally, further investigations are warranted to generate evidence regarding RC prevalence and factors associated with RCs, especially psychosocial factors, which could guide the development of interventions to mitigate RCs among YAWBC.

4.6 | Conclusion

This review found that RCs were a common issue among YAWBC. "Personal health," "child's health," and "fertility potential" were the top three types of RCs among YAWBC. Age, parenthood status, fertility desire, and chemotherapy treatment were associated with RCs among YAWBC. More research with

rigorous designs is warranted to clarify RC-related factors. Additionally, RCs were correlated to health-related outcomes among YAWBC, including treatment decisions, depression, and quality of life. Healthcare providers should prioritize attentions to early assessment and management of RCs among YAWBC.

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The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author on reasonable request.

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Supporting Information

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