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ORIGINAL ARTICLE

Analysis of Lifestyle Factors (Dietary Patterns, Physical Activity, Stress Levels, and Sleep Patterns) on Readiness for Early Detection of Breast Cancer Through SADARI (Breast Self-Examination) Among Adolescent Girls in Health Vocational High Schools: A Systematic Review

Andre Utama Saputra , Berta Afriani, Maya yuniarti
[1,2,3]Sekolah Tinggi Ilmu Kesehatan Al Ma arif
*Corresponding Author: andreutamasaputra.07@gmail.com

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ABSTRACT

Introduction: *Early detection of breast cancer is affordable and accessible; however, its implementation in Indonesia remains below 50%. Lifestyle factors including diet, physical activity, stress levels, and sleep patterns may influence breast cancer risk, starting as early as adolescence, and can also affect preventive health behaviors.* ***Objective:*** *To synthesize scientific evidence regarding the relationship between these four lifestyle factors and breast cancer risk.* ***Methods:*** *A systematic review was conducted following the PRISMA 2020 guidelines. A search of indexed literature was performed on October 19, 2026, covering publications from 2016–2026. Inclusion criteria were journal articles in English or Indonesian, indexed in Scopus (quartiles Q1–Q4), possessing a DOI, and available in full text.* ***Results:*** *Out of 52 records screened, 11 studies (2016–2025) met the criteria: 3 prospective cohort studies, 1 pooled analysis of 19 cohorts, 1 cohort study with a meta-analysis, 3 systematic reviews/meta-analyses, and 3 cross-sectional studies. Fruit consumption during adolescence is associated with a lower risk of breast cancer (HR 0.75; 95% CI 0.62–0.90), while a pro-inflammatory diet is linked to a higher risk of premenopausal breast cancer (HR 1.35 for adolescent diet). High levels of physical activity are associated with a reduced risk of premenopausal breast cancer (HR 0.90 after adjusting for BMI). Evidence regarding stress is inconsistent (a pooled RR of 1.11 in a meta-analysis, contrasted with no observed association in a cohort of 106,000 women), and sleep duration shows no association with breast cancer risk (RR 0.99 for short sleep duration; 1.01 for long sleep duration). The practice of breast self-examination (SADARI) in Indonesia is reported to be less than 50% and is associated with knowledge, attitudes, and self-efficacy.* ***Conclusion:*** *Dietary patterns and physical activity have the strongest evidence base as lifestyle factors relevant to breast health.*

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Introduction

Breast cancer is the most frequently diagnosed cancer in women globally (Bray et al., 2024). In Indonesia, breast cancer places a major burden on the health system because many women present at an advanced stage, which worsens prognosis and treatment outcomes (Azhar et al., 2023; Dewi et al., 2019). Given limited access to mammography and ultrasonography, breast self-examination (SADARI) is one of the practical strategies for recognizing breast changes as early as possible (Azhar et al., 2023).

Although it is easy and inexpensive, the practice of SADARI is not yet optimal. A systematic review and meta-analysis of studies in Indonesia reported that fewer than 50% of women of reproductive age perform SADARI, with the lowest percentages outside Java and in community-based groups (Azhar et al., 2023). Among adolescent girls, research in Salatiga showed that lack

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of knowledge, the belief that SADARI is only needed when symptoms are present, lack of privacy, and limited time are barriers to practice (Tauho et al., 2025).

Adolescence is regarded as a vulnerable period in the natural history of breast cancer. Large prospective cohorts show that dietary patterns during adolescence are associated with breast cancer risk later in life (Farvid et al., 2016; Harris et al., 2017), and high physical activity is associated with a lower risk of premenopausal breast cancer (Timmins et al., 2024). The evidence for stress and sleep patterns is more varied (Bahri et al., 2019; Schoemaker et al., 2016; Wong et al., 2021; Zhang et al., 2025). Besides being related to risk, lifestyle may also be related to preventive health behavior. A cross-sectional study in Japan reported that high psychological distress was associated with lower breast screening participation, whereas regular exercise was associated with higher participation (Satoh et al., 2025). In health behavior theory, stress and coping strategies are also positioned as factors that shape health behavior (Glanz et al., 2024).

Female students at health vocational high schools (SMK Kesehatan) are an interesting target group for community nursing: they are exposed to health content in their curriculum, are in late adolescence, and can serve as peer change agents. However, to date there has been no systematic review that synthesizes these four lifestyle factors as determinants of SADARI readiness in this population. This review was prepared to fill that gap and to show transparently how far the available evidence can answer that question.

In this review, *early detection readiness* is operationalized as a construct that encompasses knowledge, attitudes and health beliefs (benefits, barriers, self-efficacy), and SADARI practice, as used in studies of SADARI determinants in Indonesia (Dewi et al., 2019; Tauho et al., 2025). The main research question is: "How does current scientific evidence describe the relationship of dietary patterns, physical activity, stress levels, and sleep patterns with breast cancer risk and with early detection readiness or behavior (SADARI and screening participation) among adolescent girls and young women, and what are the implications for female students at health vocational high schools?"

Methods

Study Design and PRISMA Protocol

This systematic review was prepared following the PRISMA 2020 guidelines (Page et al., 2021), with reference to methodological guidance for systematic reviews in health (Egger et al., 2022; Higgins et al., 2024). The question framework uses the PEO format (*Population, Exposure, Outcome*): Population of adolescent girls and young women (senior high/vocational high school students, university students), as well as women in cohorts with lifestyle exposure in adolescence or early adulthood; dietary patterns, physical activity, stress levels, and sleep patterns; Outcomes of breast cancer risk, and early detection readiness or behavior (SADARI and breast screening participation).

Literature Search Strategy

The search was conducted on October 19, 2026 through online searching of records indexed in PubMed/PMC, the Directory of Open Access Journals (DOAJ), and official journal publisher websites (among others BMJ, MDPI, Frontiers, BioMed Central, Oxford Academic, and ASCO), for publications from January 2016 to October 2026. Keywords included combinations of: ("breast self-examination" OR "BSE" OR "SADARI") AND (adolescent* OR "female students" OR "vocational"); ("breast cancer") AND (diet OR "fruit and vegetable" OR "physical activity" OR stress OR "sleep duration") AND (adolescen* OR "young women" OR premenopausal); and ("breast cancer screening") AND (lifestyle OR "psychological distress"). The Boolean operators AND and OR were used to optimize results. Indexing status and journal quartiles were confirmed through journal pages, Scopus, and SCImago Journal Rank.

Methodological transparency note: this search was not conducted in licensed databases (Scopus/Web of Science/CINAHL) and selection was carried out by a single author. Therefore, the numbers in the PRISMA diagram reflect the records examined during this drafting session

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and not the total body of existing literature. For publication purposes, the search needs to be repeated in licensed databases with two independent reviewers.

Inclusion and Exclusion Criteria

Table 1 presents the inclusion and exclusion criteria applied in the study selection process.

Table 1. Inclusion and Exclusion Criteria of Studies

Criteria	Inclusion	Exclusion
Publication type	Scientific journal articles (cohort, cross-sectional, pooled analysis, systematic review, meta-analysis) indexed in Scopus (Q1–Q4), with a DOI, and with full text that can be traced	Undergraduate/master's theses, proceedings, conference abstracts, preprints, institutional repositories, journals whose indexing could not be verified, editorials, letters to the editor
Publication year	2016 – 2026	Before 2016
Language	English and Indonesian	Languages other than English and Indonesian
Population	Adolescent girls, young women (school and university students), or female cohorts with lifestyle exposure in adolescence/early adulthood or premenopause	Women with a history of breast cancer (survivors), studies solely of women aged ≥50 years
Exposure	Dietary patterns, physical activity, stress/distress levels, sleep patterns (duration or quality)	Exposures outside these four lifestyle domains
Outcome	Breast cancer risk; SADARI knowledge/attitudes/self-efficacy/practice; breast screening participation	Treatment, survival, or patient quality-of-life outcomes

Selection and Data Extraction Process, Selection was carried out in two stages: title and abstract screening, followed by assessment of the full text or official article page. Data were extracted using a standardized form that included article identity (authors, year, journal, DOI), design, population and sample size, lifestyle domain, main findings along with measures of association, and journal quartile. The figures reported in this review were taken from the abstracts and text of the source articles.

Study Quality Assessment, Methodological quality assessment was conducted *indicatively* using tools appropriate to the design: the Newcastle-Ottawa Scale (NOS) for cohorts, AMSTAR-2 for systematic reviews and meta-analyses, and JBI checklists for cross-sectional studies. Each study was classified as low, moderate, or high quality based on design information, exposure and outcome measurement, and control of confounders as reported by the authors. Synthesis was conducted narratively because heterogeneity of designs, populations, and effect sizes did not allow quantitative meta-analysis.

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Results

Search Results and Study Selection (PRISMA Diagram),The search yielded 52 unique records that were examined (Figure 1). At the title and abstract screening stage, 24 records were excluded: gray literature in the form of theses, proceedings, conference abstracts, and institutional repositories (n = 6); articles in journals whose Scopus indexing could not be verified (n = 11); and articles published before 2016 (n = 7). The full text of 28 records was assessed further, and 17 were excluded because the population or topic did not fit, for example women aged ≥50 years, cancer survivors, or a focus on mammography (n = 6); SADARI studies in university students that were redundant with the selected studies (n = 7); or overlap with other studies in the same domain (n = 4). Finally, 11 studies met all criteria and were included in the narrative synthesis.

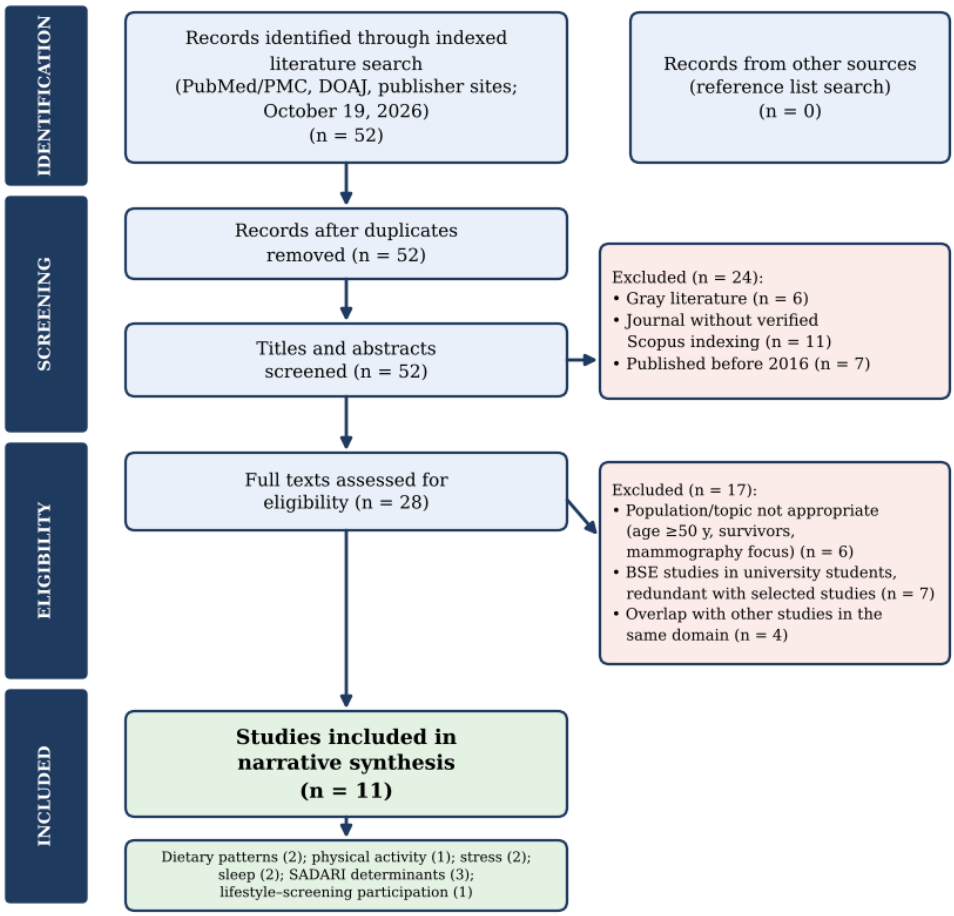

Figure 1. PRISMA Diagram of the Systematic Review

Characteristics of Included Studies

Of the 11 studies analyzed, 3 were prospective cohorts (27.3%), 1 was a pooled analysis of 19 cohorts (9.1%), 1 was a cohort with prospective meta-analysis (9.1%), 3 were systematic reviews/meta-analyses (27.3%), and 3 were cross-sectional studies (27.3%). The publication years ranged from 2016–2025. The evidence came from the United States (two Nurses' Health Study II cohorts), the United Kingdom, Japan, and Indonesia, as well as multinational syntheses.

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Only one study was conducted on adolescent girls in Indonesia, namely among female university students aged 18–21 years in Salatiga (Tauho et al., 2025). No included study was conducted among female students at health vocational high schools, and none directly examined the four lifestyle factors in relation to SADARI readiness.

Study Characteristics and Findings Table

Table 2 presents the characteristics and main findings of the 11 included studies.

Table 2. Characteristics and Main Findings of Included Studies

Author (Year)	Design and Population	Domain	Main Findings	Journal (Quartile*)
Farvid et al. (2016)	Prospective cohort (NHS II); 44,223 women for adolescent diet analysis	Dietary patterns	Total fruit intake in adolescence was associated with a lower breast cancer risk: HR 0.75 (95% CI 0.62–0.90) in the highest vs lowest quintile (median 2.9 vs 0.5 servings/day); fruit juice was not associated	BMJ (Q1)
Harris et al. (2017)	Prospective cohort (NHS II); 45,204 women	Dietary patterns	A pro-inflammatory dietary pattern was associated with premenopausal breast cancer: HR 1.35 (1.06–1.73) for adolescent diet and HR 1.41 (1.11–1.78) for early adulthood; not associated with postmenopausal cancer	Cancer Research (Q1)
Timmins et al. (2024)	Pooled analysis of 19 cohorts; 547,601 premenopausal women, 10,231 cases	Physical activity	High vs low leisure-time physical activity: HR 0.94 (0.89–0.99) and HR 0.90 (0.85–0.95) after adjustment for BMI; strongest association in HER2-enriched (HR 0.57; 0.39–0.84)	J Clin Oncol (Q1)
Bahri et al. (2019)	Systematic review and meta-analysis of cohort studies	Stress	History of stressful life events: pooled RR 1.11 (95% CI 1.03–1.19) for breast cancer	Breast Cancer Res Treat (Q1)
Schoemaker et al. (2016)	UK prospective cohort; 106,000 women, 1,783 cases	Stress	No consistent association between perceived stress frequency and risk; divorce was associated with ER-negative cancer (RR 1.54; 1.01–2.34)	Breast Cancer Research (Q1)

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Author (Year)	Design and Population	Domain	Main Findings	Journal (Quartile*)
Wong et al. (2021)	Cohort (Million Women Study; 713,150 women) and meta-analysis of 15 prospective studies (65,410 cases)	Sleep patterns	Sleep duration was not associated with risk: RR for short sleep 0.99 (0.98–1.01) and long sleep 1.01 (0.98–1.04) in the meta-analysis	Sleep (Q1)
Zhang et al. (2025)	Systematic review and meta-analysis of cohort studies (search 2014–2024)	Sleep patterns	Poor sleep quality: OR for incidence 1.09 (1.05–1.13), progression 1.55 (1.51–1.59), specific mortality 1.54 (1.50–1.58); effect on incidence is relatively small	Int J Public Health (Q1)
Azhar et al. (2023)	Systematic review, meta-analysis, meta-regression (PROSPERO CRD42022362907); Indonesian women	SADARI determinants	SADARI practice in Indonesia <50%, lowest outside Java and in community groups; determinants: good knowledge, good attitudes, family history, family support, information exposure	Diagnostics (Q2*)
Dewi et al. (2019)	Cross-sectional; 1,967 women aged 20–60 years, Surabaya	SADARI determinants	Higher benefits and self-efficacy and lower barriers were uniquely correlated with SADARI practice (Health Belief Model framework)	BMC Public Health (Q1)
Tauho et al. (2025)	Cross-sectional; 67 female university students aged 18–21 years, Salatiga	SADARI determinants (adolescents)	Barriers: considering it unimportant (37.3%), lack of knowledge (35.8%), feeling it unnecessary without symptoms (38.8%), feeling too young (20.9%); predictors of non-practice: lack of knowledge, belief that SADARI is only needed when symptomatic, lack of privacy, limited time	Int J Public Health Sci (Q2; SJR 0.365*)

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Author (Year)	Design and Population	Domain	Main Findings	Journal (Quartile*)
Satoh et al. (2025)	Cross-sectional; Japanese women	Lifestyle and screening participation	High psychological distress, risk aversion, and smoking were associated with lower screening participation; regular exercise was associated with higher participation; 16.8% attended breast screening	Prev Med Rep (Q1–Q2*)

*Quartiles are indicative based on Scopus/SCImago (the latest accessible CiteScore or SJR) and may shift each year. Quartiles marked with * need to be reconfirmed at scimagojr.com before publication. NHS II = Nurses' Health Study II; HR = hazard ratio; RR = risk ratio; OR = odds ratio; BMI = body mass index.

Methodological Quality Assessment of Studies, Table 3 presents the indicative methodological quality assessment of the 11 included studies.

Table 3. Methodological Quality Assessment of Studies (NOS / AMSTAR-2 / JBI; Indicative)

Study	**Design**	**Tool**	**Main Risk of Bias**	**Overall Quality**
Farvid et al. (2016)	Prospective cohort	NOS	Adolescent diet reported from memory (*recall*); residual confounding	High
Harris et al. (2017)	Prospective cohort	NOS	High school diet recalled; dietary pattern derived statistically	High
Timmins et al. (2024)	Pooled analysis of cohorts	NOS	Self-reported physical activity and harmonization across cohorts; adult premenopausal population	High
Bahri et al. (2019)	SR/MA of cohorts	AMSTAR-2	Heterogeneity in definitions and measurement of stress	Moderate
Schoemaker et al. (2016)	Prospective cohort	NOS	Stress self-reported at a single measurement point	High
Wong et al. (2021)	Cohort + meta-analysis	NOS	Self-reported sleep duration; middle-aged population	High
Zhang et al. (2025)	SR/MA of cohorts	AMSTAR-2	Varied sleep quality measurement tools; pooling of OR/RR/HR	Moderate
Azhar et al. (2023)	SR/MA of prevalence	AMSTAR-2	Registered in PROSPERO; high heterogeneity; most studies from western Indonesia	Moderate–High
Dewi et al. (2019)	Cross-sectional	JBI	Self-reported; large sample; not an adolescent population	Moderate

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Study	Design	Tool	Main Risk of Bias	Overall Quality
Tauho et al. (2025)	Cross-sectional	JBI	Small sample (n = 67); very wide confidence intervals; single institution	Low–Moderate
Satoh et al. (2025)	Cross-sectional	JBI	Cross-sectional design; Japanese screening context; self-reported	Moderate

Dietary Patterns:Two Nurses' Health Study II cohorts provide the most consistent evidence for the dietary pattern domain. Farvid et al. (2016) found that total fruit intake in adolescence was associated with a lower breast cancer risk (HR 0.75; 95% CI 0.62–0.90 for the highest compared with the lowest quintile), and this association was independent of fruit intake in adulthood. Consumption of apples, bananas, and grapes in adolescence was specifically associated with lower risk, whereas fruit juice and total vegetables were not associated (Farvid et al., 2016). Harris et al. (2017) showed that a pro-inflammatory dietary pattern, characterized by high intake of sugar-sweetened and diet beverages, refined grains, red and processed meat, and margarine, and low intake of leafy green vegetables, cruciferous vegetables, and coffee, was associated with premenopausal breast cancer (HR 1.35 for adolescent diet and 1.41 for early adulthood), but not with postmenopausal cancer.

Physical Activity:Timmins et al. (2024) pooled individual data from 19 cohorts (547,601 premenopausal women; 10,231 cases) and found that high compared with low leisure-time physical activity was associated with a 6% lower breast cancer risk (HR 0.94; 0.89–0.99) before and 10% (HR 0.90; 0.85–0.95) after adjustment for BMI. The association did not differ significantly across risk factor strata, including adiposity, and appeared strongest in the HER2-enriched subtype (HR 0.57; 0.39–0.84). The study population was adult premenopausal women, so generalization to adolescents is indirect.

Stress Levels:The evidence on stress is inconsistent. A meta-analysis of cohort studies reported that a history of stressful life events was associated with a small increase in breast cancer risk (pooled RR 1.11; 1.03–1.19) (Bahri et al., 2019). In contrast, a prospective cohort of 106,000 women in the United Kingdom with 1,783 cases found no consistent evidence that perceived stress frequency or adverse life events in the past five years were associated with breast cancer risk (Schoemaker et al., 2016). In that study, divorce was associated with ER-negative breast cancer (RR 1.54; 1.01–2.34), and loss of the mother before age 20 was associated with an RR of 1.31 (1.02–1.67) that weakened to 1.17 (0.85–1.61) after excluding mothers with breast or ovarian cancer. In terms of early detection behavior, high psychological distress was associated with lower breast screening participation among Japanese women (Satoh et al., 2025).

Sleep Patterns: In the Million Women Study cohort (713,150 women; 24,476 cases after excluding the first five years of follow-up), sleep duration was not associated with breast cancer; compared with 7–8 hours of sleep, the RRs for <6 hours, 9 hours, and >9 hours were 1.01 (0.95–1.07), 1.01 (0.96–1.06), and 1.03 (0.95–1.12), respectively (Wong et al., 2021). The meta-analysis of 15 prospective studies (65,410 cases) in the same paper showed null results, namely RR 0.99 (0.98–1.01) for short sleep and 1.01 (0.98–1.04) for long sleep (Wong et al., 2021). In contrast, Zhang et al. (2025) reported that poor sleep quality was associated with an increased risk of incidence (OR 1.09; 1.05–1.13), progression (OR 1.55; 1.51–1.59), and breast cancer-specific mortality (OR 1.54; 1.50–1.58), concluding that sleep traits mainly affect progression in patients and have a relatively small effect on incidence.

Determinants of SADARI Readiness and Practice Among Young Women in Indonesia

Azhar et al. (2023) concluded that fewer than 50% of women of reproductive age in Indonesia practice SADARI, with the highest prevalence among university students (49.90%) and the lowest outside Java Island and in community groups. Determinants associated with SADARI practice were good knowledge, good attitudes, a family history of breast cancer, family support,

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and exposure to breast cancer information. Using the Health Belief Model framework among 1,967 women in Surabaya, higher perceived benefits and self-efficacy and lower barriers were unique correlates of SADARI practice (Dewi et al., 2019). Among late adolescents in Salatiga, 70.1% of respondents had received information about SADARI, mainly from social media (35.8%) and school (32.8%), but barriers such as the belief that SADARI is unimportant, unnecessary without symptoms, or that respondents were still too young remained prominent (Tauho et al., 2025). It should be noted that the confidence intervals in the regression analysis of the Salatiga study were very wide due to the small sample size (n = 67), so the effect estimates were unstable. None of these studies measured dietary patterns, physical activity, stress, or sleep as predictors of SADARI practice.

Lifestyle and Breast Screening Participation: The only included study that linked lifestyle with early detection behavior was a cross-sectional study of Japanese women, which found that regular exercise was associated with higher breast screening participation, whereas high psychological distress, risk aversion, and smoking were associated with lower participation (Satoh et al., 2025). The outcome of this study was screening participation at health care facilities, not SADARI, and its population was adult women, so this evidence only supports a hypothesis and cannot be generalized directly to female students at health vocational high schools.

Table 4. Narrative Synthesis of Evidence by Lifestyle Domain

Domain	Direction of evidence	Relevance to SADARI readiness	Certainty of evidence
Dietary patterns	Fruit in adolescence: lower risk; pro-inflammatory pattern: higher premenopausal risk (Farvid et al., 2016; Harris et al., 2017)	Supports educational material on "why adolescent lifestyle matters"; a direct relationship with SADARI readiness has not been studied	Moderate (large cohorts, recalled diet)
Physical activity	High activity: lower premenopausal risk (HR 0.90) (Timmins et al., 2024); regular exercise: higher screening participation (Satoh et al., 2025)	Two pathways: a protective risk factor and a marker of a healthy behavior cluster; not yet tested on SADARI	Moderate for risk; low for behavior
Stress levels	Inconsistent: RR 1.11 (meta-analysis) vs no association (cohort); high distress: lower screening participation	Hypothesis: stress/distress reduces motivation and self-efficacy; educational messages must not imply stress as a definite cause of cancer	Low–moderate
Sleep patterns	Sleep duration: not associated with risk; poor sleep quality: small association with incidence, larger with progression	No direct evidence regarding SADARI; relevance is hypothetical (energy, learning capacity, routines)	Low–moderate
SADARI determinants (non-lifestyle)	Knowledge, attitudes, benefits, self-efficacy, barriers, family support, information exposure	The most consistent predictors and can be targeted by interventions in schools	Moderate (predominantly cross-sectional)

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Discussion

Adolescent Lifestyle Is Etiologically Relevant, but the Strength of Evidence Differs Between Domains The results of this review show that dietary patterns and physical activity have the strongest evidence base as lifestyle factors related to breast cancer risk in women whose exposure begins in adolescence or early adulthood. Two Nurses' Health Study II cohorts consistently showed that diet quality in adolescence, both fruit consumption and a pro-inflammatory pattern, is related to later risk (Farvid et al., 2016; Harris et al., 2017), and the pooled analysis of 19 cohorts supports a role for physical activity in premenopausal breast cancer (Timmins et al., 2024). In contrast, the evidence for stress and sleep is not yet convincing: the meta-analysis showing a small increase in risk from stressful life events (Bahri et al., 2019) is inconsistent with a large cohort that found no consistent association (Schoemaker et al., 2016), and sleep duration was not associated with risk in the largest available cohort (Wong et al., 2021), while poor sleep quality is more related to progression than to incidence (Zhang et al., 2025).

The practical implications for education are important: materials for female students at health vocational high schools need to present dietary patterns and physical activity as modifiable factors with a stronger evidence base, while taking care not to state that stress or lack of sleep causes breast cancer, because the evidence does not yet support such causal claims.

SADARI Readiness Is Explained More by Cognitive–Psychosocial Factors Studies evaluating SADARI determinants in Indonesia, including among adolescents, focus on knowledge, attitudes, perceived benefits and barriers, self-efficacy, family support, and information exposure (Azhar et al., 2023; Dewi et al., 2019; Tauho et al., 2025). These factors are consistent with the Health Belief Model discussed in the health behavior reference book (Glanz et al., 2024). The finding in Salatiga that most respondents had received information yet perceived barriers remained high suggests that information exposure alone is not enough; knowledge needs to be translated into beliefs, skills, and habits (Tauho et al., 2025).

How Lifestyle May Be Related to SADARI Readiness: Hypotheses, Not Findings Because no included study tested a direct relationship, the following mechanisms should be read as working hypotheses. First, stress and poor sleep may reduce energy, learning capacity, and motivation, thereby lowering self-efficacy to perform SADARI routinely; health behavior theory frameworks do position stress, coping, and adaptation as factors that shape health behavior (Glanz et al., 2024). Second, healthy dietary patterns and physical activity may belong to the same healthy behavior cluster as screening behavior, as seen in the association of regular exercise with screening participation among Japanese women (Satoh et al., 2025). Third, this relationship may be moderated by cognitive factors that have already been proven, such as knowledge and self-efficacy (Dewi et al., 2019). These hypotheses need to be tested, not assumed.

Implications for Health Vocational High Schools and Community Nursing As part of community nursing practice, schools are a strategic setting for interventions at the primary and secondary prevention levels (Stanhope & Lancaster, 2025). For health vocational high schools, the findings of this review support an integrated program that combines SADARI education and skills training with the promotion of healthy dietary patterns and physical activity, plus strengthening of self-efficacy, privacy, and peer support to reduce the barriers reported by adolescents (Tauho et al., 2025). Stress management and sleep hygiene can be included as beneficial components of general adolescent health, without claiming that either prevents breast cancer.

Research Agenda To answer the question posed in the title, an analytical cross-sectional study among female students at health vocational high schools is recommended with: (1) SADARI readiness outcomes operationalized through knowledge, a health belief scale (for example an Indonesian version of Champion's Health Belief Model Scale as used by Dewi et al., 2019), self-efficacy, and SADARI practice; (2) exposure measurement using validated instruments, for

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example a food frequency questionnaire, IPAQ-SF or PAQ-A for physical activity, PSS-10 for stress, and PSQI for sleep quality; (3) multivariable logistic regression controlling for age, family history, and information exposure as potential confounders; and (4) adequate sample size calculation, because the included Indonesian adolescent study had a small sample and unstable estimates (Tauho et al., 2025).

Strengths and Limitations of This Review The strengths of this review include: all included studies have a DOI and a traceable article page; simultaneous coverage of four lifestyle domains; use of explicit criteria regarding Scopus indexing; and transparency that direct evidence is not available.

The main limitations include: (1) the search was not conducted in licensed databases and selection was carried out by a single author, so the risk of missed studies and selection bias cannot be ruled out; (2) there is no direct evidence on lifestyle as a determinant of SADARI readiness among female students at health vocational high schools, so most of the synthesis is indirect; (3) heterogeneity of designs, populations, and effect sizes precluded meta-analysis; (4) the largest cohorts come from high-income countries and adolescent diet was measured by recall, while Indonesian studies are dominated by cross-sectional designs; (5) journal quartiles may change every year; and (6) local research on SADARI among female students at health vocational high schools published in national journals without verifiable Scopus indexing was excluded according to the criteria, although it could provide local context. Additional searches on SINTA and Garuda are recommended as a complement.

Conclusion

This systematic review shows that, of the four lifestyle factors reviewed, dietary patterns and physical activity have the strongest and most consistent evidence as factors related to breast cancer risk in women with exposure from adolescence or early adulthood (HR 0.75 for fruit consumption in adolescence; HR 1.35 for a pro-inflammatory dietary pattern in adolescence; HR 0.90 for high physical activity). The evidence for stress levels and sleep patterns is inconsistent and, for sleep duration, shows no association with risk.

SADARI readiness and practice among young women in Indonesia remain low and are more consistently explained by cognitive–psychosocial factors, namely knowledge, attitudes, perceived benefits and barriers, self-efficacy, family support, and information exposure. No included study directly tested the relationship of dietary patterns, physical activity, stress levels, and sleep patterns with SADARI readiness among female students at health vocational high schools; this relationship remains a hypothesis.

Recommendations: (1) SADARI programs in health vocational high schools should focus on strengthening knowledge and self-efficacy and reducing barriers, and can be integrated with the promotion of healthy dietary patterns and physical activity; (2) educational materials must not state that stress or lack of sleep causes breast cancer; and (3) an analytical cross-sectional study among female students at health vocational high schools using validated instruments is needed, accompanied by a repeat search in licensed databases by two independent reviewers before the results of this review are published.

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