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SYSTEMATIC REVIEW

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Epidemiological association between male sexual dysfunction and depression: a systematic review and meta-analysis of observational studies published between 2020 and 2025

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Abstract

Background: Male sexual health and mental health are closely linked, yet a quantitative synthesis of recent evidence is limited. Objectives: This study synthesized observational evidence published between 2020 and 2025 on depressive symptoms among adult men with erectile dysfunction (ED) and on the association between ED and depression; broader male sexual dysfunction evidence was summarized narratively when clinically relevant. **Methods**: We searched PubMed, EMBASE, Cochrane Library, PsycINFO, and Scopus, and conducted random-effects meta-analyses with prespecified subgroup analyses by measurement instrument. Study quality was assessed using the Newcastle-Ottawa Scale (NOS). **Results**: Eight observational studies (24,563 participants) were included. Among ED samples, pooled depression prevalence was 22.1% (Patient Health Questionnaire-9 (PHQ-9) $\geq$10; 95% confidence interval (CI): 7.6%–49.5%) and 65.0% (Self-rating Depression Scale (SDS) $\geq$53; 95% CI: 60.7%–69.0%). Among men with major depressive disorder (MDD), the pooled sexual dysfunction prevalence (Arizona Sexual Experience Scale (ASEX)-defined) was 54.0% (95% CI: 23.2%–82.0%). In a population-based study, ED was associated with approximately two-fold higher odds of depressive symptoms (adjusted odds ratio (aOR) 2.021; 95% CI: 1.797–2.272). In men with MDD, depressive symptom severity correlated strongly with sexual dysfunction severity (r = 0.640). **Conclusion**: ED and depression frequently co-occur in adult men. Current observational evidence supports integrated screening and collaborative care across urology and mental health services, but causal inferences remain limited. **The PROSPERO Registration**: https://www.crd.york.ac.uk/PROSPERO/view/CRD420261280261, CRD420261280261.

Keywords

Erectile dysfunction; Depression; Meta-analysis; Male mental health; Sexual dysfunction; Observational study

1. Introduction

Male sexual well-being extends far beyond reproductive capacity; it serves as a fundamental health metric that determines self-esteem, interpersonal satisfaction, and overall quality of life. Manifesting through complex presentations, such as erectile dysfunction (ED), premature ejaculation (PE), and diminished libido [1, 2], sexual dysfunction represents a prevalent clinical issue affecting a substantial portion of the global male population. Notably, Rajih *et al.* [1] reported significant prevalence rates even among young married men, indicating that this challenge is not confined to the elderly, but constitutes a public health concern spanning the entire life course.

Recent epidemiological studies consistently highlight a robust association between ED and depression, and some studies also report similar patterns for broader male sexual dysfunction constructs [3–8]. Beyond dampening emotional vitality, depression physiologically disrupts the balance of neurotransmitters essential for initiating and maintaining sexual arousal. In this context, Sayed *et al.* [5] noted the high frequency of concurrent sexual dysfunction in patients with Major Depressive Disorder (MDD), emphasizing a direct correlation between the severity of depression and the decline in sexual performance. Similarly, Jiang *et al.* [8] investigated drug-naive patients with first-episode depression, revealing that significant sexual dysfunction exists even in the absence of antidepressant medication.

Although male sexual dysfunction is a broad umbrella term, ED is not interchangeable with other sexual dysfunction do-

mains. ED is the most consistently defined and most frequently measured male sexual dysfunction in the recent observational literature included in this review. Accordingly, the present study focuses its main quantitative synthesis on ED and depressive symptoms, while evidence on broader sexual dysfunction constructs is summarized only as contextual narrative evidence.

The relationship between ED and depression is likely complex and potentially bidirectional, although the predominantly cross-sectional literature does not allow definitive causal inference. Chronic sexual impairment may contribute to psychological withdrawal and performance anxiety, while depressive symptoms may also worsen subjective sexual well-being. In a large cohort of over 21,000 Brazilian men, Pitta *et al*. [9] reported that ED was independently associated with depression, suggesting a clinically meaningful link between sexual and mental health. Saito *et al*. [3] further noted that age may influence these psychological mechanisms; specifically, they proposed that reduced psychological inflexibility acts as a critical mediator between sexual dysfunction and depression in younger demographics.

Despite these strong associations, stigma and help-seeking barriers may obstruct patients from seeking appropriate care [4, 10]. Analyzing clinical environments in India and Vietnam, respectively, Ghosh *et al*. [11] and Quang *et al*. [6] described how social stigma and cultural taboos may compel men to conceal sexual concerns. This concealment creates a significant public health gap by delaying the identification of comorbid depressive symptoms. Additionally, Xiao *et al*. [7] identified lifestyle factors, such as smoking and lower educational attainment, as variables associated with worse depressive symptoms in patients with sexual dysfunction, arguing for the necessity of a multifaceted clinical approach.

The present review was designed as an update of recent observational evidence published between 2020 and 2025, rather than as a full historical synthesis of the post-1998 literature. This recent-evidence approach was chosen to identify contemporary epidemiological patterns, measurement practices, and clinical implications in the ED–depression literature. Nevertheless, restricting the temporal scope may omit earlier landmark studies and should therefore be interpreted as a deliberate scope decision and a limitation of the review.

Therefore, this systematic review and meta-analysis aimed to synthesize recent observational evidence on the association between ED and depression in adult men, quantify depression prevalence within ED samples where pooling was appropriate, summarize ED-related association estimates, and identify the main methodological limitations that should guide future research.

2. Materials and methods

2.1 Eligibility criteria

This systematic review and meta-analysis was designed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 reporting guidelines [12, 13]. The completed PRISMA 2020 checklist is provided as **Supplementary material**. The protocol for this systematic review and meta-analysis was registered in the International Prospective Register of Systematic Reviews (PROSPERO, registration number: CRD420261280261; registration date: 07 January 2026). To precisely evaluate the epidemiological association between sexual dysfunction and mental health in the adult male population, we selected literature based on specific eligibility criteria. We restricted the study population to adult males aged 18 years and older. Following observations by Rajih *et al*. [1] and Saito *et al*. [3] regarding the rising prevalence trends among younger demographics, we adopted a strategy with no upper age limit to ensure the inclusion of data spanning the entire adult life spectrum.

Furthermore, to mitigate the confounding impact of antidepressant medication on sexual function, we prioritized studies involving drug-naive participants whenever feasible. The primary exposure for the main quantitative synthesis was ED, defined using validated ED-specific instruments (*e.g.*, International Index of Erectile Function 5 (IIEF-5) questionnaire) or clinical diagnosis. Broader categories of male sexual dysfunction, including composite ASEX-defined sexual dysfunction or mixed PE/ED samples, were not treated as equivalent to ED and were not pooled with ED-focused studies in the primary meta-analysis. Such studies were retained only for limited narrative context when they provided clinically relevant complementary evidence.

Regarding antidepressant exposure, medication status was recorded during data extraction whenever reported. Studies were not excluded solely because some participants had used antidepressants; however, studies focused primarily on treatment-induced sexual dysfunction were excluded. Because the number of eligible studies with medication-stratified data was very small, subgroup analysis according to antidepressant use was not performed.

For this review, ED-focused studies were eligible for quantitative synthesis, whereas studies of broader male sexual dysfunction constructs (*e.g.*, ASEX-defined general sexual dysfunction or mixed PE/ED samples) were retained only for narrative context when they contributed clinically relevant complementary evidence. Regarding the outcome variable, we accepted either formal clinical diagnoses of depression or symptom scores derived from standardized psychometric instruments, such as the PHQ-9 [14], SDS [15], and Beck Depression InventoryII (BDI-II) [16]. In terms of study design, we strictly included observational studies (cross-sectional, cohort, and case-control) that statistically validated independent correlations between the variables. Conversely, to maintain data reliability, we excluded randomized controlled trials (RCTs) assessing pharmaceutical or surgical interventions, reviews based solely on expert opinion, and abstracts where the full text was inaccessible.

2.2 Search strategy and information sources

We queried PubMed, EMBASE, the Cochrane Library, PsycINFO, and SCOPUS for academic literature published between January 2020 and December 2025. To optimize search sensitivity, we utilized Boolean logic combining Medical Subject Headings (MeSH) with free-text terms.

Crucially, we expanded our keywords to include various subcategories of sexual dysfunction; this approach aimed to capture the cultural specificities and diverse clinical settings identified by Ghosh *et al*. [11] and Quang *et al*. [6]. Because the review was initially designed to capture the broader recent literature on male sexual dysfunction and depression, the search strategy included ED-related terms as well as broader sexual dysfunction terms. However, the primary quantitative synthesis in the revised manuscript was restricted to ED-focused studies. The PubMed query was, for example, as follows:

("Sexual Dysfunction, Physiological"[MeSH] OR "Erectile Dysfunction"[MeSH] OR "Premature Ejaculation"[MeSH] OR "sexual dysfunction"[TIAB] OR "erectile function"[TIAB] OR "premature ejaculation"[TIAB] OR "low libido"[TIAB] OR "IIEF"[TIAB] OR "ASEX"[TIAB]) AND ("Depression"[MeSH] OR "Depressive Disorder"[MeSH] OR "depression"[TIAB] OR "depressive symptoms"[TIAB] OR "mood disorder"[TIAB] OR "PHQ-9"[TIAB] OR "BDI"[TIAB] OR "SDS"[TIAB]) AND ("Observational Study"[PT] OR "Cross-Sectional Studies"[MeSH] OR "Cohort Studies"[MeSH] OR "Case-Control Studies"[MeSH] OR "observational"[TIAB] OR "cross-sectional"[TIAB] OR "longitudinal"[TIAB] OR "prevalence"[TIAB]) AND ("2020/01/01"[PDAT] : "2025/12/01"[PDAT]).

No language restriction was prespecified at the search stage; however, only studies with sufficient full-text information for data extraction and quality assessment were included in the final synthesis.

2.3 Study selection

After removing duplicates, the researchers independently reviewed the collected records. We performed an initial screening based on titles and abstracts to assess thematic relevance. Following this, we conducted a full-text examination adhering to the inclusion criteria outlined by Xiao *et al*. [7], which led to the final selection of eight studies for analysis. A PRISMA flow diagram is shown in Fig. 1.

2.4 Data extraction

We systematically harvested data from the selected literature using a standardized extraction form. We categorized the extracted items into study-level characteristics (author, publication year, country, study design, recruitment period, sample size, and traits) and measurement specifications (instruments and cut-off points for sexual dysfunction and depression, recall window). To facilitate comparison between multidimensional assessments—such as the ASEX tool [17] employed by Sayed *et al*. [5]—and domain-specific instruments like the IIEF-5 [10], we meticulously documented the operational definitions of each measurement tool.

2.5 Quality assessment

We assessed the risk of bias in the included observational studies using the Newcastle-Ottawa Scale (NOS) [13]. This instrument evaluates three core domains: Selection (representativeness), Comparability, and Outcome, allowing each study to earn a maximum of nine stars (★). Specifically, we weighted the "Comparability" domain based on whether the study adequately controlled for key confounders—such as age, education level, and smoking status—through multivariable regression analysis. This rigorous approach ensures our evidence-based conclusions reflect both the quantitative findings and the methodological quality of the individual studies.

2.6 Statistical analysis

To synthesize prevalence data, we applied a Logit transformation to individual study proportions and employed a DerSimonian-Laird random-effects model, conservatively accounting for potential between-study heterogeneity. We evaluated statistical heterogeneity using the I^2 statistic, considering $I^2 > 50\%$ or Cochran's Q $p < 0.10$ as indicative of meaningful heterogeneity. To investigate sources of variation, we conducted pre-planned subgroup analyses based on measurement instruments (*e.g.*, PHQ-9, SDS) and participant characteristics, calculating tool-specific prevalence rates. For comparing associations and severity, we utilized adjusted odds ratios (aOR), regression coefficients (β), correlation coefficients (r), and standardized mean differences (SMD; Hedges' g) as effect size indicators, presenting all results with 95% confidence intervals (CIs). All statistical tests were two-sided. Because the number of studies available within each ED-focused quantitative analysis was small, meta-regression and extensive subgroup exploration by region, age, or study quality were not considered statistically reliable and were, therefore, not performed. Single-study estimates, such as adjusted odds ratios, regression coefficients, correlation coefficients, and standardized mean differences, were not interpreted as pooled meta-analytic findings. Rather, they were presented as narrative or descriptive individual-study results. Exploratory publication-bias assessment used funnel-plot inspection and Egger's regression test, but these results were interpreted cautiously because of the limited number of included studies and the marked imbalance in sample sizes. All meta-analyses were conducted using R software with standard meta-analytic procedures.

3. Results

3.1 Study characteristics

The eight observational studies finally selected for this systematic review were published between 2021 and 2025 (Table 1, Ref. [1, 3, 5–9, 11]). Regarding study design, six investigations employed a cross-sectional approach, while two studies (Pitta *et al*. [9] and Jiang *et al*. [8]) utilized a retrospective design based on medical records. The cumulative sample size was 24,563 participants. Notably, Pitta *et al*. [9] significantly bolstered the statistical power of the analysis by contributing a large-scale general population dataset of 21,139 individuals. Conversely, Sayed *et al*. [5] and Ghosh *et al*. [11] focused on smaller clinical cohorts of 68 and 100 patients, respectively, allowing for in-depth analysis within specific clinical settings.

In terms of participant characteristics, the studies diverged in their target populations. Rajih *et al*. [1] and Saito *et al*. [3] aimed to assess sexual dysfunction within the gen-

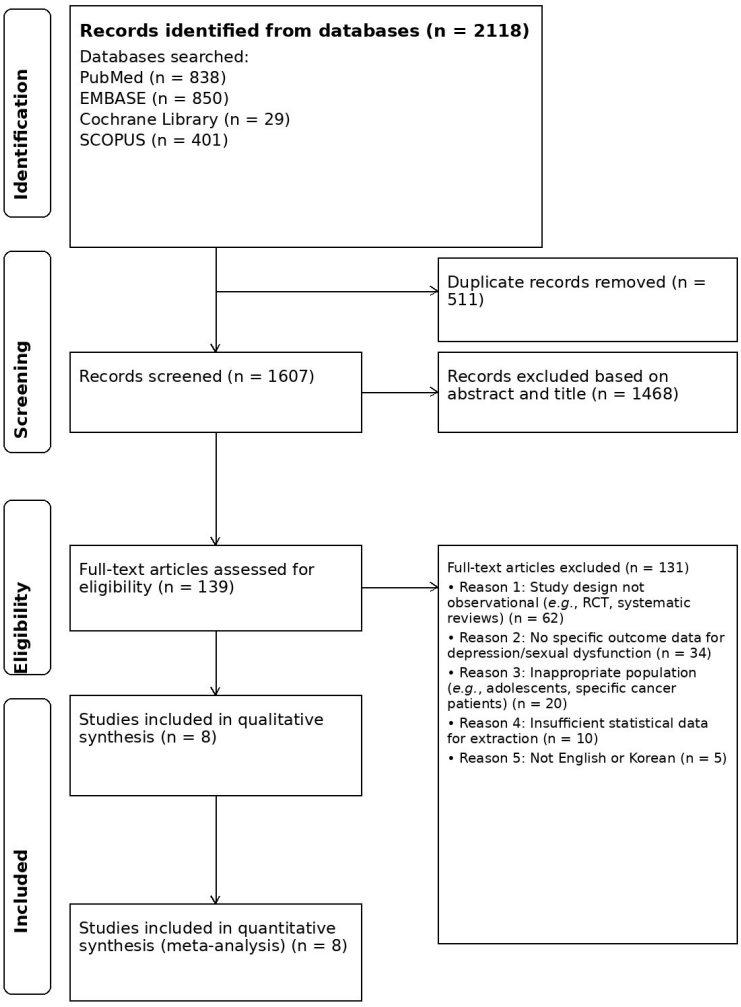

FIGURE 1. PRISMA flow diagram. RCT: randomized controlled trial.

TABLE 1. General characteristics of included studies.

Ref.	Author (year)	Country/setting	Design	Recruitment period	Population	Sample size, N	Age
[1]	Rajih *et al.* (2025)	Saudi Arabia/community	Cross-sectional	2023.04–2024.08	Young married men	196	36.0 (median)
[3]	Saito *et al.* (2024)	Japan/web-based	Cross-sectional	2023.01	Men with ED symptoms	643	36.19 ± 7.54
[5]	Sayed *et al.* (2021)	Bangladesh/hospital	Cross-sectional	2017.09–2019.08	Male MDD patients	68	32.00 ± 7.90
[6]	Quang *et al.* (2024)	Vietnam/hospital	Cross-sectional	2022.11–2023.03	Men with ED	390	37.63 ± 11.84
[7]	Xiao *et al.* (2023)	China/hospital	Cross-sectional	2021.07–2022.04	Men with ED	511	33.79 ± 8.20
[8]	Jiang *et al.* (2023)	China/hospital	Retrospective	2020.10–2022.09	Drug-naive first-episode MDD	1516	43.80 ± 18.70
[9]	Pitta *et al.* (2024)	Brazil/screening	Retrospective	2008–2018	General male screening sample	21,139	49.94 ± 7.55
[11]	Ghosh *et al.* (2023)	India/hospital	Cross-sectional	1.5 years	Men with PE/ED	100	35.68 ± 9.48

ED: erectile dysfunction; MDD: major depressive disorder; PE: premature ejaculation.

eral population, recruiting community-dwelling young men in Saudi Arabia and web-based samples in Japan, respectively. In contrast, Sayed *et al.* [5] and Jiang *et al.* [8] examined the prevalence of sexual dysfunction within cohorts already diagnosed with Major Depressive Disorder (MDD). Jiang *et al.* [8] specifically selected drug-naive, first-episode patients to rigorously control for the confounding effects of antidepressant medication. Finally, Quang *et al.* [6] and Xiao *et al.* [7] investigated the comorbidity of depressive symptoms among patients visiting hospitals specifically for ED treatment. Because most of the quantitatively informative and conceptually consistent studies focused on ED, the revised main synthesis centered on ED-focused studies, whereas the broader sexual dysfunction studies were retained only as contextual evidence. The general characteristics and corresponding study references are summarized in Table 1.

3.2 Measurement instruments

The most frequently used instrument for assessing ED across the selected literature was the IIEF-5 (also known as Sexual Health Inventory for Men (SHIM)), the abbreviated version of the International Index of Erectile Function [17]. Rajih *et al.* [1], Saito *et al.* [3], Quang *et al.* [6], Xiao *et al.* [7], and Pitta *et al.* [9] uniformly established a cut-off score of 21 or lower to identify the presence of ED.

By contrast, Sayed *et al.* [5] and Jiang *et al.* [8] used the Arizona Sexual Experience Scale (ASEX), which captures broader sexual dysfunction, rather than ED alone. Ghosh *et al.* [11] used the International Classification of Diseases (ICD-10) based assessment in a mixed PE/ED sample. These studies were, therefore, not treated as ED-equivalent in the main quantitative synthesis.

Regarding depressive symptom measurement, Saito *et al.* [3], Quang *et al.* [6], and Ghosh *et al.* [11] commonly employed the Patient Health Questionnaire-9 (PHQ-9), generally setting the threshold for suspected depression at a score of 10 or higher. In studies conducted in China, Xiao *et al.* [7] and Jiang *et al.* [8] adopted the Self-rating Depression Scale (SDS), considering an index score of 53 or above as indicative of clinically significant depression. Furthermore, Pitta *et al.* [9] applied a cut-off of 14 or higher using the Beck Depression Inventory-II (BDI-II), while Rajih *et al.* [1] utilized the PHQ-2 to enhance screening efficiency in a community setting, demonstrating the selection of tools optimized for specific research environments. Most studies designed their measurement time windows to reflect the "current" state or the "past 1–2 weeks", focusing on elucidating the concurrent correlation between sexual dysfunction and depression. In this paper, "ED" is used for erectile dysfunction, "sexual dysfunction" is reserved for broader constructs when appropriate, and instrument abbreviations, such as PHQ-9, IIEF-5, SHIM, ASEX, SDS, and BDI-II, are used consistently. The detailed measurement characteristics and corresponding study references are summarized in Table 2 (Ref. [1, 3, 5–9, 11]).

3.3 Study quality

Using the Newcastle-Ottawa Scale (NOS) to assess the risk of bias across the eight included observational studies, we observed a quality spectrum ranging from "Low" to "Very Good". This evaluation focused on three critical domains: Selection, Comparability, and Outcome/Exposure.

In the Selection domain, Pitta *et al.* [9] demonstrated the highest validity, securing strong scores for representativeness by leveraging a massive general population dataset of 21,139 individuals. Conversely, Sayed *et al.* [5] and Ghosh *et al.* [11] faced limitations regarding representativeness and potential selection bias due to their reliance on convenience sampling from small, hospital-based cohorts. While Rajih *et al.* [1] and Saito *et al.* [3] utilized community and web-based samples from Saudi Arabia and Japan, respectively, we evaluated them as retaining some risk of selection bias inherent to voluntary response protocols.

Within the Comparability domain, our assessment centered on whether studies employed multivariable regression to control for key confounders, such as age, socioeconomic status, and comorbidities. Saito *et al.* [3], Quang *et al.* [6], Xiao *et al.* [7], Jiang *et al.* [8], and Pitta *et al.* [9] achieved high comparability—earning two stars (★★)—by adequately adjusting for these confounding variables within their statistical models. However, Ghosh *et al.* [11] relied primarily on simple correlation or descriptive statistics; consequently, we determined that they failed to sufficiently rule out the influence of confounding variables when establishing an independent association between sexual dysfunction and depression.

Finally, in the Outcome/Exposure domain, most studies received favorable evaluations for utilizing validated self-report instruments, such as the IIEF-5, PHQ-9, and SDS. Jiang *et al.* [8] particularly secured objectivity by precisely measuring sexual function in patients prior to medication. In contrast, Ghosh *et al.* [11] recorded lower scores due to insufficient descriptions of their clinical diagnostic procedures and a lack of measurement standardization.

Synthesizing these assessments, Pitta *et al.* [9] emerged as the highest quality study ("Very Good") with a score of 7. The studies by Saito *et al.* [3], Quang *et al.* [6], Xiao *et al.* [7], and Jiang *et al.* [8] were rated as "Good" with 6 points. Rajih *et al.* [1] and Sayed *et al.* [5] maintained a "Moderate" level with scores of 5 and 4, respectively, whereas Ghosh *et al.* [11] was classified as "Low" quality with a score of 3. We incorporated these quality gradings to appropriately weigh the evidence when deriving our final conclusions. The NOS domain scores and corresponding study references are summarized in Table 3 (Ref. [1, 3, 5–9, 11]).

3.4 Prevalence of depression in patients with ED

Three studies (Saito *et al.* [3], Nguyen Quang *et al.* [6], Xiao *et al.* [7]) reported the prevalence of depression within samples suffering from ED. Given the disparity in assessment tools, we prioritized a subgroup analysis based on the specific instrument used, adhering to the study protocol. Fig. 2 (Ref. [3, 6, 7]) illustrates the depression prevalence in the ED cohort and the results stratified by instrument.

Pooling two studies [3, 6] that defined depression using a PHQ-9 cutoff of $\geq$10 via a logit-transformed random-effects model yielded a combined prevalence of 22.1% (95% CI:

TABLE 2. Sexual dysfunction and depression measurement details.

Author (year)	Ref.	SD domain	SD instrument	SD cut-off	Depression instrument	Depression cut-off	Time window
Rajih *et al.* (2025)	[1]	ED	SHIM	≤21	PHQ-2	Positive screen	Current
Saito *et al.* (2024)	[3]	ED	IIEF-5	≤21	PHQ-9	≥10	2 weeks
Sayed *et al.* (2021)	[5]	General	ASEX	Total ≥19	DASS-21 (depression)	Severity categories	1 week
Quang *et al.* (2024)	[6]	ED	IIEF-5	≤21	PHQ-9	≥10	2 weeks
Xiao *et al.* (2023)	[7]	ED	IIEF-5	≤21	SDS	Index ≥53	Recent
Jiang *et al.* (2023)	[8]	General	ASEX	Total ≥19	SDS	Index ≥53	Recent
Pitta *et al.* (2024)	[9]	ED	IIEF-5	Presence	BDI-II	≥14	15 days
Ghosh *et al.* (2023)	[11]	PE/ED	ICD-10	Clinical diagnosis	HAM-D/PHQ-9	Mean difference	Recent

ED: erectile dysfunction; PE: premature ejaculation; IIEF: International Index of Erectile Function; ASEX: Arizona Sexual Experience Scale; PHQ: Patient Health Questionnaire; SDS: Self-rating Depression Scale; BDI: Beck Depression Inventory; SD: Sexual Dysfunction; SHIM: Sexual Health Inventory for Men; ICD: International Classification of Diseases; DASS: Depression Anxiety Stress Scales; HAM-D: Hamilton Depression Rating Scale.

TABLE 3. Quality assessment using the Newcastle-Ottawa Scale (NOS).

Author (year)	Selection	Comparability	Outcome/Exposure	Total score	Quality	Ref.
Rajih *et al.* (2025)	★★	★	★★	5/9	Moderate	[1]
Saito *et al.* (2024)	★★	★★	★★	6/9	Good	[3]
Sayed *et al.* (2021)	★	★	★★	4/9	Moderate	[5]
Quang *et al.* (2024)	★★	★★	★★	6/9	Good	[6]
Xiao *et al.* (2023)	★★	★★	★★	6/9	Good	[7]
Jiang *et al.* (2023)	★★	★★	★★	6/9	Good	[8]
Pitta *et al.* (2024)	★★★	★★	★★	7/9	Very good	[9]
Ghosh *et al.* (2023)	★	★	★	3/9	Low	[11]

★: criterion met in that domain; ★★: criteria met; ★★★: criteria met (only possible in Selection or Outcome/Exposure, since Comparability max is 2).

7.6%–49.5%). Heterogeneity between these studies was substantial. Conversely, the single study employing the SDS with a cutoff of ≥53 [7] reported a significantly higher prevalence of 65.0% (95% CI: 60.7%–69.0%). While the aggregate prevalence across all three studies—regardless of the tool—was 34.7% (95% CI: 13.2%–64.9%), and between-study heterogeneity was extreme. Therefore, the overall pooled estimate should be interpreted with considerable clinical caution.

3.5 Prevalence of sexual dysfunction in male MDD patients

Two studies (Sayed *et al.* [5], Jiang *et al.* [8]) reported the prevalence of sexual dysfunction, defined by the Arizona Sexual Experience Scale (ASEX), among male patients with Major Depressive Disorder (MDD). Integrating these findings using a logit-based random-effects model resulted in a pooled prevalence of 54.0% (95% CI: 23.2%–82.0%), with substantial heterogeneity observed (I^2 = 95.9%). Fig. 3 (Ref. [5, 8]) presents the results of this meta-analysis.

3.6 Association between ED and depressive symptoms (adjusted OR)

One study (Pitta *et al.* [9]) presented the association between ED and depressive symptoms in a general male population using an adjusted odds ratio (aOR) to control for covariates. The analysis revealed a significant association between ED and depressive symptoms, with an aOR of 2.021 (95% CI: 1.797–2.272). This indicates that men with ED had approximately double the odds of depressive symptoms compared with those without ED in that study. Fig. 4 (Ref. [9]) displays these effect

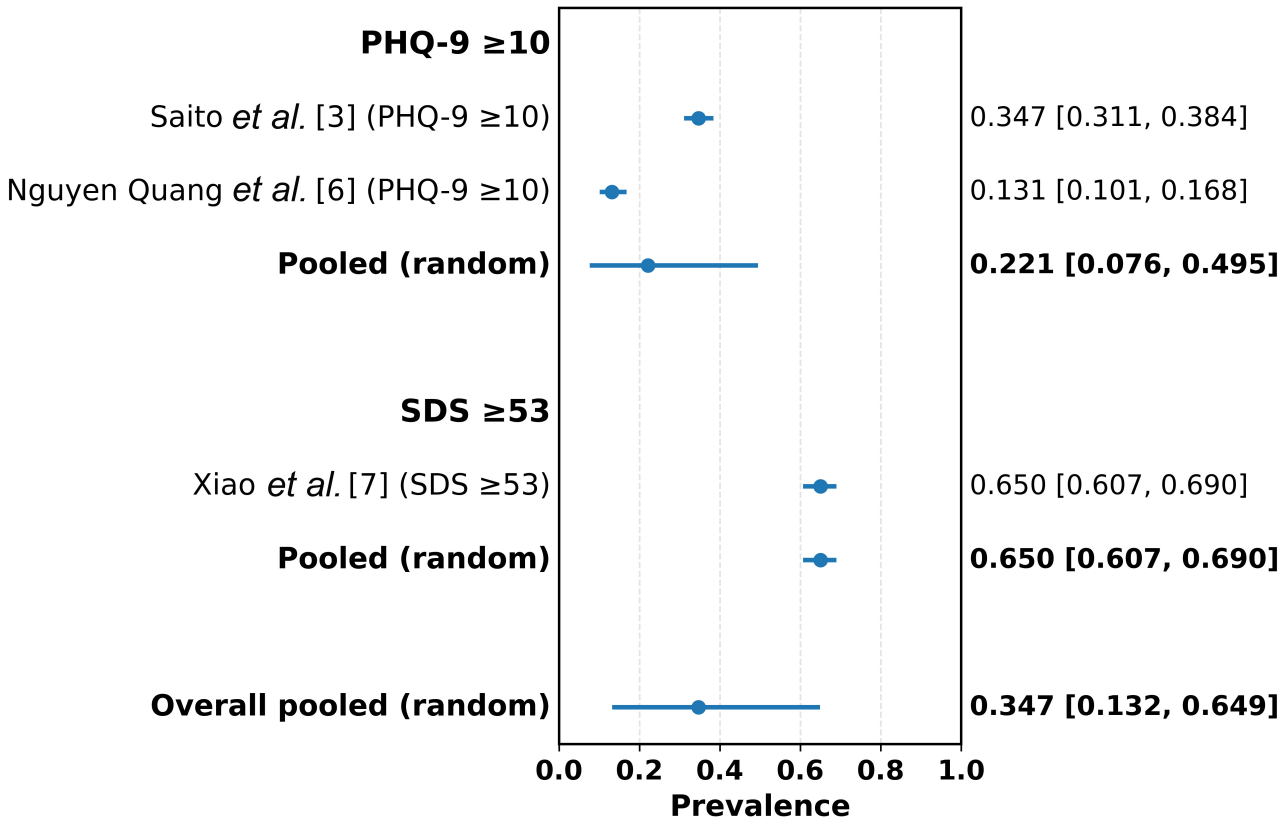

FIGURE 2. Depression prevalence among ED samples (subgrouped by instrument: PHQ-9 ≥10 *vs.* SDS ≥53). PHQ: Patient Health Questionnaire; SDS: Self-rating Depression Scale.

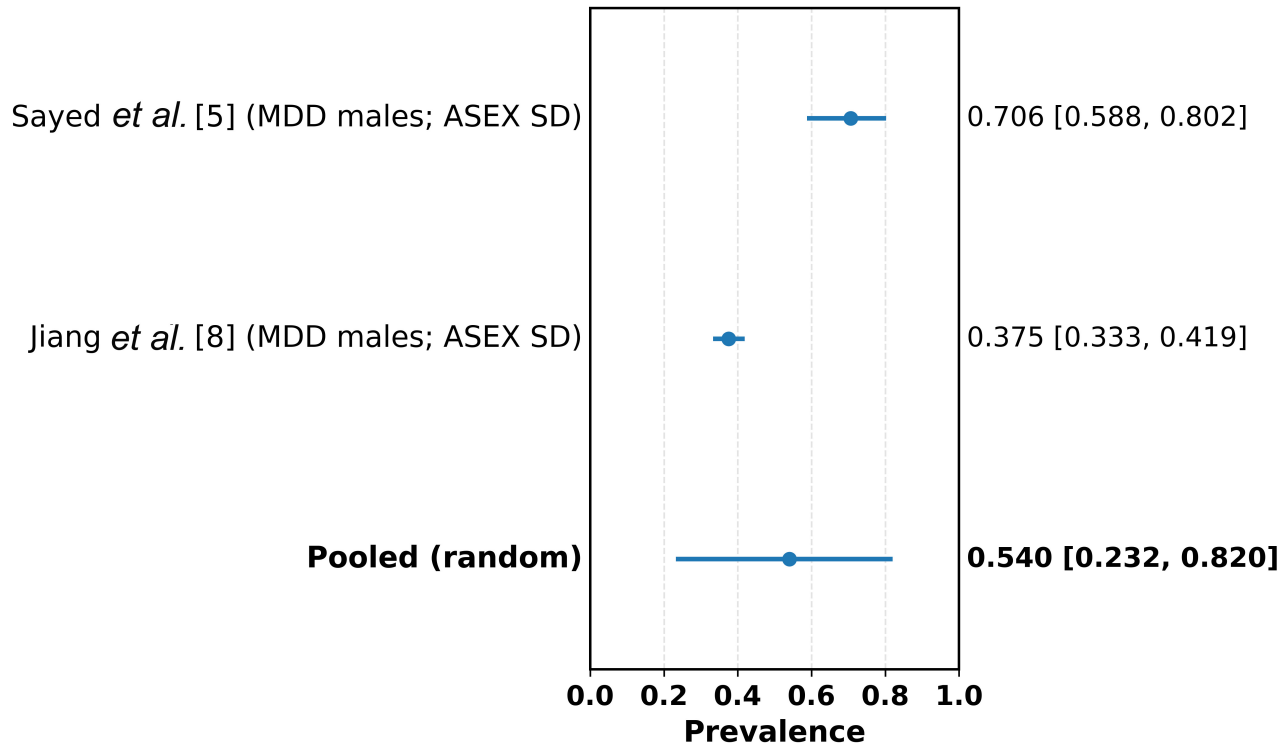

FIGURE 3. Sexual dysfunction prevalence among males with MDD (ASEX-defined; random-effects model). MDD: major depressive disorder; ASEX: Arizona Sexual Experience Scale; SD: Sexual Dysfunction.

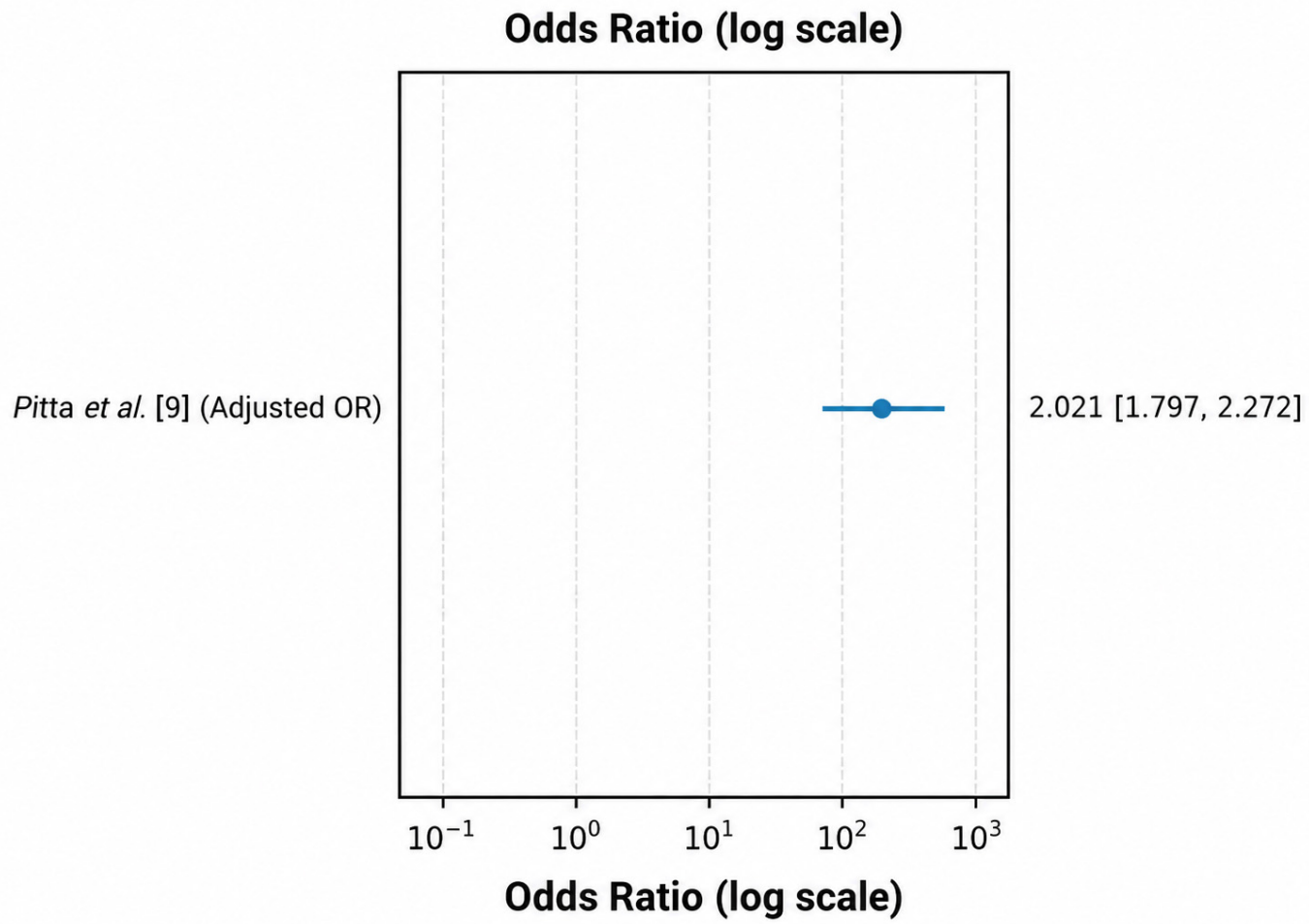

FIGURE 4. Association between ED and depressive symptoms (adjusted odds ratio) in a population-based male sample.

estimates. Because this estimate was derived from a single large study, rather than a pooled meta-analysis, it is interpreted in this paper as an important individual-study finding, rather than definitive meta-analytic evidence.

3.7 Differences in erectile function scores by depression screening status

Rajih *et al*. [1] utilized regression coefficients to report the linear relationship between depression screening results and erectile function scores in a cohort of young married men. Multivariable regression analysis indicated that the group screening positive for depression had significantly lower IIEF scores (β = −12.65; 95% CI: −17.37 to −7.92) and lower SHIM scores (β = −4.63; 95% CI: −6.64 to −2.62) compared to the negative screening group. These findings demonstrate a significant negative association between depressive state and erectile function. Fig. 5 (Ref. [1]) illustrates these results.

3.8 Correlation between depression severity and sexual dysfunction

According to Sayed *et al*. [5], who analyzed the correlation between depression severity and the degree of sexual dysfunction in male MDD patients, the correlation coefficient between DASS-21 scores and ASEX total scores was r = 0.640 (95% CI: 0.474–0.762). This indicates a strong positive correlation, where the intensification of depressive symptoms parallels the worsening of sexual dysfunction. Fig. 6 (Ref. [5]) presents these correlation estimates.

3.9 Standardized mean difference (SMD) in depression severity by sexual dysfunction status

Jiang *et al*. [8] compared depression severity based on the presence of sexual dysfunction using Propensity Score Matching (PSM). Post-matching analysis revealed that the sexual dysfunction group had statistically significantly higher SDS scores than the control (non-dysfunction) group. The calculated Standardized Mean Difference (Hedges' g) was 0.624 (95% CI: 0.403–0.845), representing a medium effect size according to Cohen's criteria. Fig. 7 (Ref. [8]) details this result.

3.10 Other single-study prevalence estimates

Additionally, an observational study [11] focusing on samples related to premature ejaculation and erectile dysfunction re-

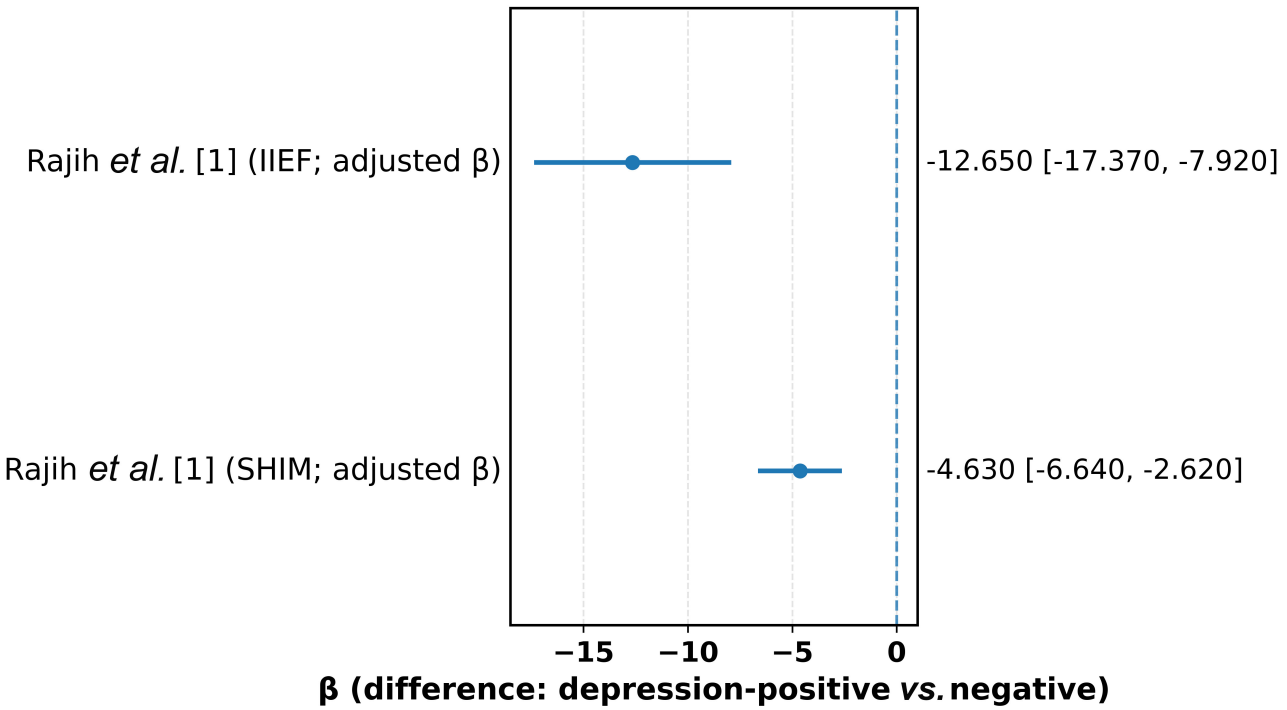

FIGURE 5. Adjusted regression coefficients for erectile-function scores (IIEF and SHIM) by depression screening status. IIEF: International Index of Erectile Function; SHIM: Sexual Health Inventory for Men.

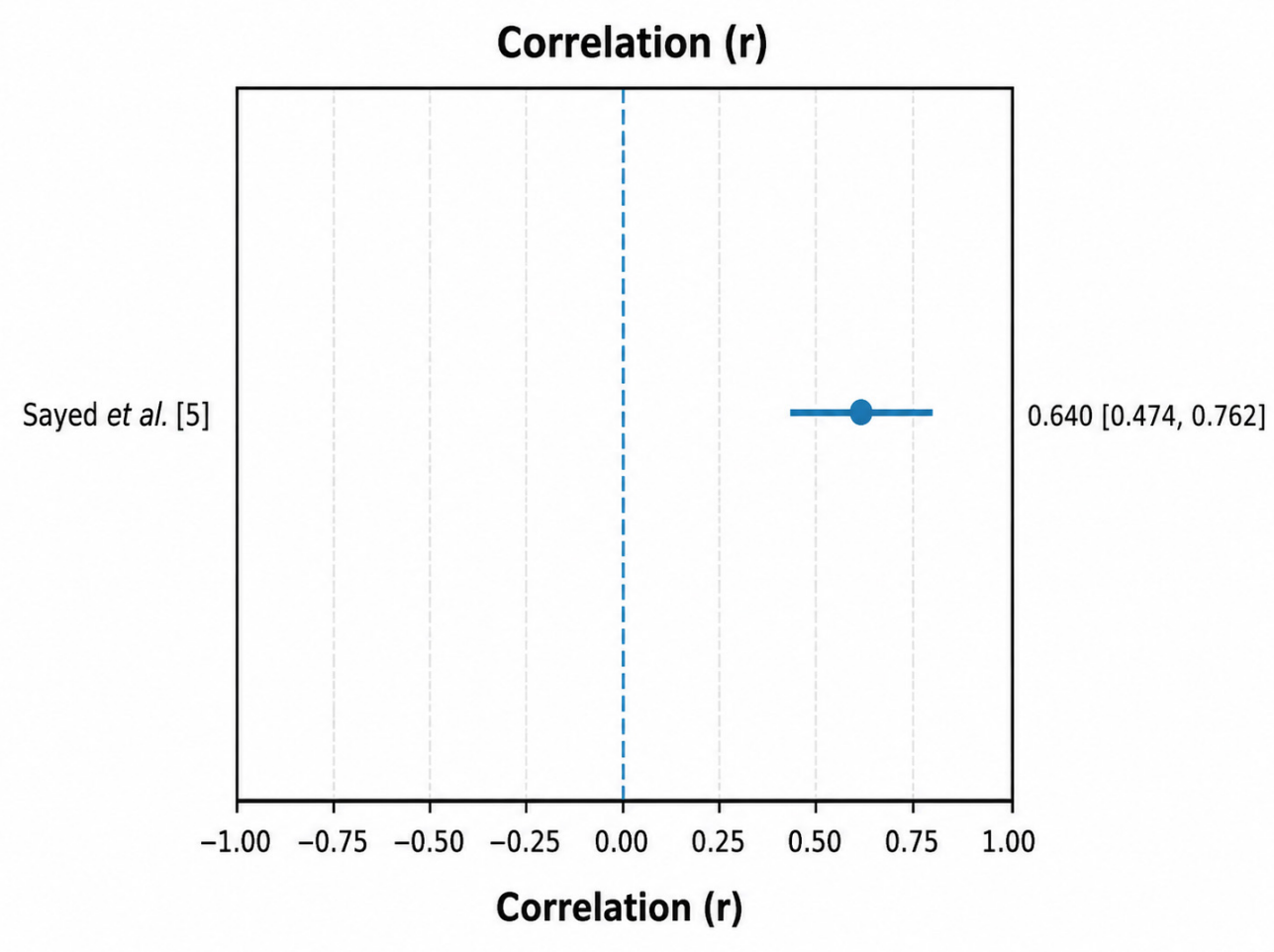

FIGURE 6. Correlation between depressive symptom severity tool (DASS-21) and sexual dysfunction severity (ASEX) in males with MDD.

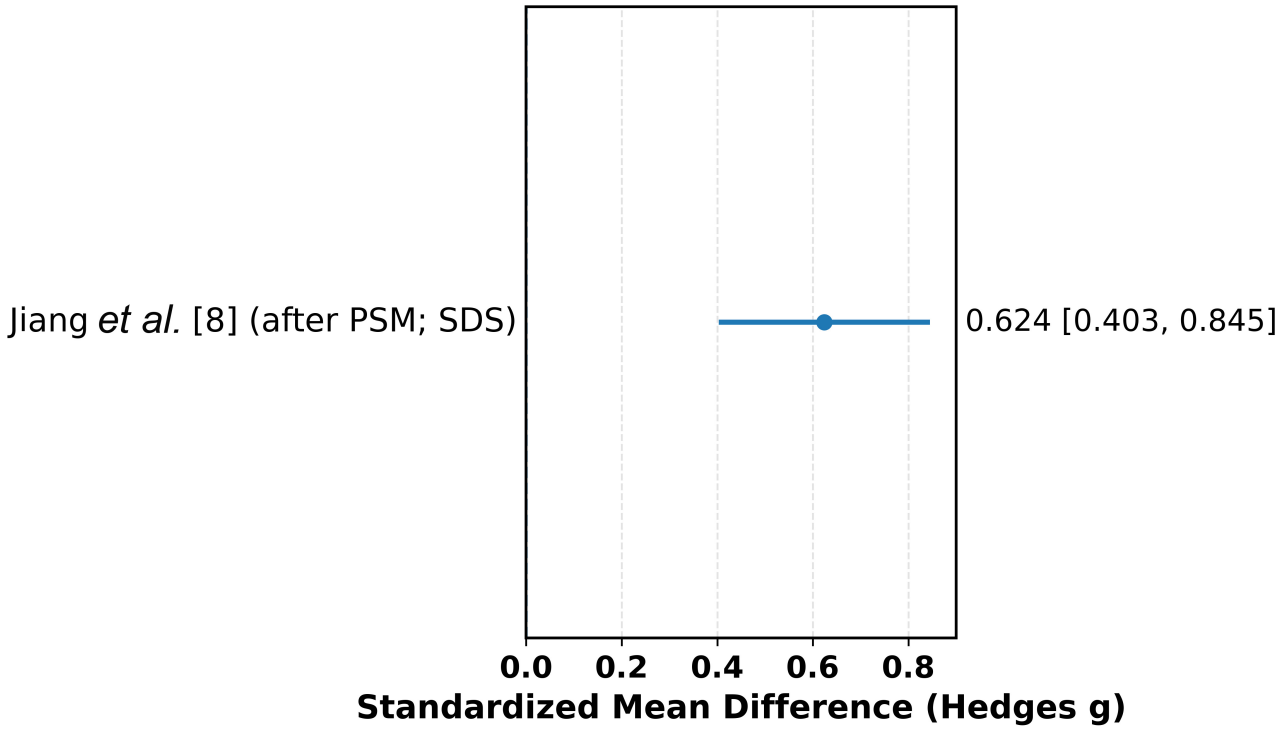

FIGURE 7. Standardized mean difference (Hedges' *g*) in depressive symptom severity (SDS) between sexual dysfunction *vs.* non-dysfunction groups (after PSM). PSM: Propensity Score Matching; SDS: Self-rating Depression Scale.

ported a prevalence of "depressive symptoms (or depression accompanied by anxiety)" at 57.0% (95% CI: 47.2%–66.3%); this is shown in Fig. 8 (Ref. [11]). Separately, Rajih *et al.* [1] reported a positive response rate for depressive symptoms of 63.8% (95% CI: 56.8%–70.2%) using PHQ-2 screening in a specific cohort of young married men.

3.11 Evaluation of publication bias

To explore potential publication bias among the eight included studies, we used both visual inspection of the funnel plot (Fig. 9) and Egger's regression test [18]. The funnel plot did not show a strongly directional visual pattern; however, Egger's regression test was statistically significant ($p < 0.001$), raising the possibility of publication bias or small-study effects. Because only a small number of studies were available and the quantitative evidence base was heterogeneous in both study design and effect-size metric, these results were treated as exploratory, rather than confirmatory. Publication bias or small-study effects, therefore, cannot be excluded. Although methods such as trim-and-fill correction [19] or leave-one-out influence analysis can be informative, we did not emphasize them here because the evidence base was limited and the reported effect measures were not sufficiently homogeneous for robust comparative sensitivity testing. Future reviews based on larger and more methodologically consistent datasets should incorporate these additional approaches.

4. Discussion

This systematic review synthesized recent observational evidence on the epidemiological link between ED and depressive symptoms by examining eight studies published between 2020 and 2025. Overall, the findings suggest a clinically meaningful association between ED and depression, while also indicating a high burden of broader sexual dysfunction among men with MDD.

First, the prevalence of depression within ED samples varied considerably depending on the assessment instrument. As evidenced by our subgroup analysis, studies utilizing the PHQ-9 (cutoff 10 points) yielded a pooled prevalence of 22.1% [3, 6], whereas the study employing the SDS (cutoff 53 points) reported a substantially higher figure of 65.0% [7]. This discrepancy likely reflects not only instrumental differences, but also variations in clinical severity, study setting, and cultural context [20]. The high heterogeneity ($I^2 \approx 98\%$) suggests that the mental health status of ED patients cannot be generalized into a single metric. Consequently, clinicians must prioritize individualized assessments that account for both the degree of sexual impairment and the specific psychological distress reported by the patient. Because the number of studies was too small to support statistically reliable meta-regression or broader subgroup modeling, the pooled prevalence estimates should be interpreted cautiously, rather than treated as precise universal values.

The association between ED and depressive symptoms was observed across both large-scale population studies and specific age-group research. Pitta *et al.* [9] reported an adjusted odds ratio of 2.021, indicating that ED was associated with higher odds of depressive symptoms in a large population-based sample. This pattern is further supported by later population-based evidence showing that young men with ED had higher prevalence and subsequent incidence of

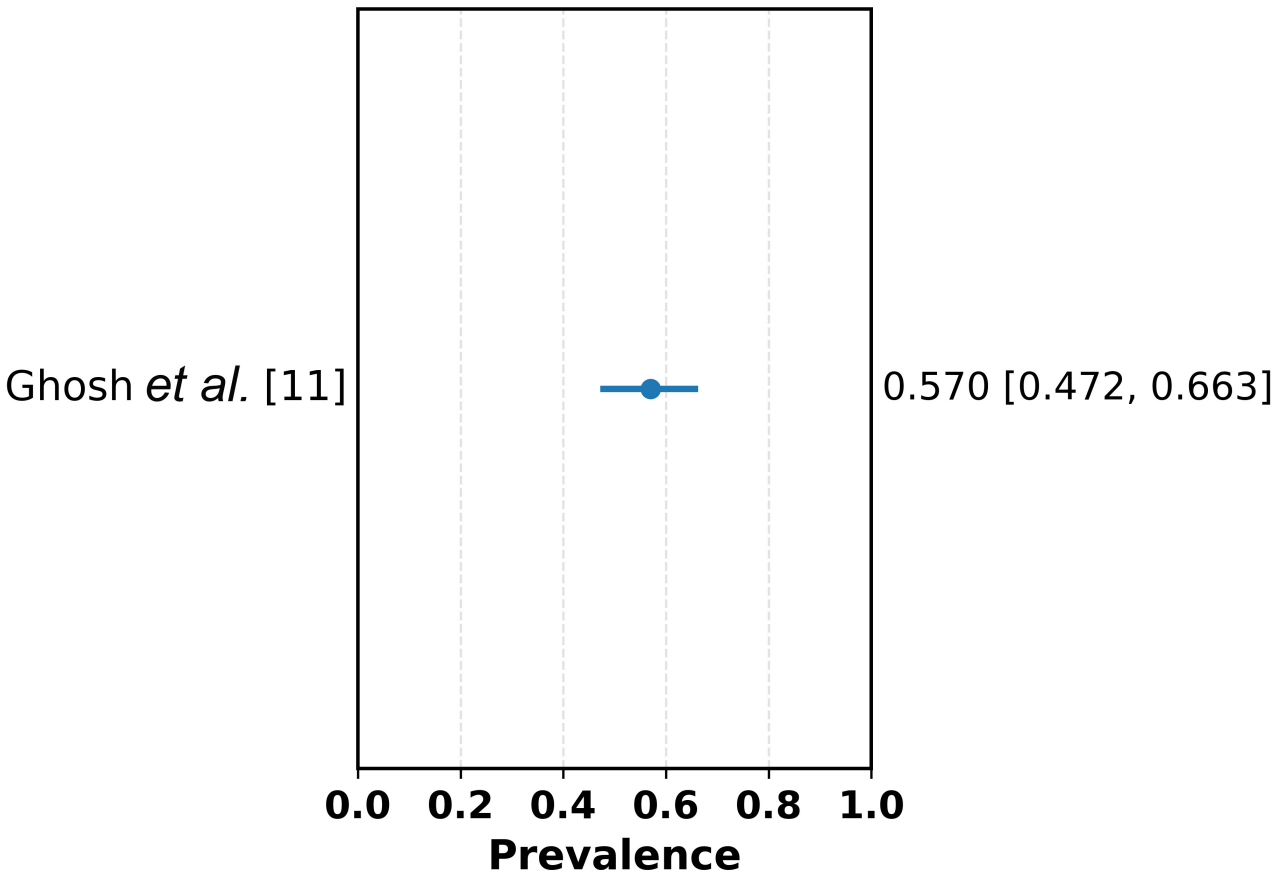

FIGURE 8. Depression prevalence in a PE/ED-related observational sample (definition: depression or anxiety + depression). PE: premature ejaculation; ED: erectile dysfunction.

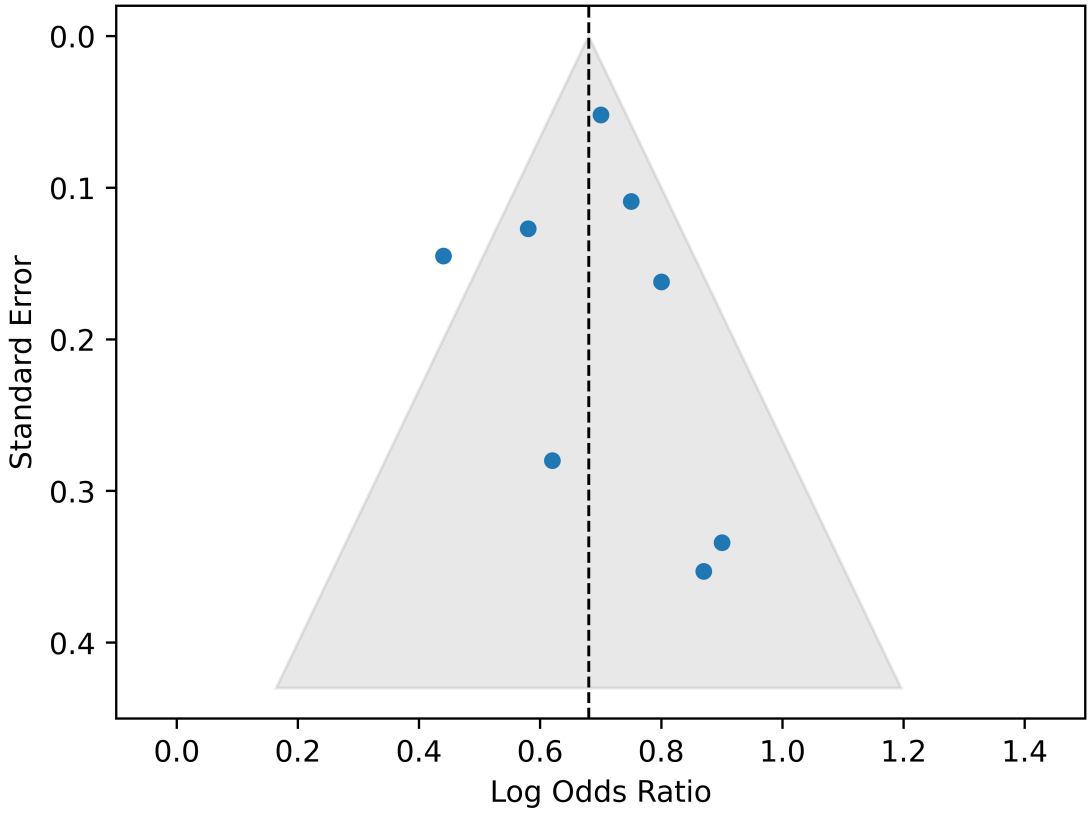

FIGURE 9. Funnel plot for evaluating publication bias.

depression and anxiety than matched controls [21], as well as by a large federated-network analysis reporting that ED was associated with a higher risk of major depressive disorder [22]. This aligns with psychological models suggesting that sexual difficulties may reduce self-esteem and subjective well-being, while stress and performance worry may aggravate erectile difficulties [23]. Furthermore, Rajih *et al*. [1] found that young married men screening positive for depression had significantly lower IIEF and SHIM scores. Taken together, these findings support a clinically important relationship between erectile function and depressive symptoms, but they do not establish temporal order or causality [24].

The 54.0% prevalence of sexual dysfunction observed in male MDD patients carries important clinical implications. The finding that more than one in two men with MDD had ASEX-defined sexual dysfunction suggests that sexual symptoms are not merely peripheral complaints, but potentially important comorbid features of depression. Notably, the strong positive correlation (r = 0.640) between depression severity and ASEX scores reported by Sayed *et al*. [5] highlights the possibility of comorbid worsening. Jiang *et al*. [8] provided further insight; even after controlling for potential confounders via PSM, the sexual dysfunction group exhibited significantly higher SDS scores (g = 0.624). These findings support a clinically relevant association between sexual dysfunction and depressive symptom burden; however, the directionality of this relationship cannot be determined from the predominantly cross-sectional evidence base. They also underscore the need to carefully distinguish between sexual decline associated with antidepressant side effects and sexual symptoms related to the underlying depressive disorder itself.

The clinical implications of these findings can be stated more concretely. In urology settings, routine screening for depressive symptoms using brief instruments, such as the PHQ-2 or PHQ-9, may help identify men with ED who warrant further mental-health evaluation. Conversely, in psychiatric outpatient settings, routine sexual-function assessment using validated tools, such as the IIEF-5, SHIM, or ASEX, may improve recognition of clinically relevant sexual symptoms in men with depression. In addition, a structured referral pathway between urology and mental-health services may improve identification and management of men with co-occurring ED and depressive symptoms. These practical recommendations are also consistent with the European Society of Sexual Medicine position statement, which emphasizes a biopsychosocial and multidisciplinary approach to ED assessment and treatment [25].

This study has several limitations. First, the number of studies included in the meta-analysis was limited, and several key estimates (adjusted OR, regression coefficients, correlation coefficients, and standardized mean differences) were derived from single studies, rather than pooled analyses; these findings should, therefore, be interpreted as supportive narrative evidence, rather than definitive meta-analytic conclusions. Second, the extreme statistical heterogeneity observed in the depression prevalence analysis among ED patients warrants caution in interpreting quantitative aggregates. Third, most included studies employed a cross-sectional design, making it difficult to establish temporal precedence or causal direction between depression and sexual dysfunction. Fourth, variations in covariate control and symptom cutoffs across studies mean that residual confounding cannot be entirely ruled out. Fifth, the review was intentionally limited to studies published between 2020 and 2025 and, therefore, should be understood as a recent-evidence update, rather than a comprehensive historical synthesis. Sixth, although the protocol was registered in PROSPERO, that registration occurred after completion of the literature search and should, therefore, be interpreted as retrospective. Seventh, publication bias or small-study effects cannot be excluded, particularly because Egger's regression test was statistically significant and the available evidence base was small and heterogeneous. In addition, emerging Mendelian randomization evidence suggests that genetically predicted depression may increase the risk of ED, reinforcing the need for longitudinal and mechanistic studies to clarify temporal direction in clinical populations [26]. The interpretation of SDS and BDI-II measurement definitions was also checked against established psychometric references [27, 28].

5. Conclusion

Recent observational evidence suggests a clinically meaningful association between ED and depressive symptoms in adult men. Depressive symptoms appear common among men with ED, and individual studies indicate that ED is associated with poorer mental-health status and that depression screening positivity is associated with lower erectile-function scores. However, the strength and direction of this relationship should be interpreted cautiously because the number of eligible studies was limited, several findings relied on single-study estimates, heterogeneity was substantial, and most included studies were cross-sectional. Rather than supporting definitive causal conclusions, the current evidence supports heightened clinical awareness, routine cross-screening in urology and mental-health settings, and closer collaboration between sexual-medicine and psychiatric services.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are provided at the request of the corresponding author.

AUTHOR CONTRIBUTIONS

HB—conceptualization, methodology, formal analysis, and writing-original draft; writing–review and editing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable. This study synthesized data from previously published studies and did not involve new data collection from human participants.

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Not applicable.

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CONFLICT OF INTEREST

The author declares no conflict of interest. Haewon Byeon is serving as one of the Editorial Board members/Guest editors of this journal. We declare that Haewon Byeon had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to MS.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jomh.org/files/article/20717967615573852 16/attachment/Supplementary%20material.docx.

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