

SYSTEMATIC REVIEW

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Interventions to prevent sexual harassment in universities: an umbrella review of systematic reviews

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Abstract

Objective This umbrella review analyzes existing literature on sexual harassment (SH) prevention in universities, including approaches that address SH within broader gender-based violence (GBV) forms. Conducted as part of the Uni4Equity project (CERV-2022-DAPHNE Programme), it aims to identify key trends, limitations and gaps in current prevention strategies.

Method A systematic search of four databases (PubMed, Scopus, Web of Science, and PsycINFO) was conducted to identify relevant systematic reviews evaluating interventions aimed at preventing SH (and related GBV forms) in university settings. Reviews were selected if they (1) demonstrated methodological requirements (e.g., detailed search strategies, pre-registered protocol), (2) were published in English between 2000 and 2024, (3) involved adult populations (students, staff).

Results We identified 17 systematic reviews meeting these criteria, whose methodological quality was rated as “critically low” according to the AMSTAR-2. Notably, none of the included reviews focused specifically on SH, and the available evidence derived from interventions targeting broader forms of GBV. The most consistent results came from bystander intervention programs, which effectively improved knowledge, attitudes, and self-efficacy, though they had limited impact on actual behavior change. Primary prevention programs addressing sexual and relationship violence had mixed results, while self-defense and risk reduction programs showed limited evidence of effectiveness. Social minorities, including LGBTQ+ populations, were notably underrepresented in the studies reviewed.

Conclusions Findings highlight the need for comprehensive, campus-wide strategies that go beyond individual-focused interventions. These strategies should integrate education, policy reforms, awareness campaigns, and staff training. Moreover, they must be inclusive and intersectional, addressing the different layers of gender relations—social, institutional, and interpersonal. Methodological rigor is also essential to develop sustainable and culturally relevant solutions.

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Keywords Sexual harassment, Gender-based violence, Prevention programs, Bystander intervention, Higher education

Introduction

Sexual harassment (SH) can be defined as any unwanted verbal, non-verbal, physical, or digital conduct of a sexual nature that has the purpose or effect of violating a person's dignity, particularly when it creates an intimidating, hostile, degrading, humiliating, or offensive environment. [1]. In university settings, SH may include unwanted sexual comments, jokes, gestures, messages, images, repeated sexual advances, inappropriate touching, coercive requests, or abuses of power linked to academic or professional roles. These behaviors, whether occurring face-to-face or through digital channels, are recognized as abusive and perpetuate societal power imbalances, disproportionately affecting women [2]. Often, it is difficult to define the boundary between SH and broader forms of violence such as gender-based violence, sexual abuse, sexual assault, and psychological harassment. This conceptual and terminological ambiguity complicates theoretical understanding as well as legal, research, and prevention efforts [3–5].

Within this broader framework, SH could be conceptualized as part of the continuum of sexual violence (SV) [6], representing its earlier and less explicit manifestations [7–9].

In university settings, SH is a pressing concern. In the United States, an estimated 20–25% of women and 7–8% of men experience SH during their university education, with especially high rates among women under 30 [10, 11]. This period is sometimes referred to as the "Red Zone" to emphasize the heightened risk [12]. In Europe, prevalence rates are similar, with approximately 23% of women reporting experiences of SH or abuse during their studies [13]. Although research rarely provides staff-specific prevalence data [14–16], some evidence shows that they are also affected: for example, at the Complutense University of Madrid, 11.2% of administrative employees and 12.7% of teachers reported SH—higher rates than those observed among students (5.7%) [17]. Studies also indicate that a significant proportion of men engage in such behaviors, underscoring the need for targeted preventive measures addressing this group [18]. University environments are characterized by power dynamics—often shaped by hierarchical relationships between students, faculty and administrative staff—that can create conditions conducive to SH [19–21]. These imbalances are reinforced by cultural and contextual factors such as male-dominated environments, sexist attitudes, and the persistence of traditional gender norms, all of which contribute to the normalization and underestimation of harassment [19, 22–24]. Moreover, the diversity of

university populations increases risk exposure, particularly for individuals from marginalized groups based on gender identity, sexual orientation, ethnicity, or disability [19, 25–27]. Minority groups—especially LGBTQ+ individuals and ethnic minorities—face disproportionately high risks due to intersecting forms of discrimination and social exclusion [28–33]. For instance, LGBTQ+ individuals are up to three times more likely to experience SH than their heterosexual peers [34]. Preventing SH and other GBV forms is a complex challenge with far-reaching consequences for victims' physical, mental, social and economic well-being, as well as for institutional climate and academic performance. Psychological impacts include depression, anxiety, and post-traumatic stress disorder (PTSD) alongside potential physical health consequences such as sexually transmitted infections [35, 36]. Academically, harassment can result in concentration difficulties, delayed graduation, or university withdrawal [37]. Among university staff, SH is often linked to burnout, absenteeism, and turnover, which undermine well-being and productivity [38–40]. In response, various policies and measures have been implemented at both international and national levels. In the United States, Title IX prohibits gender discrimination in educational institutions receiving public funding, while the Campus Sexual Violence Elimination (SaVE) Act [41] introduced additional provisions to prevent and address sexual violence on university campuses. In Europe, many universities have adopted similar policies, though regulations vary considerably across countries [15, 42]. Despite these efforts, identifying effective and sustainable long-term solutions remains challenging. The literature on violence prevention is extensive, encompassing numerous studies and reviews [43, 44]. In line with the conceptual overlap outlined above, many interventions addressing sexual harassment are embedded within broader programs targeting gender-based violence (GBV), SV, sexual assault (SA) and intimate partner violence (IPV), often focusing on awareness, consent, and active bystander strategies. This reflects the current state of the literature, in which SH prevention is rarely examined independently, and interventions are often developed and evaluated within broader frameworks addressing different form of GBV. To the best of our knowledge, no universally accepted classification system for these interventions exists. Overall, they can be grouped by the target populations involved (e.g., athletes, potential perpetrators, potential victims, general bystanders) and intended outcomes (e.g., improving consent-related behaviors, enhancing self-defense skills, promoting active bystander strategies,

etc.) [45]. While some approaches are promising, findings remain heterogeneous and often contradictory [46], leaving open questions about which models are the most effective in specific contexts.

Given this complexity, the aim of this umbrella review was to collect, integrate, and summarize the evidence on strategies to prevent and manage SH in university settings, drawing on systematic reviews and meta-analyses, while highlighting areas of consensus and disagreement and evidence gaps in current strategies.

Methods

This umbrella review was preregistered in the International Prospective Register of Systematic Reviews (PROSPERO; Registration Number: CRD42024597243) and conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [47]. The review was conducted as part of the Uni4Equity project (CERV-2022-DAPHNE Programme, European Union), which provided a broader framework and context for the study [48].

Eligibility criteria and outcomes of interest

Systematic reviews, with or without meta-analysis, as well as scoping reviews including any type of preventive intervention—whether primary, secondary or tertiary prevention—targeting potential victims, bystanders or perpetrators of different forms of GBV were eligible for inclusion. This because SH in higher education is rarely studied in isolation and interventions frequently target different forms of violence (GBV, SV, IPV and SH). Specifically, papers were included if they met the following criteria:

1. Minimum methodological requirements: clearly stated inclusion and exclusion criteria, detailed search strategies (e.g., full search strings or comprehensive keyword lists), use of at least two scientific databases, and a pre-registered protocol on PROSPERO or an equivalent platform.
2. Language and date: published in English between 2000 and 2024.
3. Setting and population: conducted in higher-education contexts and involving adult participants in any role (students, lecturers, staff, etc.).

Exclusion criteria were:

- a) Studies conducted outside university or college settings.
- b) Studies involving minors.

No geographical restrictions were applied.

Information sources and searching strategy

A systematic search of the literature was conducted up to February 2025 to identify systematic reviews of studies evaluating interventions aimed at preventing SH in universities. To ensure a comprehensive evidence base by preventing the omission of critical data, an inclusive search strategy considering also SH-related domains was adopted. Accordingly, a comprehensive search (comprising any type of intervention, including prevention) of four databases (PubMed, Scopus, Web of Science and PsycINFO) was conducted using a combination of controlled vocabulary (MeSH terms) and free-text keywords related to SH (e.g., “sexual harassment”, “sexual violence”, “gender-based violence”), academic environments (e.g., “university”, “college”, “campus”, “academia”). The search was limited to reviews published in English between 2000 and 2024. Full search strings are provided in the Appendix (see Table 3 in the [Appendix](#)). Reference lists of all eligible review articles were also hand-searched to identify additional relevant systematic reviews. The selection process was documented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [47].

Selection process and data extraction

Two review authors (LA and GT) independently screened titles and abstracts for inclusion using Rayyan [49]. Articles rated as possible candidates by either reviewer were added to a preliminary list, and their full texts were retrieved. Working independently and in duplicate, the two review authors then assessed the full texts for eligibility. Discrepancies were resolved by consensus or, if necessary, through discussion with a third researcher (VD). Two review authors (FDM and LA) independently extracted data, with disagreements resolved by a third reviewer (VD). For each included review, the following information was collected: geographical and temporal focus (see Table 4 in the [Appendix](#)), the type of review (e.g., systematic review, meta-analysis), number of included studies, types of interventions (e.g., distinguishing between “Bystander Programs”, “Primary prevention Programs on Sexual and Relationship Violence”, “Self-Defense & Risk Reduction Programs”), sample characteristics (e.g., population type/role, age range, ethnicity, specific groups composition), delivery format and duration of interventions, outcome, main findings (see Table 5 in the [Appendix](#)) and assessment tools implemented (see Table 2). To facilitate systematic comparison across studies, both interventions and outcomes were categorized using a structured framework. Interventions were grouped into three main types: (1) bystander programs; (2) prevention programs on sexual and relationship; and (3) self-defense and risk reduction programs. Where possible, outcomes were classified into seven domains based

on the construct assessed: (1) knowledge; (2) attitudes and beliefs; (3) intentions; (4) self-efficacy; (5) behaviors; (6) victimization; and (7) perpetration. This classification was used to organize the summary tables and to guide the descriptive synthesis of findings (see Table 1 and Table 5 in the [Appendix](#)). Consistent with the evidence-mapping purpose of this umbrella review, the results section is intended primarily to provide a descriptive synthesis of intervention characteristics, targeted outcomes, and recurring patterns across reviews.

Methodological quality of systematic reviews

The methodological quality of the included reviews was independently assessed by two reviewers using the AMSTAR-2 tool [50]. This instrument comprises 16 items, including 7 considered critical domains: prior registration of a protocol, comprehensiveness of the literature search, justification for the exclusion of studies, assessment of risk of bias in included studies, appropriateness of meta-analytic methods, consideration of the risk of bias when interpreting the findings and evaluation of the presence and potential impact of publication bias. Each review was rated as high, moderate, low, or critically low quality by two independent reviewers (FDM and LA). The quality appraisal also took into account relevant methodological limitations highlighted by Puljak et al. [51].

Primary studies overlap assessment

To ensure the independence and robustness of the synthesized findings, we assessed the potential risk of data distortion arising from the inclusion of the same primary studies across multiple systematic reviews (the "double-counting" bias). Following standard methodological guidelines for umbrella reviews, we constructed a comprehensive citation matrix mapping all included systematic reviews against their respective primary studies. Furthermore, we quantitatively evaluated the degree of overlap by calculating the Corrected Covered Area (CCA) proposed by Pieper et al. [52]. The resulting CCA percentage was interpreted according to the thresholds established by Pieper et al. [52]: slight overlap (0–5%), moderate overlap (6–10%), high overlap (11–15%), and very high overlap (> 15%).

Results

Review and primary study selection

As shown in the PRISMA flow diagram (see Fig. 1), the electronic search identified 1131 records across four databases: PsycINFO ($n=29$), PubMed ($n=134$), Scopus ($n=509$), and Web of Science ($n=459$). After removing 282 duplicates using Rayyan, 849 records remained for title and abstract screening. Of these, 754 were excluded for not meeting eligibility criteria. The full texts of 95

articles were then assessed for eligibility, resulting in the exclusion of 78 articles for the following reasons: inappropriate publication type ($n=10$), unsuitable target population ($n=21$; e.g., adult participants not affiliated with the university context), or irrelevant outcomes ($n=47$; e.g., focusing on mobbing or bullying). The final sample included in this umbrella review comprises 17 reviews.

Review characteristics

Most of the included reviews were systematic reviews ($n=13$) [45, 46, 53–64], several of which were accompanied by meta-analyses ($n=8$) [46, 53–59]; four were systematic scoping reviews [61, 65–67]. The included reviews allowed for the following study design: randomized controlled trials (RCTs, $n=12$), quasi-experimental designs (QEDs, $n=11$), and other designs ($n=8$). Overall, the 17 reviews included a substantial number of primary studies, ranging from 7 to 106 per review, with an average of approximately 32 articles per review. Geographically, the primary studies were predominantly conducted in North America, particularly the United States, although some reviews incorporated data from other international contexts, such as Vietnam and South Korea [65] and Europe [56]. Regarding publication trends, most studies were concentrated in two periods: 2018–2020 ($n=5$, 21%) and 2023–2024 ($n=12$, 71%), despite the present search covering publications from the year 2000 onward. Further details are provided in Table 4 in the [Appendix](#).

Methodological quality of the systematic reviews

All included reviews—both with and without meta-analysis—were rated as “critically low quality” according to the AMSTAR-2 tool. The full assessment is presented in Fig. 2. The most recurrent weaknesses were: (1) lack of justification for excluded studies (Item 7); (2) absence or inadequate reporting of risk of bias assessments for included studies (Item 9); (3) failure to report funding sources of primary studies (Item 10); and (4) lack of integration of risk of bias considerations when interpreting results (Item 13). Nonetheless, several reviews demonstrated strengths, including: (1) clearly formulated research questions (Item 1); (2) adequately describing study selection and data extraction methods (Items 5 and 6) and, (4) in some cases, comprehensive searches across multiple databases (Item 4).

Overlap analysis and corrected covered area

The 17 included systematic reviews ($c=17$) contained a total of 538 primary study citations ($N=538$). After removing duplicates and cross-checking the references, a total of 366 unique primary studies ($r=366$) were identified. The full mapping of these primary studies across the included systematic reviews is presented in the Citation Matrix (see Supplementary Material). The calculated

Table 1 Intervention types and related outcome results

Studies	Programs	Outcome: knowledge	Outcome: attitudes/ beliefs	Outcome: intentions	Outcome: efficacy	Outcome: behaviors	Outcome: victimization	Outcome: perpetration
Jouriles et al., 2018 [53]	BYSTANDER PROGRAMS	[65] +	[53] +	[46] +	[46] +	[53] +	[62] +/-	[65] +
Kettrey & Marx, 2019a [54]		[45] +	[62] +	[57] +	[57] +	[54] +		[57] -
Kettrey & Marx, 2019b [46]		[64] +	[57] +	[62] +	[62] +	[46] +		[59] -
Bouchard et al., 2024 [57]			[45] +	[65] +	[65] +	[65] +		[62] +/-
Kettrey et al., 2024b [59]			[65] +	[45] +	[45] +	[45] +		[45] +/-
Evans et al., 2019 [60]				[60] +/-	[60] +/-	[59] -		
Banton et al., 2023 [62]						[62] +/-		
Villalonga-Aragón et al., 2023 [65]						[60] +/-		
Tibbels & Benbouriche, 2024 [45]								
Zara et al., 2024 [64]								
Kettrey et al., 2024a [58]	PREVENTION PROGRAMS ON SEXUAL AND RELATIONSHIP VIOLENCE	[58] +	[56] +	[56] +	[56] +	[56] -	[58] -	[45] +
Wong et al., 2023 [56]		[56] +	[63] +	[63] -	[63] -	[63] -		[58] -
Lee et al., 2023 [63]		[63] +	[45] +					
Tibbels & Benbouriche, 2024 [45]		[45] +	[58] -					
Kettrey et al., 2023 [55]	SELF-DEFENSE & RISK REDUCTION PROGRAMS	[55] +	[55] +		[45] +/-	[55] -	[55] +	[61] +
Kettrey et al., 2024b [59]		[45] +/-	[45] +/-				[59] +	[55] -
Denhard et al., 2020 [61]							[61] +	
Tibbels & Benbouriche, 2024 [45]							[45] +/-	

To facilitate systematic comparison, the table is structured as a synthesis matrix according to the framework described in the Methods. Interventions are grouped into three main categories: (1) bystander programs; (2) prevention programs on sexuality and relationships; and (3) self-defense and risk reduction programs. Outcomes for each category are mapped across seven domains (Knowledge, Attitudes/Beliefs, Intentions, Self-efficacy, Behaviors, Victimization, and Perpetration). The coding used reflects the direction of effect reported by the review authors and was derived from their narrative synthesis of the evidence. For reviews including a meta-analysis, coding was based on the statistical conclusions reported by the authors: (+) indicates a statistically significant positive effect, whereas (-) indicates a non-significant effect for the corresponding outcome. For systematic reviews without meta-analysis, coding was based on the overall direction of findings reported in the narrative synthesis: (+) indicates that the authors described a predominantly positive trend across included studies; (-) indicates a predominantly null or unfavorable trend; and (+/-) denotes mixed, inconsistent, or insufficiently comparable findings that did not allow the review authors to identify a clear overall pattern. Reviews are included only in the outcome domains for which effectiveness results were reported. Review by An et al. [66] and by De Fazio et al. [67] are not represented in the matrix because it provided a descriptive mapping of intervention characteristics without evaluating intervention effectiveness

Corrected Covered Area (CCA) for this umbrella review was 0.029 (or 2.94%). According to the criteria outlined by Pieper et al. (2014), this value falls well within the 0–0.05 range, indicating a slight overlap among the primary evidence base. This objective metric demonstrates that the systematic reviews included in this study target largely independent bodies of literature, thereby confirming that the risk of bias or artificial inflation of findings due to double-counting is negligible.

Characteristics of the Target Population

The 17 included systematic reviews focused primarily on university student populations, only one review [54] included a small number of studies conducted in secondary school settings (2 out of 14 studies), which were not considered in the present synthesis. Zara et al. [64] included studies addressing trainees and academic staff in addition to students. In most primary studies, participants had a mean age between 18 and 25 years and were predominantly cisgender and heterosexual, with limited representation of sexual and gender minorities, international students or ethnic minorities. Several reviews also considered high-risk or particularly relevant subgroups, such as fraternity/sorority members ($n=7$), college athletes ($n=6$) and single-sex groups (male or female; $n=9$). However, reporting of socio-demographic characteristics—such as ethnicity, socioeconomic status, and sexual

orientation—was often incomplete or missing. The main characteristics of the included populations are summarized in Table 5 in the [Appendix](#).

Types of interventions and targeted outcomes

As previously described, interventions were categorized according to their core objectives and theoretical orientation into three main groups: (1) bystander programs ($n=15$); (2) primary prevention programs on sexuality and relationships ($n=13$) and (3) self-defense and risk reduction programs ($n=5$). For each intervention category, outcomes were systematically analyzed across the eight identified domains: knowledge ($n=9$), attitudes/beliefs ($n=11$), intentions ($n=8$), self-efficacy ($n=9$), behaviors ($n=11$), victimization ($n=6$), and perpetration ($n=9$).

Since several interventions included in this review addressed broader forms of GBV (e.g., SV, SA, IPV), findings are reported using the terminology adopted by the original reviews, reflecting the primary GBV-related concepts on which they focused. The main findings are summarized descriptively below, following the same structured classification presented in Table 5 in the [Appendix](#) (Characteristics of included systematic reviews) and Table 1 (Intervention types and related outcome results), which acts as a visual evidence map, employing a coding system — (+), (-), and (+/-) — that

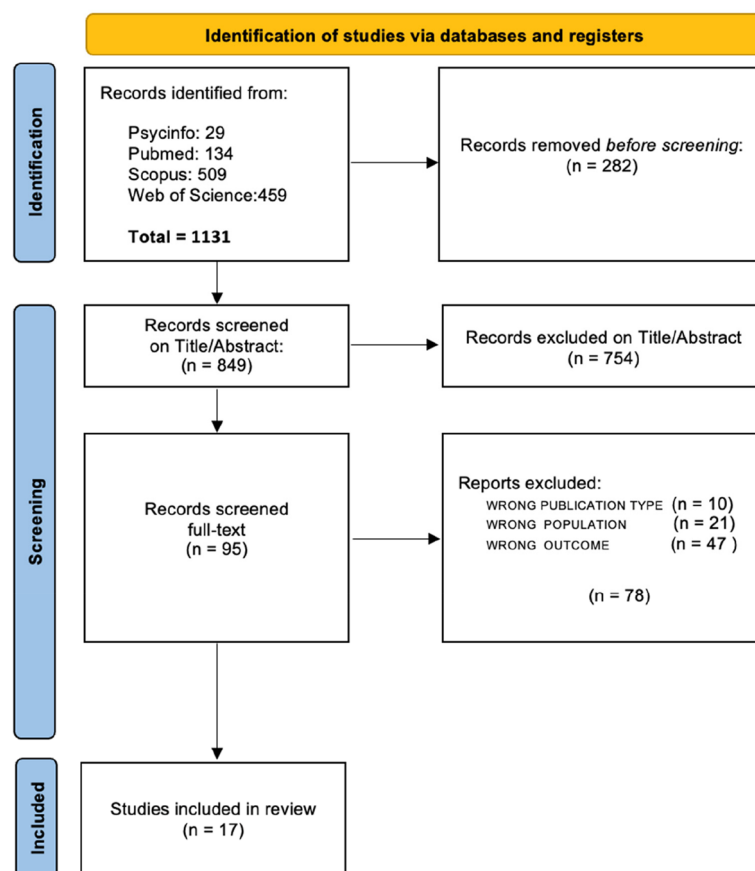


Fig. 1 PRISMA flow diagram. Articles selection process

allows readers to identify intuitively the areas of consensus or disagreement found in the literature across each type of intervention. In Table 1, reviews are included only in the outcome domains for which effectiveness results were reported.

Bystander programs. This category includes interventions designed to promote prosocial behaviors and a sense of collective responsibility among peers, encouraging them to effectively recognize and respond to high-risk situations associated with sexual violence and harassment. These programs are grounded in situational models of intervention [68, 69] (e.g., the five-step model of bystander action: noticing the event, interpreting it as a problem, assuming responsibility, knowing how to help, and implementing help) that conceptually distinguish from more traditional prevention approaches by their explicit shift from an individual victim–perpetrator framework to a community-oriented model of responsibility, framing gender-based violence prevention as a collective task and positioning peers as active agents in creating a social environment that discourages and interrupts harmful behaviors. Fifteen of the seventeen reviews included in this umbrella review reported evidence on this type of intervention, and ten of these provided

sufficient information on the impact for at least one of the outcomes listed in Table 1. The specific programs and their related findings are detailed in Table 5 in the Appendix.

These interventions primarily targeted university students aged between 18 and 26, including high-risk groups such as fraternity members and athletes. Program duration ranged from brief 24-min sessions to multi-week interventions. A substantial proportion of interventions included interactive and skill-based components designed to translate awareness into behavioral competence, such as structured role-playing exercises based on realistic scenarios (e.g., party-related risk situations, peer-perpetrated sexist comments, ...), guided rehearsal of intervention strategies (e.g., the “5D” model), peer-led training sessions, and group problem-solving activities. Some programs also use theatre-based skits (e.g., SCREAM) or video modeling (e.g., TakeCARE) to simulate intervention opportunities within realistic social contexts. A detailed overview of findings for each outcome listed in Table 1 is presented below. The respective references can be fully consulted in the same table. Briefly:

AMSTAR - 2																
Study	1 *	2	3*	4	5	6	7	8*	9*	10	11	12	13	14	15	16
Reviews with meta-analysis																
Jouriles et al., 2018 [53]																
Kettrey & Marx, 2019a [54]																
Kettrey & Marx, 2019b [46]																
Kettrey et al., 2023 [55]																
Wong et al., 2023 [56]																
Bouchard et al., 2024 [57]																
Kettrey et al., 2024a [58]																
Kettrey et al., 2024b [59]																
Reviews withOUT meta-analysis																
Evans et al., 2019 [60]																
Denhard et al., 2020 [61]																
Banton et al., 2023 [62]																
Lee et al., 2023 [63]																
Villalonga-Aragón et al., 2023 [65]																
An et al., 2024 [66]																
DeFazio et al., 2024 [67]																
Tibbels & Benbouriche, 2024 [45]																
Zara et al., 2024 [64]																

Legenda

	methodological requirements met
	methodological requirements partly met
	methodological requirements not met
	not applicable (no meta-analysis)

1	PICO *	<i>Did the research question and inclusion criteria include the components of the PICO?</i>
2	Protocol	<i>Was a complete protocol written?</i>
3	Study design	<i>Did the authors explain their selection of study designs for inclusion in the review?</i>
4	Search strategy	<i>Comprehensive search strategy?</i>
5	Study selection	<i>In duplicate?</i>
6	Data extraction	<i>In duplicate?</i>
7	Excluded studies	<i>List of excluded studies and justification?</i>
8	Included studies *	<i>Included studies described in detail?</i>
9	Risk of bias *	<i>Risk of bias assessed?</i>
10	Funding sources	<i>Funding sources reported?</i>
11	Meta-analysis	<i>Appropriate methods used?</i>
12	Impact risk of bias	<i>Did authors assess impact of RoB on results?</i>
13	Discussing risk of bias	<i>Did authors discuss potential effects of bias?</i>
14	Heterogeneity	<i>Discussion of any heterogeneity</i>
15	Publication bias	<i>Investigation of publication bias?</i>
16	Conflicts of interest	<i>Did the review authors report any conflicts of interest in conducting the review?</i>

*Only partially applicable based on Puljak et al., [51].

Fig. 2 AMSTAR-2 Characteristics of systematic reviews and meta-analyses of included reviews

- Knowledge: Three reviews reported immediate improvements in the ability to recognize SV and identify helping strategies. Zara et al. [64] specifically noted that these effects were observed only in the short term.
- Attitudes/beliefs: Five reviews documented reductions in adherence to rape myths, increases in prosocial beliefs and greater understanding of victim's perspective.
- Intentions: Six reviews reported significant increases in students' intentions to intervene as bystanders. However, Evans et al. [60] found these effects to be short-lived. One review [46] reported that the effects on bystander intentions were significantly stronger among first- and second-year students compared with those in later years.
- Self-efficacy: Six reviews reported increased perceptions of readiness and capacity to intervene. One review [65] found that this effect was maintained at one-year follow-up.
- Behaviors: Eight reviews assessed actual bystander behaviors, with most reporting increases. However, three reviews [59, 60, 62] described inconsistent or mixed effects.
- Victimization and Perpetration: Five reviews examined outcomes related to victimization and perpetration. Only Villalonga Aragón et al. [65] reported a small but statistically significant reduction in perpetration, while the other reviews found no significant effects.

Primary prevention Programs on Sexual and Relationship Violence. This category includes interventions aimed at enhancing knowledge related to consent, healthy relationships, victim empathy, and deconstruction of rape myth. These interventions encompass a broad spectrum of approaches, ranging from primarily informational and passive awareness-raising approaches to more interactive and skills-based programs. Thirteen of the seventeen reviews included in this umbrella review reported evidence on this type of intervention, and four of these provided sufficient information on the impact for at least one of the outcomes listed in Table 1. The specific programs and their related findings are detailed in Table 5 in the Appendix. These programs primarily targeted university students, although age ranges were often unspecified. Some interventions were directed at specific high-risk groups—either for victimization or perpetration—such as college athletes, fraternity/sorority members and LGBTQ+ students. Most programs included men and women participants, although some were specifically tailored for men or women. More specifically, some interventions targeted men with the aim of reducing perpetration-related attitudes and increasing empathy

toward victims (e.g., The Men's Program, RealConsent), whereas others focused on healthy relationships and conflict resolution skills within intimate relationships (e.g., SHARe, Project PEACE). In contrast, social marketing campaigns such as The Red Flag Campaign and Consent is Sexy primarily aimed to increase awareness of warning signs, consent, and unhealthy relational dynamics through posters, videos, and media-based messaging. Delivery modes varied, including in-person, online and hybrid formats, with particular emphasis on poster-based and social media campaigns in the studies reviewed by Lee et al. [63]. Several interventions also incorporated interactive and experiential components, such as role-playing exercises based on realistic scenarios (e.g., party-related situations, coercive peer interactions, and consent negotiation), theatrical performances, video modeling, and skill-building activities focused on assertive communication, conflict de-escalation, and healthy relationship practices. Program duration also varied widely, ranging from single sessions of 24 min to three hours and campaign exposures from one week up to two academic semesters. A detailed overview of findings related to each outcome listed in Table 1 is presented below. The respective references can be fully consulted in the same table. Briefly:

- Knowledge: Four reviews reported positive effects on increasing knowledge regarding sexual violence, dating violence, and consent. Some studies indicated that these gains may diminish over time [58]. Educational campaigns showed some effectiveness in improving understanding of sexual consent and promoting more informed social norms [63].
- Attitudes/beliefs: Four reviews examined attitude-related outcomes and yielded mixed findings. Three reviews reported improvements in empathy toward victims, reduced hostility toward women and decreased endorsement of rape myths. In contrast, Kettrey et al. [58] found non-significant or inconsistent results.
- Intentions: Two reviews presented contrasting findings regarding the impact on intentions to intervene or to seek sexual consent. According to Wong et al. [56], the effects were significant and positive; in contrast, Lee et al. [63] found no significant effects, except for intentions to seek consent, which showed a positive outcome.
- Self-efficacy: Two reviews assessed perceived self-efficacy to act as a bystander. Wong et al. [56] found significant and positive effects, while Lee et al. [63] reported no meaningful effects.
- Behaviors: Two reviews reported that effects on bystander behavior were generally limited or mixed, with no clear evidence of effectiveness.

- **Victimization and Perpetration:** Two reviews evaluated outcomes related to victimization and perpetration. Tibbels & Benbouriche [45] reported a reduction in self-reported perpetration rates, whereas Kettrey et al. [58] found no significant effects on psychological victimization or psychological/physical perpetration.

Risk Reduction and Self-Defense Programs. This category includes interventions aimed at strengthening individuals' ability to prevent their own sexual victimization [55, 59] or to address related phenomena - such as binge drinking [61]—which is frequently associated in the literature with an increased likelihood of experiencing harassment or assault. Compared to bystander-based interventions, these programs place greater emphasis on individual-level risk management, situational awareness and behavioral resistance strategies aimed at reducing personal vulnerability or interrupting potentially dangerous situations [55, 61]. Six of the seventeen reviews included in this umbrella review reported evidence on this type of intervention, and four of these provided sufficient information on the impact for at least one of the outcomes listed in Table 1. The specific programs and their related findings are detailed in Table 5 in the [Appendix](#). These interventions primarily targeted undergraduate student populations, typically aged 18–25. Across the reviewed studies, these interventions frequently adopt gender-specific approaches aimed at increasing women's self-efficacy, assertiveness and resistance capacities, while some male-targeted programs focus on the association between alcohol use and perpetration risk [61]. Data on populations with diverse gender identities remain scarce [55, 59]. In terms of delivery formats, the reviewed studies described both in-person and online implementations, with varied durations. Core intervention contents commonly include recognition of “red flags”, alcohol-related risk reduction, communication and consent negotiation skills. Several programs also incorporate active learning components such as verbal and physical resistance training, assertiveness exercises, motivational interviewing, and role-playing activities based on realistic campus situations to strengthen behavioral readiness and situational coping skills. A detailed overview of findings for each outcome listed in Table 1 is presented below. The respective references can be fully consulted in the same table. Briefly:

- **Knowledge:** Two reviews assessed this outcome, referring primarily to sexual assault-related content. Kettrey et al. [55] reported a significant improvement in knowledge compared to control groups; while Tibbels & Benbouriche [45] found mixed results: approximately half of the included studies showed an

increase in knowledge, while the other half reported no effect. A third review [59] described program content (personal safety, defensive techniques, empowerment) but did not evaluate effectiveness.

- **Attitudes/beliefs:** Kettrey et al. [45, 55] identified positive changes, such as less tolerant attitudes toward victimization and a significantly less favorable acceptance of the rape myth. In contrast, Tibbels & Benbouriche [45] reported inconsistent findings across included studies.
- **Self-Efficacy:** One review [45] found mixed evidence: some studies reported increased self-efficacy, while others showed no significant change.
- **Victimization and Perpetration:** Four reviews evaluated these outcomes. Two reviews [55, 59] found a small but favorable effect on the reduction of victimization, with no impact on perpetration. A third review [61] reported an overall trend toward reduced sexual assault outcomes associated with decreased alcohol consumption. Finally, Tibbels & Benbouriche [45] reported partial and mixed findings: about half of the included studies showed a decrease in victimization, while the others showed no effect.

Evaluation tools

The systematic reviews reported a wide range of instruments used to evaluate the effectiveness of sexual harassment-sexual violence prevention interventions in university settings. Despite the methodological heterogeneity, a core of particularly recurrent validated psychometric measures was identified. Table 2 presents the main instruments identified in the included reviews, grouped according to the outcomes they were designed to assess.

Discussion

The objective of this umbrella review was to map and synthesize the evidence on the available interventions to prevent SH in universities, including interventions that address SH and related constructs within broader gender-based violence forms. Although the search covered a broad time span (2000–2024), the scientific output is concentrated in two main periods: 2018–2020 (21%) and, more prominently, 2023–2024 (71%). This pattern indicates rapid growth. This recent surge can be linked to policy developments and cultural shifts that have brought sexual misconduct in higher education to the forefront. In particular – in the USA—the reinforcement of Title IX regulations, enactment of the 2013 Campus Sexual Violence Elimination Act and the proactive stance of the Obama administration laid important groundwork [70]. At the same time, social movements such as #MeToo and #TimesUp heightened public awareness and institutional

accountability, creating a favorable climate for research and intervention development [15, 42]. The seventeen review studies included in this umbrella review provide a broad overview of the international landscape on SH and related constructs of SV, GBV, and IPV prevention interventions in university settings. The evidence base is heavily concentrated in North America—particularly in the United States. This geographic concentration implies that the reported results may be closely tied to the specific socio-legal framework of U.S. universities.

None of the included reviews focused exclusively on SH; instead, SH might be considered situated within a broader continuum of abusive behaviors. This aligns with the perspective highlighted by Zara et al. [64] that various forms of GBV are interconnected and rooted in power dynamics and shared socio-cultural norms also reproduced within academic environments [71]. As a result, many SV, GBV, and IPV prevention strategies were included and described in the present review as relevant also to SH prevention. This is based on the assumption that they may also address earlier or less overt manifestations of abuse [8].

Importantly, all included systematic reviews were rated as “critically low” quality according to AMSTAR-2. This has important implications for the interpretation of the findings presented in this review. While recurring patterns across intervention types can be identified, the underlying evidence base is methodologically limited, and conclusions regarding effectiveness should therefore be interpreted with caution.

Finally, the reviews examined reported frequent use of validated instruments such as the Illinois Rape Myth Acceptance Scale (IRMA) [72], the Bystander Efficacy Scale [73] and the Sexual Experiences Survey [74]. However, the marked heterogeneity of measurement instruments and the prevalence of self-report measures limit the comparability of findings across studies and introduce potential social desirability bias [54].

Bystander programs remain among the most widespread and promising strategies. Grounded in the Bystander Effect model [68], they aim to counteract the diffusion of responsibility by fostering early risk recognition, personal responsibility, and the ability to act. In academic settings, this approach is intended to foster prosocial behavior and the development of collective responsibility [64, 75] framing gender-based violence forms as a community issue to be addressed through the active involvement of the entire university population [65, 76], rather than as a problem exclusively concerning victims and perpetrators. Evidence suggests consistent improvements in knowledge, attitudes, self-efficacy and intervention intentions, although the effects on actual behavior remain weak and tend to diminish over time [45, 53, 56, 60, 62, 64]. Furthermore, these programs

predominantly target men-students, largely excluding women, despite their potential value as active bystanders [59, 73, 77–81]. Effectiveness appears to depend largely on the degree of interactivity, the duration of the intervention, and the alignment between program content and contextual relevance [50, 53, 64]. Interventions incorporating experiential and skill-based components—such as role-playing activities, realistic campus scenarios, peer-led discussions and rehearsal of intervention strategies—seem to be more likely to strengthen behavioral readiness and intervention confidence [46, 53, 54, 65, 66].

Prevention programs on sexual and relationship violence generally seek to shift attitudes and cultural norms by increasing awareness of consent, healthy relationships, empathy toward victims, while also challenging rape myths. Knowledge gains are the most consistently reported outcomes [58], whereas evidence regarding effects on intentions, self-efficacy, and behaviors remain mixed [56, 63]. As with bystander interventions, these programs are primarily delivered to students and often focus specifically on men populations (e.g., “The Men’s Program, Coaching Boys into Men”), thereby offering only a partial view of the range of possible prevention strategies.

Self-defense and risk exposure/perpetration reduction programs—though less common—have roots in feminist movements and focus primarily on women’s capacity to recognize and respond to risky situations through assertiveness, situational awareness and resistance strategies. Content typically includes personal safety, assertiveness, defensive techniques and responsible alcohol use. Positive effects have been observed mainly in the reduction of female victimization, while impacts on perpetration are limited or absent [55, 59]. However, these outcomes are often underexplored and based on self-report measures, which may have contributed to underestimation of effects in this area. Regarding the delivery of content related to personal safety and responsible alcohol use, some authors have highlighted potential risks inherent in this approach: placing excessive emphasis on women’s individual responsibility may inadvertently reinforce rape myths, contribute to victim-blaming and discourage the engagement of others in prevention efforts [55]. Moreover, they appear to be less effective in producing behavioral change and remain poorly inclusive of students with non-binary gender identities or male survivors of violence [55].

General considerations on the interventions and outcomes

Across all intervention types, a recurring issue is the persistent heteronormative and binary framing that positions GBV forms primarily as male-perpetrated and female-experienced. While this reflects prevalence data indicating that women are disproportionately affected

Table 2 Main evaluation tools reported in the included reviews, grouped by outcome

Outcome	Authors	Instrument	Brief Description	Reviews in which it was used
Knowledge, attitudes and beliefs related to sexual violence	<i>Humphreys & Brousseau, 2010</i> [80]	Sexual Consent Scale	Assesses knowledge, attitudes and behavioral representations regarding sexual consent	[65, 67]
	<i>Payne et al., 1999</i> [81]	Illinois Rape Myth Acceptance Scale (IRMA)	Assesses endorsement of rape myths (e.g., minimization, justification, or distortion of sexual violence)	[56, 57, 60, 63, 65, 67]
	<i>Burt, 1980</i> [82]	Acceptance of Interpersonal Violence Scale	Measures general attitudes toward violence in intimate relationships	[58]
	<i>Lanier & Green, 2006</i> [83]	College Date Rape Attitudes Scale	Evaluates beliefs related to date rape, especially in the context of existing romantic relationships	[56]
Bystander self-efficacy and intentions to intervene	<i>Banyard, 2008</i> [70]	Bystander Efficacy Scale	Assesses perceived confidence in intervening in high-risk situations	[56, 57, 60, 65, 67]
	<i>Banyard, 2008</i> [70]	Bystander Intention to Help Scale	Measures future-oriented intentions to intervene	[56, 60, 67]
	<i>Banyard et al., 2014</i> [84]	Intent to Help a Friend and Stranger Scale	Differentiates intentions to help based on the nature of the relationship (friend vs. stranger)	[56, 65, 67]
Bystander behaviors	<i>Banyard et al., 2005</i> [85]	Bystander Behavior Scale	Assesses the frequency of past bystander intervention behaviors	[46, 56, 60, 67]
	<i>Banyard et al., 2014</i> [84]	Opportunity to Engage in Bystander Behaviors Scale	Measures perceived exposure to high-risk situations requiring bystander intervention	[60]
Victimization and perpetration	<i>Koss & Oros, 1982</i> [86]	Sexual Experiences Survey (SES)	Assesses experiences of sexual victimization, including verbal coercion, substance-related incapacitation, or force	[60, 61, 67]
	<i>Fitzgerald et al., 1995</i> [87]	Sexual Experiences Questionnaire (SEQ)	Evaluates instances of sexual harassment in specific contexts (e.g., academic or workplace settings)	[64]

[10, 11, 13], it may unintentionally overlook other experiences—such as the victimization of men. The reliance on relatively homogeneous populations in the current evidence base—primarily cisgender, heterosexual students—raises critical questions regarding the transferability of intervention outcomes to LGBTQ+ individuals, who also face heightened risk [34]. Because these programs have been evaluated on narrow samples, their effectiveness in more diverse contexts remains insufficiently established. A more intersectional approach therefore appears both urgent and necessary [48, 82], to avoid the risk of implicit marginalization of group-specific pathways.

Another key limitation is the modest medium- to long-term impact of interventions on concrete behavioral outcomes such as perpetration or victimization. Most studies are based on pre–post evaluations and lack long-term follow-up, limiting the ability to assess the durability of observed effects and to determine whether participants had real opportunities to apply the knowledge they acquired in real-world contexts [57, 65]. Outcomes that show the most consistent improvement tend to be cognitive or motivational in nature (e.g., knowledge, attitudes, self-efficacy), while behavioral effects are often weak, inconsistent or supported by methodologically fragile evidence [46, 58, 59, 62]. This pattern may reflect

not only limitations in intervention effectiveness, but also structural weaknesses in study design and outcome measurement. This gap may partly reflect the distinction highlighted by McCall et al. [83]: “changing understanding is one thing, changing behavior is another”. In this context, the apparent effectiveness of interventions on intermediate outcomes (such as knowledge, attitudes, and bystander intentions) should not be interpreted as conclusive evidence of real-world behavioral impact, but rather as an indication of potential trajectories that require confirmation through higher-quality primary studies and more robust synthesis designs. Nevertheless, raising awareness of the problem and how to prevent it remains a critical step toward fostering cultural change and impacting the broader campus environment. Importantly, such knowledge must be translated into practical skills, as intervening without adequate preparation may lead to inappropriate or even counterproductive behaviors [65, 84]. Evidence suggests that the quality and depth of learning—defined as the integration of knowledge and skills—are key to enhancing both intention and effectiveness in bystander intervention. In this sense, bystander-based programs would represent a notable exception, as they combine cognitive/motivational components with practical behavioral training, and thus appear to lead

to comparatively stronger and more consistent effects on actual bystander behaviors. Program structure also influences outcomes. More effective interventions tend to have a longer duration [53], incorporate interactive components (e.g., role-playing, realistic scenarios, peer-led discussions, rehearsal of intervention strategies) [56, 67] and could be reinforced by complementary strategies such as social campaigns, visual materials or follow-up sessions [53]. In contrast, brief online programs without practical experiential elements tend to yield primarily superficial, knowledge-based outcomes without significantly strengthening participants' capacity to act [56, 85]. These findings suggest that repeated exposure and ongoing reinforcement may be necessary to counteract the natural decay of cognitive gains and support the consolidation of long-term behavioral change.

Moreover, these results may also be interpreted through a socio-ecological perspective. As suggested in prior work [65, 86], increases in individual responsibility and prosocial readiness may be undermined in contexts where explicit institutional support is perceived as insufficient or inconsistent, and where clear policies for victims-bystanders protection, reporting procedures, and perpetrator accountability are lacking. In such conditions, educational efforts risk operating in a structural vacuum that may inadvertently constrain rather than facilitate action, as participants may not perceive the organizational legitimacy or safety necessary to translate intentions into behavior [64, 86, 87]. This may help explain why many individual-level interventions are effective in improving knowledge, attitudes, and intentions, yet produce more limited effects on sustained behavioral change. When the structural drivers of harassment remain unchanged, individual gains may be insufficient to alter behaviors. Therefore, integrating prevention interventions into multi-layered, multidimensional strategies consistent with the socio-ecological model is essential [64]. This integration requires moving beyond isolated approaches and developing programs that synergistically combine educational efforts, institutional policies, targeted awareness campaigns, and ongoing training for university staff [64]. Notably, only one of the reviews included in this umbrella analysis [64] specifically addressed interventions for university staff, despite clear evidence that faculty and administrative personnel also experience SH. This gap underscores the importance of designing and implementing prevention strategies that actively involve staff alongside students [48]. While the transition toward a "whole-campus" model [64, 75] is increasingly advocated as a systemic

ideal to involve the entire university community, it currently remains a primarily theoretical framework; its empirical validation is still constrained by a literature that focuses almost exclusively on interventions targeting exclusively undergraduate populations. Nevertheless, recent scholarship and policy initiatives increasingly emphasize the need for comprehensive institutional responses that actively engage all members of the university community—including students, staff, and institutional leadership—and address not only individual behaviors but also the structural and cultural conditions that enable SH within universities [88–90]. In line with this integrated approach, notable European initiatives have already begun addressing the prevalence and prevention of SH in university contexts. Two such examples include the recently concluded UniSAFE project (<https://unisafe-gbv.eu>) and Uni4Equity project (a project funded by the CERV-2022-DAPHNE Programme of the European Union) [48]. Taken together, future prevention efforts must prioritize theoretical coherence, inclusivity, and sustainability. Achieving effective and lasting outcomes requires an intersectional and holistic approach that engages the entire academic community [89, 91] (such as: Rectorate, Parity Committee for Equal Opportunities, Confidential Counsellor, Disciplinary Committee, Occupational Health Service, Psychological services, Human Resources, etc.) and is grounded in robust empirical evidence. Only through such an approach will it be possible to implement equitable, culturally sensitive and transformative interventions that can be adapted to diverse educational contexts [91].

Limitations of this review

Several limitations of the present umbrella review should be acknowledged. A significant limitation is the lack of systematic reviews focusing exclusively on SH. In the available literature, SH is typically examined alongside broader and conceptually overlapping constructs such as SV, GBV, and IPV, and considered within broader GBV interventions. This has important implications for the interpretation of the current findings, as conclusions regarding SH-specific prevention strategies are based indirectly on evidence generated from broader GBV forms prevention frameworks and should therefore be interpreted with caution. Future research should more clearly distinguish SH from related forms of gender-based violence and develop and evaluate SH-specific prevention interventions to determine whether they produce different outcomes than broader violence prevention programs.

A further limitation concerns the lack of an integrative synthesis of the mechanisms underlying intervention effectiveness. Due to the substantial heterogeneity of intervention models, theoretical frameworks, and outcome measures, as well as variability in the way potential mechanisms of change were described across the included reviews, makes it difficult to identify which mechanisms are most likely to promote behavioral change. Future research would benefit from more theory-driven analyses to better clarify these processes.

From a methodological perspective, the overall quality of the included reviews was rated as "critically low" according to the AMSTAR-2 checklist [50], primarily due to inadequate justification for excluded studies, lack of systematic bias assessment, limited transparency about funding sources and insufficient integration of risk of bias into results interpretation. Moreover, as highlighted by Puljak et al. [51], the inclusion of non-comparative primary studies represents an additional methodological weakness, further limiting adherence to PICO criteria and AMSTAR-2 standards. Importantly, these limitations reflect broader structural weaknesses in the current evidence base on SH and related GBV forms of prevention, rather than limitations of the present umbrella review alone. Although we applied predefined methodological criteria to ensure a minimum level of transparency and reproducibility, these criteria do not capture several critical domains assessed by AMSTAR-2. As a result, the available body of systematic reviews remains affected by substantial methodological shortcomings that constrain the strength and reliability of the conclusions that can be drawn. Taken together, these limitations suggest that the apparent effectiveness of several interventions, should not be interpreted as conclusive evidence, but rather as indicative of emerging trends that require confirmation through higher-quality primary studies and more rigorous systematic reviews. Additionally, the available evidence is skewed toward U.S. contexts, with study populations that are not very diverse—primarily cisgender, heterosexual, white students residing on campus. This geographic and demographic concentration is largely driven by specific U.S. regulatory frameworks, such as Title IX, which mandate and fund prevention efforts, thereby limiting the direct transferability of these findings to different international academic or legal systems. The experiences of LGBTQ+ students, international students, ethnic minorities and academic staff are rarely

considered [55, 59]. Moreover, reporting of socio-demographic variables—such as ethnicity, socioeconomic status and sexual orientation—was frequently incomplete or entirely absent, hindering a nuanced understanding of intervention effectiveness across diverse or minority groups. This overall lack of representativeness significantly limits the transferability of findings to broader cultural and institutional contexts.

Strengths of this review

The review offers also significant contributions. Its systematic approach, adhering to PRISMA guidelines, ensures rigorous data extraction and synthesis of the available literature. A major strength of this umbrella review lies in the objective verification of data independence through the calculation of the Corrected Covered Area (CCA). The observed value confirms that the risk of bias from double-counting primary studies is negligible, reinforcing—within the inherent limitations of the included literature—the reliability of the synthesized evidence. By providing a comprehensive synthesis of the available evidence, this umbrella may serve as a resource for researchers, educators, and university policymakers, offering a foundation for developing best practices and implementing increasingly effective prevention programs across diverse international academic settings.

Conclusion

This umbrella review underscores the urgent need to move beyond fragmented and short-lived initiatives to prevent SH—and related GBV forms—toward comprehensive, multidimensional strategies consistent with the socio-ecological model. Effective prevention in university settings requires integration of educational programs, institutional policies, awareness campaigns, and staff training, embedded within a whole-campus approach that actively involves all members of the academic community.

Inclusivity and intersectionality must be prioritized to overcome the persistent heteronormative and binary framing of interventions and to ensure responsiveness to the experiences of marginalized groups. Future prevention efforts should be guided by greater methodological rigor, theoretical coherence, and international collaboration, in order to develop culturally sensitive and sustainable interventions capable of producing lasting change.

Appendix

Table 3 Index and keyword terms used in 4 databases

Database	#	Index and keyword terms
PSYCINFO	#1	sexual harassment/or sex offenses/or sexual abuse/
	#2	sexual violence/or gender violence/or sex offenses/
	#3	sex offenses/or sexual abuse/
	#4	verbal abuse/or physical abuse/
	#5	1 or 2 or 3 or 4
	#6	higher education/or colleges/
	#7	academic settings/
	#8	6 or 7
	#9	5 and 8
	#10	limit 9 to (english and yr = "2000—2024")
PUBMED	#1	("sexual harassment"[MeSH Terms]) OR ("verbal abuse"[Title/Abstract]) OR ("physical abuse"[Title/Abstract]) OR ("sexual abuse"[Title/Abstract]) OR ("sexual violence"[Title/Abstract]) OR ("sexual assault"[Title/Abstract]) OR ("sex offenses"[MeSH Terms]) OR ("gender violence"[Title/Abstract])
	#2	("higher education"[Title/Abstract]) OR (universities[MeSH Terms]) OR (college[Title/Abstract]) OR (campus[Title/Abstract]) OR (academy[MeSH Terms])
	#3	Filters: Full text, English, from 2000–2024
	#4	#1 AND #2 AND #3
SCOPUS	#1	(TITLE-ABS-KEY ("sexual harassment") OR TITLE-ABS-KEY ("verbal abuse") OR TITLE-ABS-KEY ("physical abuse") OR TITLE-ABS-KEY ("sex* assault") OR TITLE-ABS-KEY ("sex* violence") OR TITLE-ABS-KEY ("sex* offens*") OR TITLE-ABS-KEY ("gender violence"))
	#2	(TITLE-ABS-KEY ("higher education") OR TITLE-ABS-KEY (colleg*) OR TITLE-ABS-KEY (campus*) OR TITLE-ABS-KEY (universit*) OR TITLE-ABS-KEY (academ*))
	#3	PUBYEAR > 1999 AND PUBYEAR < 2025 AND PUBYEAR > 1999 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE, "English"))
	#4	#1 AND #2 AND #3
WEB OF SCIENCE	#1	"sexual harassment" (Topic) or "verbal abuse" (Topic) or "physical abuse" (Topic) or "sex* assault" (Topic) or "sex* violence" (Topic) or "sex* abuse" (Topic) or "sex* offens*" (Topic) or "gender violence" (Topic)
	#2	"higher education" (Topic) or college (Topic) or campus (Topic) or universit* (Topic) or academ* (Topic)
	#3	#1 AND #2 AND English (Languages) AND 2024 or 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2012 or 2011 or 2010 or 2000 or 2001 or 2002 or 2003 or 2004 or 2005 or 2006 or 2007 or 2008 or 2009 (Publication Years)

Table 4 Geographical and temporal references of the included systematic reviews

Author (Year)	Countries	Period	
		From ...	... To
Jouriles et al., 2018 [53]	USA	No period restriction (1997)	August 2017
Kettrey & Marx, 2019a [54]	USA	No period restriction (2000)	2018
Kettrey & Marx, 2019b [46]	USA	No period restriction (2010)	2016
Kettrey et al., 2023 [55]	USA	1991	2021
Wong et al., 2023 [56]	USA – n° 29 art. (93.6%)	January 2000	October 2020
	Europe – n°1 art. (3.2%)		
	Mexico – n°1 art. (3.2%)		
Bouchard et al., 2024 [57]	USA – n°11 art. (78,57%)	January 2005	January 2022
	Canada – n°2 art. (14,29%)		
	New Zeland – n°1 art. (7,14%)		
Kettrey et al., 2024a [58]	USA	No period restriction (1990)	2022
Kettrey et al., 2024b [59]	USA	No period restriction (1993)	2021
Evans et al., 2019 [60]	USA	January 2010	August 2017
Denhard et al., 2020 [61]	USA	January 2005	September 2019
Banton et al., 2023 [62]	USA	1972	2020
Lee et al., 2023 [63]	USA	January 2000	February 2021

Author (Year)	Countries	Period	
		From ...	... To
Villalonga-Aragón et al., 2023 [65]	USA – n° 11 art. (73%), UK—n° 1 art. (6,7%), Vietnam—n° 1 art. (6,7%), Italy—n° 1 art. (6,7%), South Korea—n° 1 art. (6,7%)	No period restriction (2002)	2021
An et al., 2024 [66]	USA	2010	2020
DeFazio et al., 2024 [67]	USA	2004	2022
Tibbels & Benbouriche, 2024 [45]	Worldwide USA majority	1991	2022
Zara et al., 2024 [64]	Worldwide	2018	2024

Table 5 Characteristics of included systematic reviews

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
Jouriles et al., 2018 [53]	Systematic Review and Meta-analysis (Includes RCTs, QED and other experimental designs)	24	Not specified	- Population: Undergraduate college students from the U.S - Age range: Not explicitly reported - Specific groups: Some studies included single-sex groups (male-only or female-only), mixed-sex groups, athletes and fraternity members - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander TakeCARE Know Your Power Green Dot One Act Friends Helping Friends Prevention Programs on Sexual and Relationship Violence The Men's Program VOICE Real Consent	Format In-person Online Video Poster campaign Duration from 24 to 360 min	Bystanders-related outcomes: • ATTITUDES/ BELIEFS • BEHAVIORS	- Bystander programs effectively promote pro-social attitudes and beliefs about sexual violence and intervention - Participants exhibit increased bystander behaviors compared to non-participants, though effects are small to moderate - Program effects decline over time but remain meaningful up to three months post-intervention - Longer programs yield stronger effects on attitudes/beliefs than shorter ones - No significant differences with respect to the type of facilitator, group composition or mode of intervention delivery
Kettrey & Marx, 2019a, [54]	Systematic Review and Meta-analysis (Includes: individual RCT, cluster RCT, 3-Armed individual RCT, individual QED, cluster QED)	21	4265	- Population: Adolescents (Grades 7–12) and undergraduate college students in the U.S. (only 2 study in Secondary education setting) - Age range: 12–25 years - Specific groups: Some studies included single-sex groups (6 studies) - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander How to help a sexual assault survivor Prevention Programs on Sexual and Relationship Violence The Men's Program TakeCARE Coaching Boys into Men RealConsent	Format Not specified Duration Not specified	Bystanders-related outcomes: • BEHAVIORS Violence-related outcomes: • PERPETRATION	- Bystander programs significantly enhance bystander intervention, but show no effect on sexual assault perpetration - The effectiveness of bystander programs does not vary by implementation method (individual, single-sex, or mixed-sex groups) - No evidence supports the gendered framing of sexual assault as a moderator of program effects

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
Kettrey & Marx, 2019b [46]	Systematic Review and Meta-analysis (Cluster RCT, Individual RCT, Cluster QED, Individual QED (3-Armed Individual RCT))	15	6104	- Population: Undergraduate college students from the U.S - Age Range: Primarily undergraduates, with mean age ≤ 25 years - Specific Groups: Included general college student samples, as well as specialized groups such as college athletes, fraternity/sorority members and single-sex samples - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander Friends Helping Friends Sexual Assault Bystander Awareness Take a Stand! TakeCARE Where Do You Stand Prevention Programs on Sexual and Relationship Violence The Men's Program RealConsent	Format Not specified Duration Not specified	Bystanders-related outcomes: • SELF-EFFICACY • INTENTIONS • BEHAVIORS	- Bystander programs significantly improve bystander efficacy, intentions and intervention behaviors - Effects on bystander intentions are stronger in the first two years of college compared to later years - No significant differences in effects on bystander efficacy or intervention across college years - Findings suggest potential benefits of earlier program implementation, possibly before college entry
Kettrey et al., 2023 [55]	Systematic Review and Meta-analysis (individual RCT, cluster RCT, QED)	80	Not specified	- Population: Undergraduate college students from the U.S - Age Range: Mean age 19.96 years (SD = 1.31) - Specific Groups: Some studies included fraternity/sorority members (57.65%), athletes (50.33%), LGBTQ+ students (5.63%) - Programs targeted mixed-gender groups (31.25%), single-gender or individual participants (68.75%), delivered in in-person (61.11%) or web-based (38.89%) formats - Ethnicity: 76.41% (19.94) White in Sample	Bystander programs (No specific programs mentioned) Prevention Programs on Sexual and Relationship Violence (No specific program mentioned) Contents related to: Rape Myths, Victim Empathy, Gender Norms, Victim Gender, Perpetrator Gender, Social Norms—Sexual Assault, Social Norms—Alcohol Self-Defense & Risk Reduction Programs (Personal Safety, Sexual Refusal, Sexual Consent, Self-Defense, Alcohol, Communication Skills)	Format In-person Web/computer/video Duration: Hours M 2.46 DS 5.73 Single/Multiple day program	SA related outcomes: • KNOWLEDGE • ATTITUDES/BELIEFS Bystanders-related outcomes: • SELF-EFFICACY • INTENTIONS • BEHAVIORS Violence-related outcomes: • VICTIMIZATION • PERPETRATION	- More pronounced effect on Knowledge and attitudes than on violence outcomes - Risk reduction programs (e.g., self-defense, personal safety advice) were linked to less favorable outcomes, including increased rape myth acceptance = emphasizing the responsibility of potential victims for preventing sexual assault may have an unintended consequence of discouraging third parties from taking action to prevent such violence
Wong et al., 2023 [56]	Systematic Review and Meta-analysis (RCT, Quasi-experiment with weakly matched comparison group, Single group pre- and posttest)	29	Not specified (sample size ranged from 28 to 2444 participants)	- Population: Undergraduate college students - Age Range: Not explicitly reported - Specific groups: Some studies focused on high-risk groups, including student-athletes and fraternity/sorority members. Majority female representation, with some studies having over 90% female participants - Ethnicity: Most studies used predominantly white samples (70–89%), while some included mixed ethnic groups	Prevention Programs on Sexual and Relationship Violence (No specific programs mentioned) Contents related to: skill building/development, bystander training, prevalence of dating/sexual violence, definitions of violent behavior types – consent—campus resources, short- and/or long-term consequences of dating/sexual violence)	Format In-person Online Campaign only (poster, ads, etc.) Mixed format Duration Not specified	IPV-related outcomes: • KNOWLEDGE • ATTITUDES/BELIEFS Bystanders-related outcomes: • SELF-EFFICACY • INTENTIONS • BEHAVIORS	- College dating violence prevention programs effectively increase knowledge and attitudes toward dating violence - Bystander efficacy and intentions improve significantly after program participation - No significant effect found on actual bystander behaviors, indicating a gap between intention and action - Program components influence effectiveness, suggesting the need for tailored interventions

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
Bouchard et al., 2024 [57]	Systematic Review and Meta-analysis (RCT, Quasi-experimental with weakly comparison group, Single group pre-test post-test)	14	2083	- Population: Primarily undergraduate college students (64%) - Age range: Not explicitly reported; - Specific groups: Mostly mixed-gender groups (31–69% male/female); some all-female (7%) and all-male (7%) groups. Some studies targeting specific groups such as fraternity/sorority members, intercollegiate athletes and student leaders (36%) - Ethnicity: Majority white (57% with $\geq 70\%$ white participants); 43% included mixed ethnic backgrounds	Bystander programs Bringing in the Bystander	Format In-person Duration: Single or multi-session	SV-related outcomes: - ATTITUDES/BELIEFS (related Rape Myth acceptance) - Bystanders-related outcomes: SELF-EFFICACY - INTENTIONS - BEHAVIORS	- Bringing in the Bystander (BitB) significantly reduced rape myth acceptance and improved bystander efficacy and intentions - Participants reported increased confidence and willingness to intervene in high-risk situations/for performing bystander behaviors - Findings suggest booster sessions and longer program duration may enhance behavioral outcomes
Kettrey et al., 2024a [59]	Systematic Review and Meta-analysis (individual RCT, cluster RCT, quasi-RCT, QEDs)	14	3298	- Population: Undergraduate college students enrolled in post-secondary educational institutions - Age Range: Majority undergraduates; mean age not specified - Specific groups: Some studies included athletes, fraternity/sorority members and single-sex samples. Mixed-sex groups, single-sex groups and individual implementations were analyzed, but no significant differences in effects were found based on group composition - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander Prevention Programs on Sexual and Relationship Violence Texts 4 Romantic Relationships STOP Dating Violence Project PEACE One-Love Escalation Workshop Victim Empathy/Outcome Expectancies Rape Supportive Cognitions Skills for Healthy Adult Relationships (SHARe) Other Psycho-educational video/Interventions related to Rape, dating violence, marital Violence	Format Not specified Duration Not specified	IPV-related outcomes: - KNOWLEDGE - ATTITUDES/BELIEFS - VICTIMIZATION - PERPETRATION	IPV prevention programs significantly improved IPV knowledge but had no significant effect on IPV attitudes, psychological/physical victimization, or perpetration
Kettrey et al., 2024b [59]	Systematic Review and Meta-analysis (individual RCT, cluster RCT, QED)	37	Not specified	- Population: Undergraduate college students, primarily from non-HBCU public universities (94.74% women, 93.33% men) - Age range: Not explicitly reported; - Specific groups: A small proportion of participants identified as TGQN or LGBTQ+ (women = 4.64%, men = 3.67%) - Ethnicity: Predominantly White (women = 83.80%, men = 85.00%)	Bystander programs (No specific programs mentioned) Self-Defence & Risk Reduction Programs (No specific programs mentioned) Contents related to: Personal safety, sexual refusal, sexual consent, self-defense, alcohol, communication skills)	Format Not specified Duration Not specified	SA related outcomes: - VICTIMIZATION - PERPETRATION - Bystanders-related outcomes: BEHAVIORS	- Women's programs often include risk reduction content and show a small but significant effect on victimization, while men's programs focus on bystander intervention but have no significant effect on perpetration - Gender-specific programs portray women as victims and men as perpetrators or bystanders. When implemented alone, effects are statistically small (i.e., women's victimization) or null (i.e., men's perpetration and bystander intervention)

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
Evans et al., 2019 [60]	Systematic Review (RCT, nonequivalent comparison group, comparative design QED)	7	11,710	- Population: Undergraduate college students, primarily first-year - Age range: Not explicitly reported; - Specific groups: Majority female (47.8%–82.2%) in five studies; one study recruited only women; two studies had gender-balanced samples - Ethnicity: Predominantly Caucasian/White (44.5%–85.8%); one study did not report race/ethnicity	Bystander programs SCREAM theater performance Bringing in the Bystander, Know Your Power Prevention Programs on Sexual and Relationship Violence The Red Flag Campaign Self-Defence & Risk Reduction Programs The Woman's Program	Format In-person Social campaign Mixed formats Theater performance Popular opinion Leader approach (motivational speeches) Duration Not specified	SV-bystander related outcomes: • ATTITUDES/BELIEFS • SELF-EFFICACY • BEHAVIORS	Bystander interventions show positive and significant overall effects but do not appear to produce substantial or lasting changes in behavior, effectiveness, or willingness to intervene
Denhard et al., 2020 [61]	(Systematic) Review (RCT)	7	Not specified	- Population: Undergraduate college students from U.S - Age Range: 18–25 years - Specific Groups: Most studies included only women, with three studies focusing on women with a history of heavy episodic drinking. One study included only men, all of whom had a history of heavy drinking - Ethnicity: Not explicitly reported	Self-Defence & Risk Reduction Programs AlcoholEDU SAFE program Other psycho-educational interventions	Format In-person Motivational interviewing Web-based interventions Duration Not specified	Violence-related outcomes: • VICTIMIZATION • PERPETRATION	- Positive results on reducing victimization across various formats (online/face-to-face), contexts (individual/group) and student populations - Greater attention should be given to the relationship between alcohol consumption and bystander behaviour, as bystander interventions are already effective in reducing sexual violence perpetration and victimisation - Alcohol-focused interventions should explicitly address sexual violence to simultaneously reduce harmful drinking and sexual assault, complementing existing prevention programs
Banton et al., 2023 [62]	Systematic Review	106	Not specified	- Population: Undergraduate college students - Age Range: Not explicitly reported; - Specific Groups: Not explicitly reported; - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander Know Your Power SCREAM The Green Dot Program	Format Motivational speech Peer Opinion Leader strategy Educational skit program In-person Social media campaign Poster Duration Not specified	Bystanders-related outcomes: • ATTITUDES/BELIEFS • INTENTIONS • EFFICACY • BEHAVIORS Violence-related outcomes: • VICTIMIZATION • PERPETRATION	- Bystander intervention programs are widely implemented but show limited effectiveness in reducing campus sexual violence - Programs improve bystander attitudes, intentions and efficacy, but behavioral change is inconsistent - Effects on sexual victimization and perpetration remain unclear

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
Lee et al., 2023 [63]	Systematic Review	15	Not specified (sample size ranged from 95 to 1650 participants)	- Population: Undergraduate college students from U.S - Age Range: Not explicitly reported; - Specific groups: Programs targeted mixed-gender groups, single-gender groups and individuals - Ethnicity: Samples were predominantly White ($\geq 70\%$ in 83% of studies) and female (majority in 87% of studies)	Bystander programs Know Your Power Prevention Programs on Sexual and Relationship Violence Consent is Sexy Consent is Good, Joyous, & Sexy Define Your Line The Red Flag Campaign	Format Poster, Website, social media campaigns, magazines, text message notification; Campus events (in-person) Duration Variable, from 1 week exposure to 2 semesters	SV-bystander related outcomes: - KNOWLEDGE - ATTITUDES/BELIEFS - INTENTIONS - EFFICACY - BEHAVIORS	- Campaigns effectively increase students' knowledge of sexual violence and some pro-social attitudes - Campaigns positively influence students' willingness to participate in prevention activities, but have little effect on their intentions to intervene directly or their confidence to intervene in real-life situations. Inconclusive results on bystander behaviors
Villalonga-Aragón et al., 2023 [65]	(Systematic) Scoping Review pre-experimental, QED, controlled experimental)	15	Nearly 17,000	- Population: Undergraduate college students from various international contexts, including the USA, UK, Vietnam, Italy and South Korea - Age Range: Typically between 18 and 25 years, except for studies including university staff (e.g., $M = 44.46$ years, $SD = 9.81$ in one study) - Specific groups: Programs were delivered to mixed-gender groups in 31.25% of cases, while 68.75% were targeted at single-gender groups or individuals. LGBTQ+ participants were included in some studies, though primarily heterosexual or bisexual samples were analyzed - Ethnicity: Majority White/Caucasian in US-based studies	Bystander programs Bringing in the Bystander Know Your Power With You Education: Bystander Program The Green Dot Program Prevention Programs on Sexual and Relationship Violence RealConsent USVreact	Format Educational video Social (media) campaign Workshop (In-person) Peer-to-peer mediate messaging Web-based education program Focus groups Video Duration Not specified	GBV-bystander related outcomes: - KNOWLEDGE - ATTITUDES/BELIEFS - INTENTIONS - EFFICACY - BEHAVIORS - Violence-related outcomes: - VICTIMIZATION - PERPETRATION	- Bystander education programs effectively increase prosocial behaviors and intentions to intervene in gender-based violence situations - Better recognition of forms of violence - Programs modify harmful gender norms and increase awareness, but self-efficacy and knowledge retention show mixed results
An et al., 2024 [66]	(Systematic) Scoping Review (pre-experimental, RCT, QED)	25	Not specified	- Population: Undergraduate college students from U.S - Age Range: Mean 20.52 years ($SD = 2.08$) - Specific Groups: Most studies ($n = 21$) included both male and female students; three targeted only women and one targeted only men - Ethnicity: Predominantly White (74%), with Asian (5%), Black/African American (5%), Latinx/Hispanic (4%) and Other (12%) representation	Bystander programs Bringing in the Bystander Modified Bringing in the Bystander Prevention Programs on Sexual and Relationship Violence STOP Dating Violence Skills for Healthy Adult Relationships (SHARE) The Red Flag Campaign Dating Relationships Involving Violence End Now (DRIVEN)	Format In-person Online Duration Not specified	IPV-related outcomes: - KNOWLEDGE - BEHAVIORS - Violence-related outcomes: - VICTIMIZATION - PERPETRATION	(Findings don't focused on programs effectiveness) - IPV prevention programs primarily focus on awareness, bystander roles and social-emotional skills, with limited evaluation of long-term behavioral outcomes - Bystander interventions improve knowledge, attitudes and intentions, but behavioral changes remain inconsistent - Skill-building components (e.g., conflict resolution, emotional regulation) show potential for reducing IPV perpetration/victimization

Author (Year)	Study Design	N° of Studies Included	Total Participants	Main Population Type	Main Interventions	Delivery Format	Outcomes	Main Findings
DeFazio et al., 2024 [67]	(Systematic) Scoping Review (RCT, QED)	18	4960	- Population: Undergraduate college students affiliated with fraternities and sororities - Age range: 18–26 years old (specific mean age and standard deviation not reported) - Specific groups: Greek-affiliated students, including both fraternity members (male students) and sorority members (female students). Bystander intervention programs were delivered to single-gender groups (fraternities and sororities) and mixed-gender groups in some cases - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander Safe Sisters Men in Violence Prevention Prevention Programs on Sexual and Relationship Violence Conversation and Pizza RESPECT SWAT training and SWAP Plus Ten Man and Ten Woman Plan Title IX Training The Men's Program Self-Defence & Risk Reduction Programs The Women's Program	Format In-person Online video Duration From 1 h to 3 months	SV-bystander related outcomes: - KNOWLEDGE - ATTITUDES/BELIEFS - INTENTIONS	Findings suggest best practices, including the importance of peer leaders, interactive sessions, simple -clear and tailored content to maximize long term effectiveness
Tibbels & Benbou-riche, 2024 [45]	Systematic Review (RCT, QED)	44	16,818	- Population: Undergraduate university students (87%); high-school students (13%) - Age Range: Not explicitly reported; - Specific Groups: Not explicitly reported; - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander TakeCare Prevention Programs on Sexual and Relationship Violence RealConsent The Men's Program Self-Defence & Risk Reduction Programs Ohio University Sexual Assault Risk Reduction Program	Format In-person Online video Duration From 24 min to 3 h	SV-bystander related outcomes: - KNOWLEDGE - ATTITUDES/BELIEFS - INTENTIONS - EFFICACY - BEHAVIORS - Violence-related outcomes: VICTIMIZATION	- Bystander interventions improve - knowledge, attitudes, self-efficacy, intentions and behaviors though some studies found intentions did not translate into action. No significant change in perpetration - Prevention programs for men effectively increase knowledge, change attitudes and reduce perpetration - Risk-reduction programs for women show positive impact on knowledge and attitudes; less than half report decreased victimization
Zara et al., 2024 [64]	Systematic Review (empirical studies)	67	nearly 92 600	- Population: Predominantly undergraduate college students but also trainees and staff - Age Range: Not explicitly reported; - Specific groups: Studies included both mixed-gender and single-gender samples. Some focused specifically on male or female groups, while others targeted LGBTQ+ populations - Ethnicity: Not explicitly reported	Bystander programs Bringing in the Bystander Green Dot (Other bystander interventions or with multilevel whole campus approach) Prevention Programs on Sexual and Relationship Violence RealConsent Sex, Safety and Respect	Format In-person workshops Online Duration Not specified	(The review provides an updated synthesis of recent research on SVSH in academia, highlighting risk factors within a prevention framework and offering recommendations for developing multilevel preventive interventions)	- Bystander programs (e.g., Green Dot, RealConsent) effectively improve awareness and intervention skills - A socio-ecological approach is needed, integrating policies, training and multi-stakeholder collaboration

Main Population Type refers to the sociodemographic and educational characteristics of the study populations included in each review (e.g., age range, specific subgroups, ethnicity). Main Interventions indicates the types of prevention programs examined, grouped by three categories: Bystander programs, Prevention Programs on Sexual and Relationship Violence, Self-Defence & Risk Reduction Programs. Delivery Format specifies the mode of delivery (e.g., in-person, web-based, hybrid) and the duration of the interventions. Outcomes were grouped into thematic categories to facilitate interpretation and manage heterogeneity across studies: knowledge, attitudes, beliefs, intentions, efficacy, behaviors, victimization and perpetration. Main Findings provides a concise summary of the key results and conclusions reported in each included systematic review

RCT Randomized Controlled Trial, QED Quasi-Experimental Design, SA Sexual Assault, SV Sexual Violence, IPV Intimate Partner Violence, GBV Gender-Based Violence

Abbreviations

SH	Sexual Harassment
SA	Sexual Assault
SV	Sexual Violence
IPV	Intimate Partner Violence
GBV	Gender-Based Violence

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

Conceptualization was led by VD, MGLM, LDP and SP. Methodology development and protocol registration were performed by VD, MGLM and FDM. Investigation (study screening and eligibility assessment) was conducted by FDM, LA, GT, SF and OS. Data curation, including data extraction and quality assessment, was carried out by FDM, LA and GT. Formal analysis and data synthesis were performed by FDM and VD. Funding acquisition and financial support were ensured by CVC and SP. Project administration and coordination were managed by VD, LDP, MGLM, and SP. Writing – original draft was prepared by FDM. Supervision and critical oversight were provided by VD, LDP, and SP. All authors contributed to Writing – review and editing through critical revision and commentary on the manuscript.

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Data availability

The data underlying this umbrella review were derived from published systematic reviews and are fully reported within the article and its Appendix.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

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Competing interests

The authors declare no competing interests.

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