

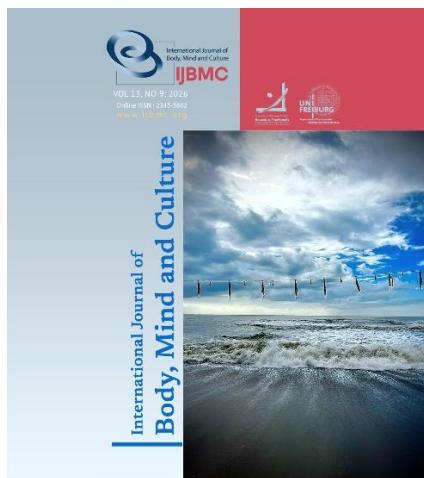
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Effectiveness of Online and Digital App-Based Interventions for Intimate Partner Violence, Dating Violence, and Coercive Control: A Systematic Review and Meta-Analysis

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ABSTRACT

Objective: This review aimed to evaluate the effectiveness of online and digital app-based interventions in reducing intimate partner violence, dating violence, and coercive control, improving safety behaviors, and enhancing mental and physical health outcomes among individuals experiencing or at risk of such violence.

Methods and Materials: We searched MEDLINE, PubMed, Scopus, and ScienceDirect for controlled studies published from January 2015 to January 2026. Eligible interventions were delivered primarily via web platforms or mobile apps. Quantitative synthesis used random-effects meta-analysis (mean difference (MD), 95% CI) for comparable outcomes. Risk of bias was assessed with Cochrane RoB 2.

Findings: Twenty-five studies were included in the qualitative synthesis. Primary outcomes were changes in relationship violence (incidence, frequency, or severity) and safety behaviors; secondary outcomes included mental health (depression, anxiety, PTSD) and physical health. Digital interventions significantly reduced depressive symptoms (MD = -0.58 to -0.77) and anxiety (MD = -1.60) at 0–3 months, improved physical outcomes at 3–6 months (MD = -0.75), and decreased PTSD symptoms at 3–6 months (MD = -0.21 after outlier removal) and >6 months (MD = -1.12). Sexual victimization showed a significant difference at 3–6 months (MD = 0.52), but results require cautious interpretation due to possible variability in instrument scoring (higher scores = greater victimization) and potential increased reporting/awareness post-intervention. Heterogeneity ranged from low to very high.

Conclusion: Online-digital interventions show promising short-term benefits for depression-anxiety and mid- to longer-term gains in physical health/PTSD. They should complement trauma-informed services, prioritizing digital safety and privacy.

Keywords: Intimate Partner Violence, Digital Intervention, Dating Violence, Coercive Control, Systematic Review, Meta-Analysis.

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Introduction

Intimate partner violence (IPV), dating violence, and coercive control, remains a major global public health and social problem. It involves physical, sexual, and psychological abuse, as well as coercive behaviors occurring in current or former intimate or dating relationships (Organization, 2013). This form of violence affects individuals across age groups and settings and continues to challenge prevention, protection, and recovery efforts worldwide (Organization, 2023).

The scale of the problem remains substantial. Recent global estimates indicate that nearly 1 in 3 women, or approximately 736–852 million, have experienced physical and/or sexual violence in their lifetime, most commonly by an intimate partner. In the past 12 months alone, about 316 million women were affected (Organization, 2023). These estimates, drawn from population-based surveys across 168 countries and territories between 2000 and 2023, demonstrate that relationship violence remains widespread and that major gaps persist in prevention and response systems. In addition, UN Women and the United Nations Office on Drugs and Crime estimated that intimate partners or family members killed around 50,000 women and girls in 2024, equivalent to approximately 137 deaths each day (NC et al., 2015).

The consequences of relationship violence extend far beyond immediate physical injury. Exposure to violence increases the risk of chronic physical illness, depression, anxiety, post-traumatic stress disorder (PTSD), substance use disorders, and suicide (Clayton et al., 2023; NC et al., 2015; Organization, 2013). Longitudinal studies and systematic reviews have also shown that IPV exposure is associated with later depressive symptoms, suicide attempts, and broader psychiatric morbidity (Bacchus et al., 2018; Devries et al., 2013; Lagdon et al., 2014). At the same time, many survivors encounter structural, social, and psychological barriers to disclosure and help-seeking. These barriers make accessible, evidence-based, and trauma-informed support especially important.

Digital interventions have emerged as one promising approach to address these challenges. In this review, digital interventions refer to programs delivered mainly through websites, mobile applications, or messaging systems, often including safety planning, psychoeducation, empowerment modules, and decision-support tools (Emezue, 2020; Emezue et al., 2022). Trauma-informed approaches in this context refer to interventions that prioritize safety, trust, empowerment, and avoidance of re-traumatization. These interventions may serve preventive purposes by reducing risk and promoting healthy relationship behaviors, or response purposes by supporting survivors through safety planning, mental health support, and linkage to services. Their relevance has increased alongside rapid internet expansion. In 2024, 5.5 billion people, or 68% of the global population, used the internet (Union, 2024). This broad reach creates opportunities to deliver support at scale, reduce geographic and stigma-related barriers, and provide more private and tailored access for survivors. Several interventions have been developed in this area, including I-DECIDE, myPlan, iCAN Plan 4 Safety, and SAFE eHealth (Decker et al., 2020; Ford-Gilboe et al., 2017; Hegarty et al., 2019; van Gelder et al., 2023). However, because perpetrators may also misuse technology for monitoring and control, digital IPV interventions must incorporate safety-by-design and trauma-informed principles (Abuse, 2013; Emezue, 2020).

Previous syntheses have reported heterogeneous findings, with benefits often limited to short-term mental health outcomes or selected safety measures (Emezue, 2020; Emezue et al., 2022). As digital approaches continue to expand across settings and platforms, an updated synthesis is needed (Emezue et al., 2022). This review examined whether digital interventions, compared with usual care, waitlist, no intervention, or non-digital alternatives, reduce violence exposure or severity and improve safety behaviors among adolescents and adults of any gender who are experiencing, are at high risk or have a history of relationship violence. We also assessed their effects on depression, anxiety, PTSD, physical health, and related outcomes in randomized and non-randomized controlled studies

published between 2015 and 2026. We hypothesized that digital interventions would produce small-to-moderate improvements, particularly in short- to mid-term mental health and safety outcomes, with greater effects in tailored, trauma-informed programs.

Methods and Materials

Study Design

PROSPERO Registration

This systematic review and meta-analysis was prospectively registered in the International Prospective Register of Systematic Reviews to enhance transparency and reduce the risk of duplication. The registration was submitted on 7 January 2026, under the title "Effectiveness of Online and Digital App Interventions for Relationship Violence: A Systematic Review and Meta-Analysis" (registration number CRD42026300001, available at https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42026300001). The protocol outlined the review objectives, eligibility criteria, search strategy, and planned analyses, following PRISMA-P guidelines.

Literature Search Strategy

A comprehensive literature search was conducted to identify relevant studies. The main bibliographic databases searched included MEDLINE, PubMed, Sciencedirect, and Scopus. Additionally, the specialist database Science Direct was queried. No language restrictions were applied to ensure inclusivity. The search was limited to articles published from 1 January 2015 to 1 January 2026, reflecting the rapid evolution of digital interventions in this field.

Search terms combined relationship violence and digital intervention concepts using Boolean operators: ("intimate partner violence" OR IPV OR "dating violence" OR "relationship violence" OR "coercive control") AND ("online intervention" OR "digital intervention" OR "web-based intervention" OR "internet-based intervention" OR "mobile application" OR "mobile app" OR mHealth OR eHealth). MeSH terms, including "Intimate Partner Violence" and "Mobile Applications," were applied when supported. Full database-specific search strings are

presented in Supplementary Table 1. Unpublished studies were not sought, but additional studies were identified through backward citation searching by checking reference lists of included articles. No forward citation searching or hand-searching of journals was performed.

Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: (1) Population: Adolescents and adults (any gender) currently experiencing, with a history of, or at increased risk of relationship violence, including intimate partner violence (IPV), dating violence, or domestic violence, recruited from any setting (community, healthcare, campus, shelters) and any country. (2) Intervention: Online or digital app-based interventions delivered primarily through web-based platforms, mobile apps, or messaging, focusing on prevention or support (safety planning, psychoeducation, empowerment, counseling). (3) Comparator: Usual care, waiting list control, no intervention, or non-digital interventions. (4) Outcomes: Primary outcomes included changes in relationship violence (incidence, frequency, or severity of physical, sexual, psychological abuse, coercive control) and safety-related outcomes (safety planning/behaviors, help-seeking, service uptake), secondary outcomes encompassed mental health measures (depression, anxiety, PTSD/trauma symptoms, stress, quality of life) and adverse events (digital safety/privacy harms). (5) Randomized controlled trials (RCTs) design studies. Studies were excluded if they did not involve digital interventions, focused solely on non-relationship violence, lacked a control group, or were published outside the specified date range. No restrictions were applied based on country, context, or socioeconomic setting, but interventions had to allow remote access via smartphone, tablet, or computer. Meta-analysis was conducted using a random-effects model due to expected heterogeneity across studies, and sensitivity analysis was performed using a leave-one-out method to assess their influence on the pooled effect size and I^2 value.

Screening and Selection Process

Titles and abstracts of retrieved records were screened independently by two reviewers using predefined eligibility

criteria. Disagreements were resolved through discussion or consultation with a third reviewer. Full-text articles of potentially eligible studies were then retrieved and assessed independently by the same reviewers. A process to resolve differences involved consensus meetings, with escalation to the review guarantor if needed. The screening process followed PRISMA guidelines, and a flow diagram was used to document the number of studies at each stage, including reasons for exclusions.

Data Extraction and Synthesis

Data extraction was performed independently by two reviewers using a standardized extraction form. Extracted variables included study characteristics, participant characteristics, intervention details, comparator, outcomes, timepoints, and effect size data. Discrepancies were resolved through discussion and, consultation with a third reviewer. Where outcome data were incomplete, corresponding authors were contacted when feasible. If standard deviations were not reported, they were derived from available statistics such as standard errors, confidence intervals, p-values, or sample size information when possible. No data were imputed unless sufficient information was available for calculation. For continuous outcomes, mean differences (MD) were extracted when studies used the same measurement scale, all were reported with 95% confidence intervals. For dichotomous outcomes, risk ratios (RR) or odds ratios (OR) with 95% confidence intervals were extracted where applicable. Where data were missing or unclear, attempts were made to contact study authors for clarification, and studies with insufficient quantitative data were summarized narratively.

When studies reported multiple follow-up timepoints, the primary meta-analysis prioritized the earliest post-intervention timepoint that was most comparable across studies. Additional follow-up timepoints were considered in subgroup or narrative analyses where appropriate and available.

Data synthesis involved narrative description for all outcomes, with quantitative meta-analysis performed where sufficient comparable data existed. Quantitative meta-analyses were conducted in Review Manager (RevMan)

using a random-effect model, with pooled estimates reported alongside measures of heterogeneity.

Analysis and Interpretation

Pooled effects were estimated for primary outcomes (relationship violence and safety-related outcomes) and secondary outcomes (mental health and adverse events) at post-intervention and the longest available follow-up, stratified by follow-up duration (≤ 3 months, 3–6 months, and > 6 months). Statistical heterogeneity was assessed using the I^2 statistic and Chi-squared tests. Sensitivity analyses were performed where appropriate, including exclusion of influential outliers and/or studies at high risk of bias to examine the robustness of pooled estimates. Subgroup and moderator analyses were conducted on an exploratory basis to examine potential sources of heterogeneity, including intervention type, follow-up duration, and study characteristics where sufficient data were available. Publication bias was assessed using funnel plots and Egger's test for meta-analyses. These analyses were interpreted cautiously because they were limited by the number of included studies and were not adjusted for multiple testing.

Risk of Bias Assessment

Risk of bias was assessed independently by two reviewers using the Cochrane Risk of Bias 2 (RoB 2) tool for randomized controlled trials. The assessment covered the domains of bias arising from the randomization process, deviations from intended interventions, missing outcome data, outcome measurement, and selection of the reported result. Any disagreements between reviewers were resolved through discussion, and when consensus could not be reached, a third reviewer was consulted. Risk-of-bias judgments were considered during interpretation of the findings and were explored in sensitivity analyses where appropriate.

Findings and Results

A systematic literature search across PubMed, Scopus, MEDLINE, and ScienceDirect identified a total of 11,623 records. After duplicate removal, titles/abstracts were screened and full texts were assessed against the eligibility criteria. In total, 25 studies were included in the qualitative

synthesis (systematic review), and studies with sufficiently comparable quantitative data were subsequently included in the quantitative synthesis. The study selection process is detailed in the PRISMA flow diagram (Figure 1). Given the substantial heterogeneity observed across studies, pooled analyses were interpreted primarily using random-effects models, which better account for between-study variability. For depression, anxiety, physical outcomes, sexual victimization and PTSD outcomes with higher scores

indicated worse symptoms. Therefore, a negative pooled mean difference favored the intervention. The pooled estimate suggested a favorable association between the intervention and reduced sexual violence-related scores. However, the result should be interpreted cautiously due to substantial heterogeneity in some outcomes and variation in intervention content. The studies result is presented in Table 1.

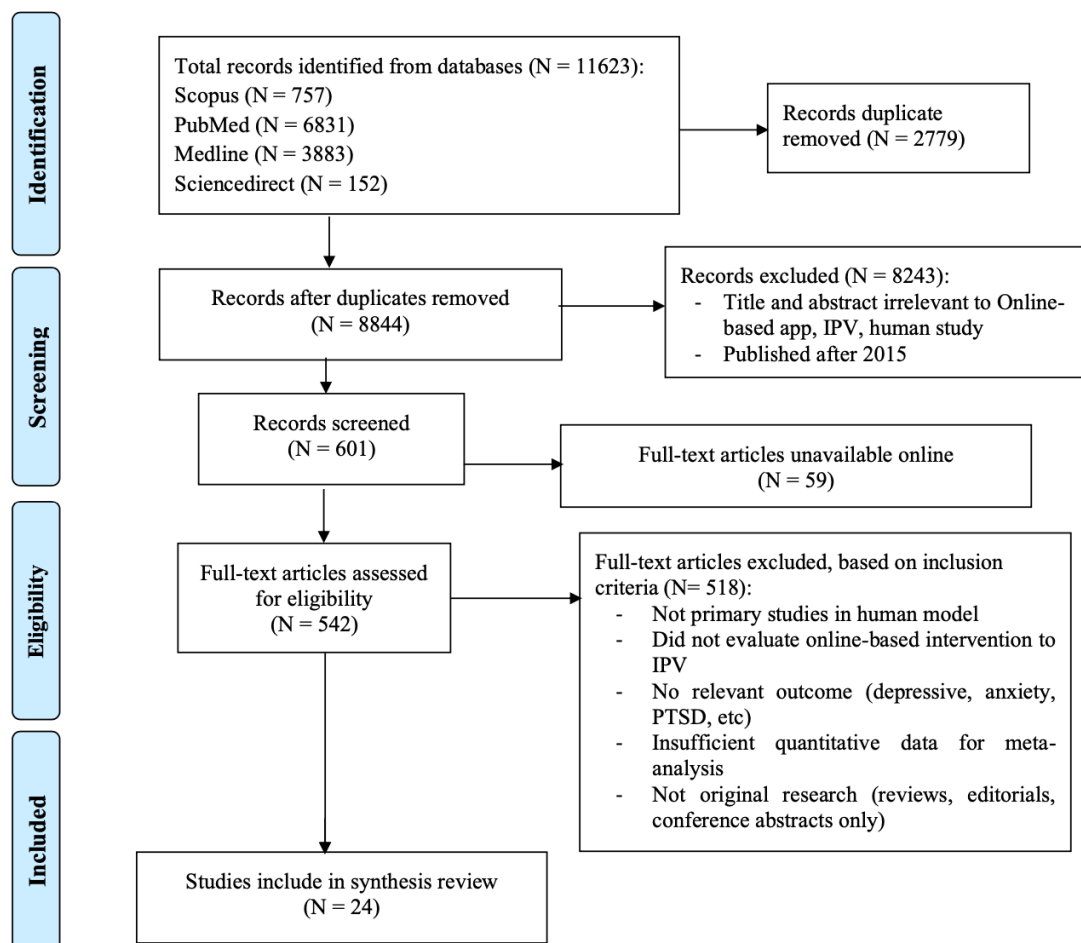


Figure 1

PRISMA

Table 1*Studies result*

No	Author	Country	Intervention	Total Participants Included in Study	Comparison Treatment	Outcome
1	Sabri et al. (2024)	USA	Digital MySteps intervention (firearm-focused safety planning, including risk assessment, psychoeducation, and tailored safety planning delivered digitally)	103 (55 in intervention arm, 48 in control arm)	Standard of care control arm	Feasibility (enrollment, adherence); Acceptability (perceptions of the intervention); Partner's access to a firearm; Women's self-efficacy beliefs; Empowerment; Qualitative feedback on use and helpfulness of safety strategies (e.g., protection from firearm-related harm, non-fatal mental and physical harm)
2	De Filippo et al. (2023)	South Africa	Behaviourally-informed digital chatbot: Gamified Treatment (T1) - interactive text-based chatbot with gamification elements; Narrative Treatment (T2) - drama-based content via pre-recorded voice notes on WhatsApp	19,643 (recruited); 11,630 (retained to primary endpoint)	Pure Control (PC); Attention Treatment (T0) - didactic information about sexual health via text-based chatbot	Gender attitudes (Gender Relations Scale); Past-month IPV exposure (WHO Multi-country Study Instrument - including physical, sexual, and overall IPV); Identification of unhealthy relationship behaviours (Intimate Partner Violence Attitudes Scale); Depressive symptoms (Patient Health Questionnaire)
3	Sabri et al. (2025)	USA	Personalized online intervention (culturally adapted myPlan app with low danger assessment, priority-setting, and tailored safety plan); For low responders: Text-only messaging or Text + Phone support (trauma-informed, empowerment-focused calls)	1265 (660 in personalized online arm; 605 in standard arm; 366 responders re-randomized: 183 text-only, 183 text + phone)	Standard online safety information	Physical and sexual IPV (reductions over time); Depression; Empowerment; PTSD; Safety behaviors (e.g., safety planning actions); Mental health outcomes (e.g., persistent IPV-related needs like powerlessness, fear)
4	Roddy et al. (2018)	USA	Web-based self-help intervention (OurRelationship program) for relationship distress	Aim 1: 2797 individuals; Aim 2: 300 couples (600 individuals)	Waitlist control group	Relationship satisfaction (CSI-4, CSI-16); IPV (LI-IPV, CS-IPV); Demographics; Anxiety (GAD-7); Depression (CES-D 10); Childhood sexual assault; Binge drinking; Infidelity
5	Glass et al. (2024)	USA	myPlan Teen app (digital healthy relationship and safety planning intervention)	617 adolescents	Usual care (standard website on teen health)	Use of helpful safety behaviors; Dating violence victimization and perpetration (Conflict in Adolescent Dating Relationships Inventory - psychological abuse, physical/sexual violence); Depression (PROMIS Pediatric Depression Scale); Suicide behavior
6	Ford-Gilboe et al. (2024)	Canada	iHEAL (woman-led, nurse-delivered health promotion)	331 women	Community service information (usual care control)	Quality of Life (QOL scale); PTSD symptoms (PCL-C); Depression (CESD-R); Confidence in Managing Daily Life (10-item scale);

			intervention over 6-7 months)				Chronic Pain (Von Korff's Chronic Pain Grade); IPV Severity (CASR-SF)
7	van Gelder et al. (2023)	Netherlands	SAFE eHealth intervention (help website with 4 modules on IPVA, support options, mental health, social support, and interactive components such as chat)	198 women (99 control); Open Feasibility Study: 170	Limited-intervention control group		Self-efficacy; Depression; Anxiety; Fear of partner; Awareness; Perceived support; Feasibility (ease of use, feeling helped, suitability, satisfaction)
8	Bloom et al. (2023)	USA	myPlan app (interactive, personalized safety decision and planning tool for concerned friends of IPV survivors)	293 college students (147 intervention, 146 control)	Usual resources	web-based	Decisional conflict; Decisional preparedness; Confidence in intervening; Supportive safety behaviors; IPV attitudes
9	Li et al. (2024)	USA	SHE (self-compassion, health, and empowerment) mobile-based empowerment intervention	50 Chinese immigrant women (25 intervention, 25 control)	Control group		IPV exposure (negotiation, psychological aggression, sexual coercion, physical assault, injury); Safety behaviors; Depressive symptoms; Anxiety symptoms; PTSD symptoms; Self-compassion
10	Schafer et al. (2025)	South Africa and Jamaica	ParentText (digital chatbot with integrated IPV prevention content)	68 (women in Jamaica: n=28; women in South Africa: n=19; men in South Africa: n=21)	Limited-intervention control group		- Primary behavioral outcomes: Women's experiences of IPV (physical, psychological, sexual, coercion, economic abuse); Men's perpetration of IPV (physical, psychological, sexual, coercion, economic abuse) - Secondary behavioral outcomes: Men's experiences of IPV; Women's perpetration of IPV; Women's positive partner interactions; Men's positive partner interactions; Overall attitude toward gender roles and IPV; Overall gender-equitable behaviors
11	Andersson et al. (2021)	Sweden	Therapist-guided, individually tailored internet-delivered CBT (ICBT) for 8 weeks, targeting PTSD/depression in IPV survivors.	64 (ICBT n=32; waitlist n=32)	Waitlist (delayed treatment)	control	Primary outcomes: PTSD and depressive symptoms. Secondary outcomes commonly included anxiety and quality of life (as measured by validated psychometric instruments). Overall, post-treatment and follow-up assessments indicated symptom improvement in the intervention group compared with control (depending on the specific scale/timepoint).
12	Flaathen et al. (2022)	Norway	Tablet-based culturally sensitive 7-min video about IPV + safety/help-seeking behaviours (multilingual).	317 women with lifetime IPV randomized (157 intervention; 160 control).	Control video: general healthy/safe pregnancy lifestyle information (7 min).		Quality of life (WHOQOL-BREF, measured ~3 months postpartum) ; IPV measures incl. AAS (history of IPV) and CAS-SF-R scores ; use of safety behaviours.
13	Zlotnick et al. (2019)	United States	SURE (Strength for U in Relationship Empowerment) - brief, motivational computer-based intervention	53 perinatal women	Usual care		IPV (overall degree, emotional abuse, physical abuse); helpfulness of information and resources.

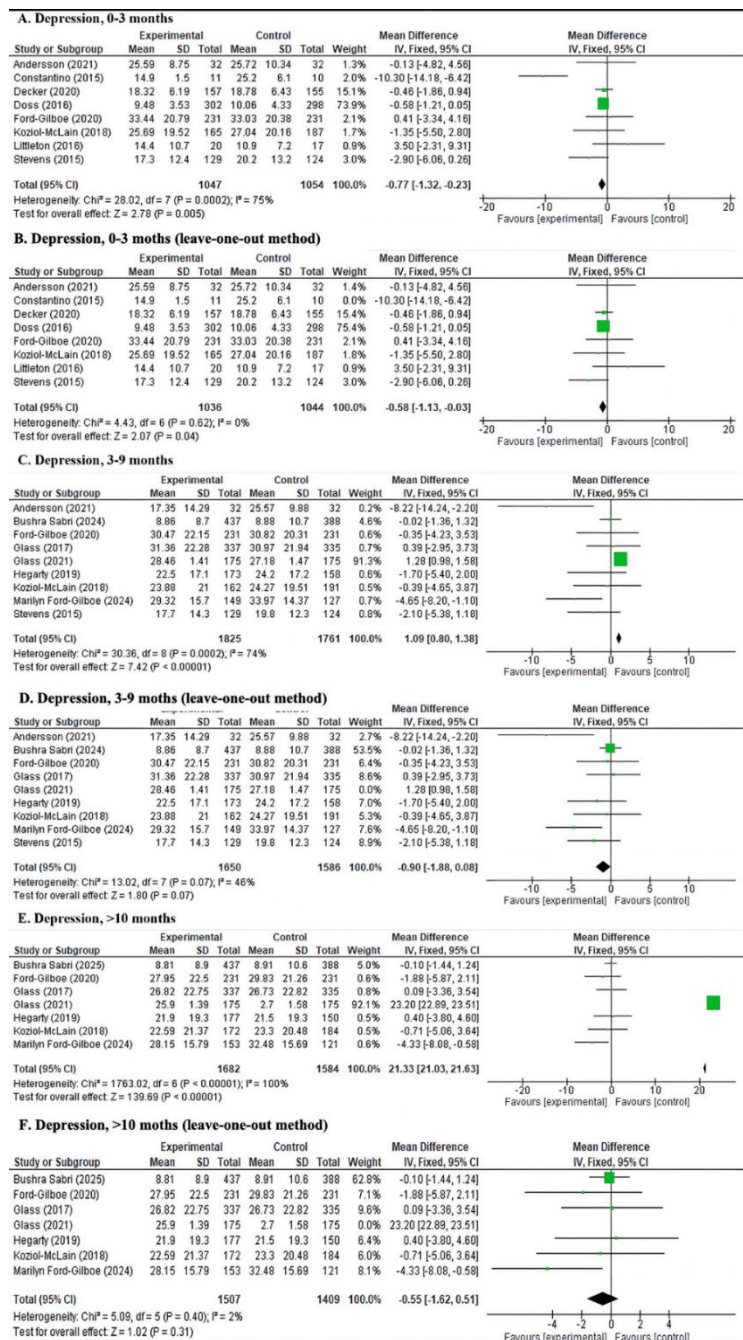
14	Doss et al. (2016)	United States	OurRelationship (OR) program - web-based program adapted from couple therapy	300 couples (600 individuals)	Waitlist control	Relationship satisfaction; relationship confidence; negative relationship quality; depressive symptoms; anxious symptoms; perceived health; work functioning; quality of life.
15	Stevens et al. (2015)	United States	Telephone Support Services (TSS) - telephone support by nurse interventionists	300 women	Enhanced Usual Care (EUC)	IPV victimization; feelings of chronic vulnerability; depressive symptoms; posttraumatic stress disorder symptoms (no differences).
16	Hegarty et al. (2019)	Australia	I-DECIDE - online interactive healthy relationship tool and safety decision aid	422 women	Static IPV information website	Self-efficacy; depressive symptoms; fear of partner; PTSD symptoms; decisional conflict; helpful/harmful behaviors; support needs; quality of life (no quantitative differences, qualitative benefits).
17	Littleton et al. (2016)	United States	From Survivor to Thriver - online therapist-facilitated cognitive-behavioral program	87 college women	Psycho-educational self-help website	PTSD symptoms; depressive symptoms; general anxiety symptoms.
18	Koziol-McLain et al. (2018)	New Zealand	isafe - web-based safety decision aid	412 women	Standard nonindividualized website	Depressive symptoms; IPV exposure (total, threat, acts, sexual); danger assessment; PTSD; decisional conflict; safety behaviors; alcohol use; drug use (reductions in IPV and depression for Māori women).
19	El-Bassel et al. (2014)	United States	Computerized WORTH - group sessions with computerized IPV prevention modules	306 women	Traditional WORTH (no computers); Wellness Promotion Computerized vs control	Physical IPV victimization; severe injurious IPV; severe sexual IPV (reductions in Wellness Promotion Computerized vs control).
20	Decker et al. (2020)	Kenya	myPlan Kenya - tailored safety decision-making mobile app by lay professionals	352 women	Standard IPV referrals	Safety preparedness; helpfulness of safety strategies; IPV; resilience; risk for lethal violence; mental health; service utilisation; self-blame.
21	Ford-Gilboe et al., (2020)	Canada	iCAN Plan 4 Safety - tailored interactive online safety and health intervention	462 women	Static non-tailored version	Depressive symptoms; PTSD symptoms; helpfulness of safety actions; confidence in safety planning; mastery; social support; coercive control; decisional conflict (improvements both, tailored better for subgroups).
22	Glass et al. (2022)	United States	myPlan app - tailored safety planning app	346 college women	Usual safety planning resources	web-based IPV (composite abuse scale, TBI-related, digital abuse, reproductive coercion); depression; suicide risk; safety behaviors (reductions in RC, suicide risk, IPV with helpful behaviors).
23	Glass et al. (2017)	United States	Tailored Internet-based safety decision aid	720 women	Control website (typical online safety info)	Safety outcomes; mental health outcomes; IPV exposure; decisional conflict (reductions in IPV, improved safety and mental health).
24	Constantino et al. (2015)	United States	Online HELPP (Health, Education on Safety, and Legal Support and Resources in IPV)	32 women	Face-to-Face Waitlist Control	HELPP; Anxiety; depression; anger; personal support; social support (decreases in negative outcomes, increases in support for online).

Depression

Digital interventions showed a pooled reduction in depression scores at 0–3 months; however, the heterogeneity

was considerable ($MD = -0.77$, $I^2 = 75\%$; $P = 0.005$) (Figure 2), indicating substantial variability across studies and limiting the certainty of the pooled estimate. After removing the outlier, the pooled effect remained significant but attenuated and heterogeneity dropped to none ($MD = -0.58$, $I^2 = 0\%$; $P = 0.04$). At 3–9 months, the pooled estimate favoured control when all studies were included ($MD = 1.09$, $I^2 = 74\%$; $P < 0.00001$), but this result was not robust: after excluding the outlier, the direction shifted toward benefit of

the intervention and became non-significant ($MD = -0.90$, $I^2 = 46\%$; $P = 0.07$). For >10 months, the analysis including all studies showed an extremely large pooled effect with high heterogeneity ($MD = 21.33$, $I^2 = 100\%$; $P < 0.00001$), indicating the result was dominated by an outlier/scale incompatibility; once the outlier was removed became non-significant with minimal heterogeneity after outlier removal ($MD = -0.55$, $I^2 = 2\%$; $P = 0.31$).



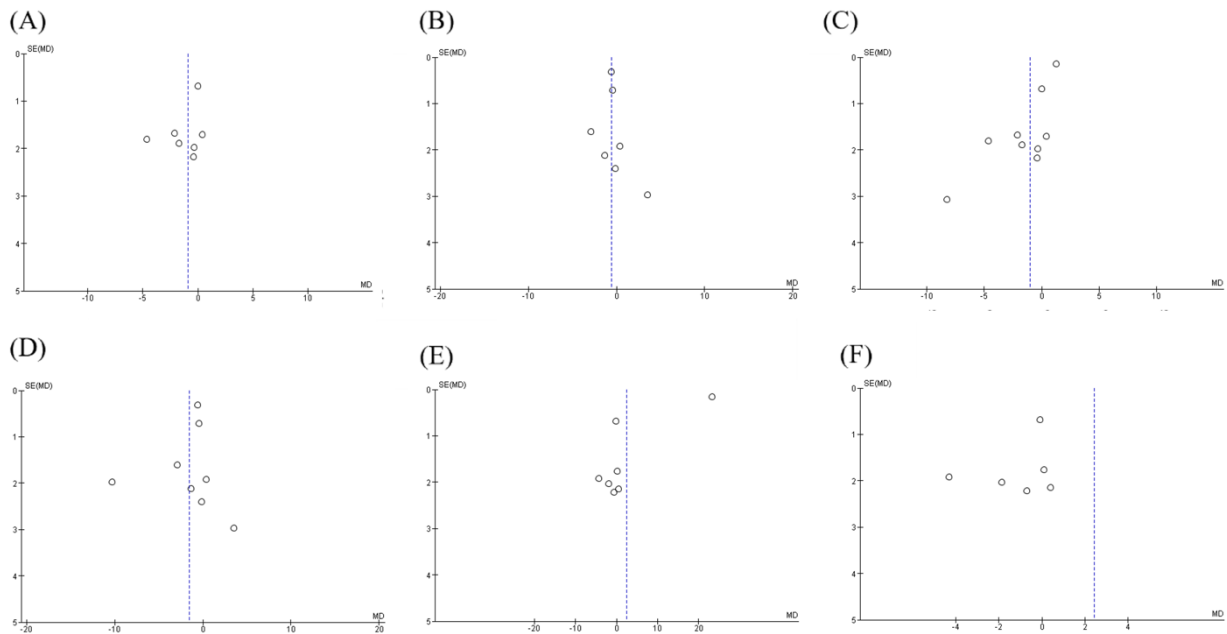


Figure 2

Depression outcomes at different follow-up periods. Random-effect (inverse-variance) forest plots and corresponding funnel plots (MD, 95% CI) for (A) depression 0–3 months, (B) depression 0–3 months (outlier removed), (C) depression 3–9 months, (D) depression 3–9 months (outlier removed), (E) depression >10 months, and (F) depression >10 months (outlier removed).

Anxiety

Online/ interventions at 0–3 months produced a significant reduction in anxiety compared with control (MD = -1.60; $I^2 = 0\%$; $P < 0.0001$), indicating a consistent short-

term benefit with no observed heterogeneity across the included studies (Figure 3). Negative effect estimate favored the intervention group by reflecting reduced anxiety levels.

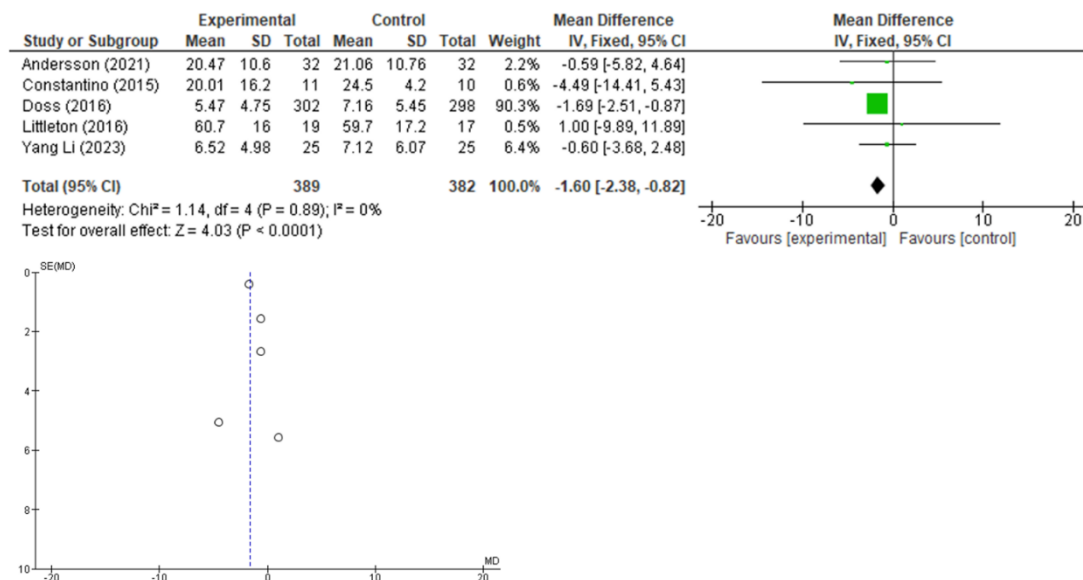


Figure 3

Forest and funnel plots of meta-analysis for Anxiety (0–3 months)

Physical

At 3–6 months, online/digital interventions were associated with significantly better physical outcomes compared with control (MD = -0.75; $I^2 = 5\%$; $P < 0.00001$), indicating a consistent mid-term benefit with low

heterogeneity (Figure 4). Although the pooled effect was in a favorable direction, the practical significance of this finding remains uncertain due to variation in how physical victimization was defined and measured across studies.

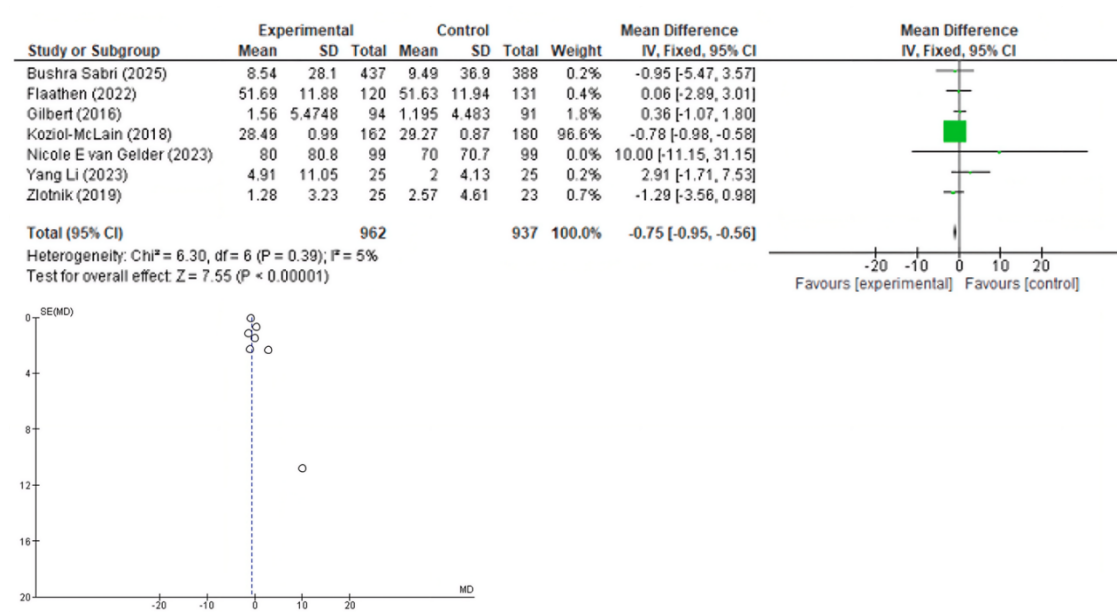


Figure 4

Forest and funnel plots of meta-analysis for Physical (3–6 months) Sexual Victimization

Online interventions at 3–6 months, showed a significant difference in sexual victimization compared with control (MD = 0.37, $I^2 = 36\%$; $P = 0.05$), with moderate heterogeneity

across studies (Figure 5). Higher sexual victimization scores represented worse outcomes; therefore, a negative effect estimate suggested a favorable reduction in victimization-related scores in the intervention group.

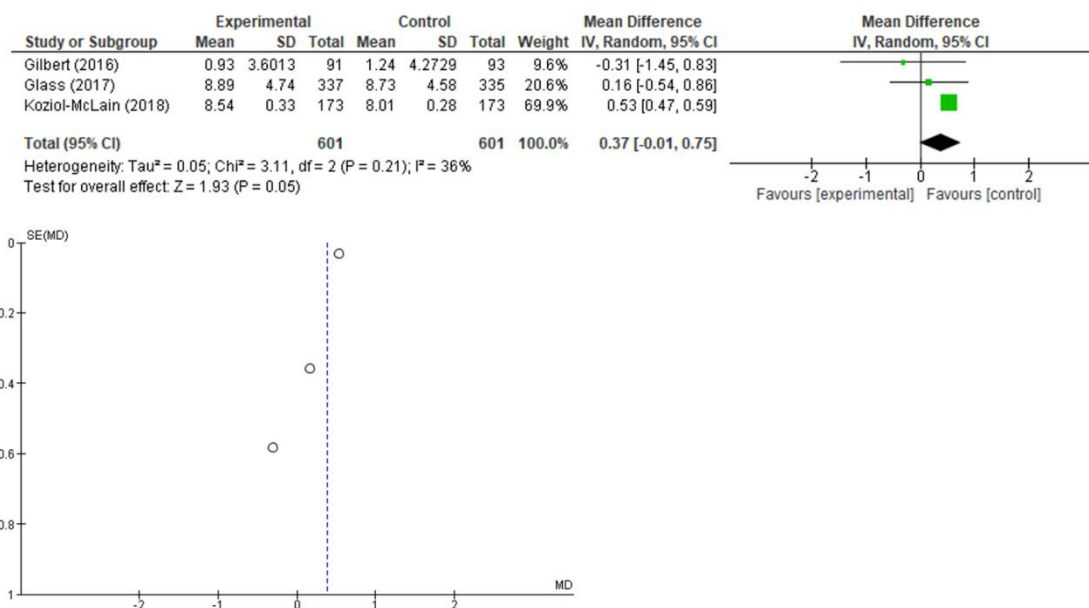


Figure 5

Forest and funnel plots of meta-analysis for Sexual victimization (3–6 months)

PTSD

The primary pooled analysis at 3–6 months PTSD outcome demonstrated a significant benefit of the intervention ($MD = -0.31$; $I^2 = 99\%$; $p = 0.0004$), but this estimate was accompanied by extreme heterogeneity. Sensitivity analysis yielded a more stable result: the effect remained statistically significant ($MD = -0.21$; $I^2 = 0\%$; $p = 0.02$), while heterogeneity decreased to 0%. This suggests that although the initial pooled estimate was influenced by

between-study variability, the direction of effect remained favorable and statistically reliable after exclusion of influential studies. In the >6 months subgroup, the pooled effect was stronger ($MD = -1.12$; $I^2 = 0\%$; $p < 0.00001$), indicating that digital interventions may provide more consistent longer-term benefit for PTSD-related outcomes. Forest and funnel plots of meta-analysis for PTSD is presented in Figure 6.

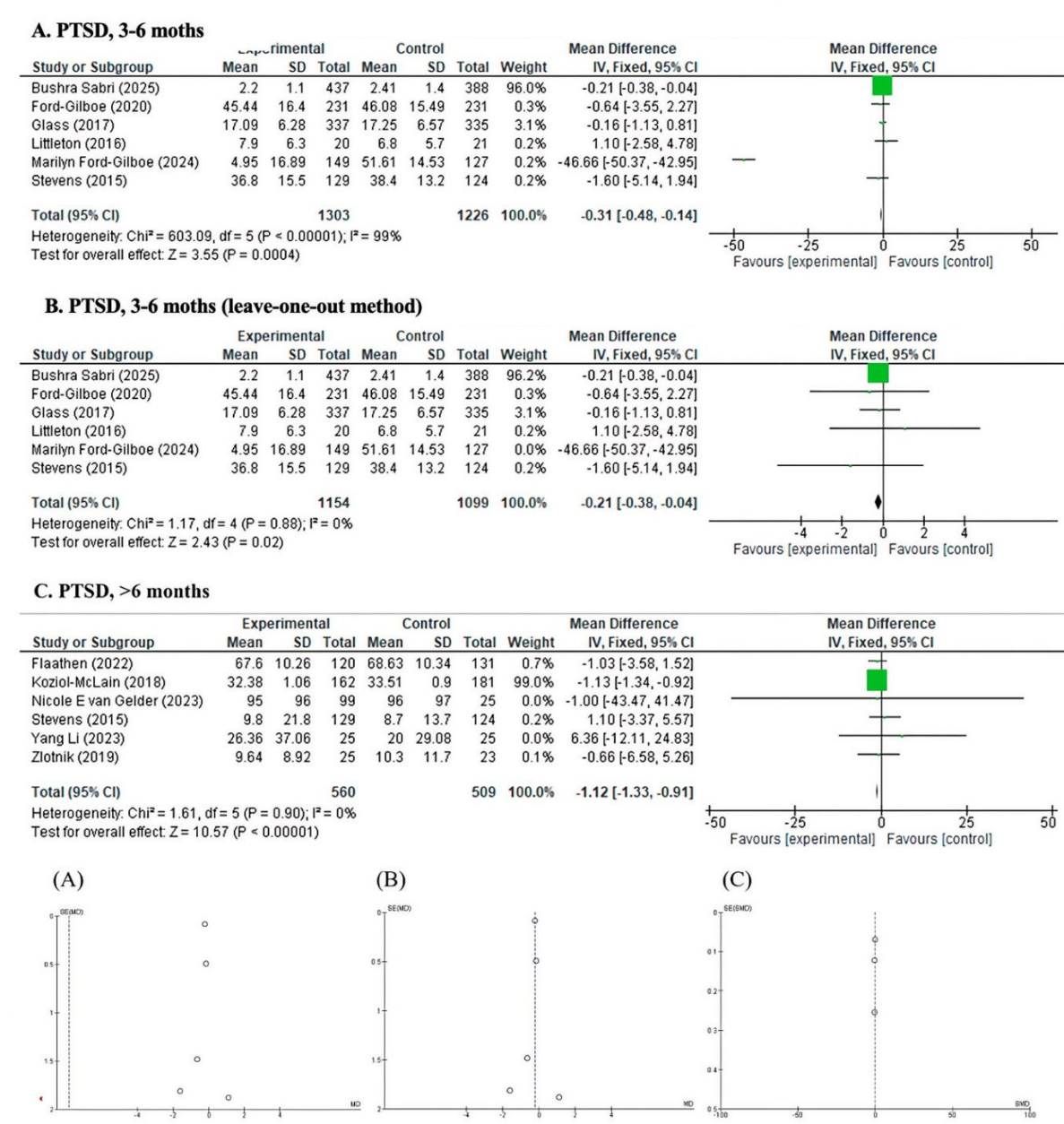


Figure 6

Forest and funnel plots of meta-analysis for PTSD (3–6 months, 3–6 months outlier removed, >6 months)

Risk of bias

Risk of bias assessment is essential in online IPV intervention meta-analyses because limitations in trial conduct and reporting (particularly around blinding and attrition) can distort effect estimates and contribute to heterogeneity. This review assessed internal validity using the standard Cochrane risk-of-bias framework for RCT across seven domains (selection, performance, detection, attrition, reporting, and other bias) to contextualize pooled effects before clinical and implementation interpretation. The most prominent concerns were blinding of participants/personnel and outcome assessment (high risk

in many studies), while sequence generation and allocation concealment were more frequently low risk but often rated unclear due to under-reporting; attrition risk was mixed, and selective reporting/other bias were predominantly low risk. Across 175 RoB 2 judgments from 25 studies, 57.1% were low risk, 24.0% unclear, and 18.9% high risk (Figure 7). High risk predominated in performance bias (88%) and detection bias (80%) due to blinding difficulties in digital interventions. Randomization and reporting were well addressed (80% low risk each). These findings call for cautious interpretation of self-reported outcomes.

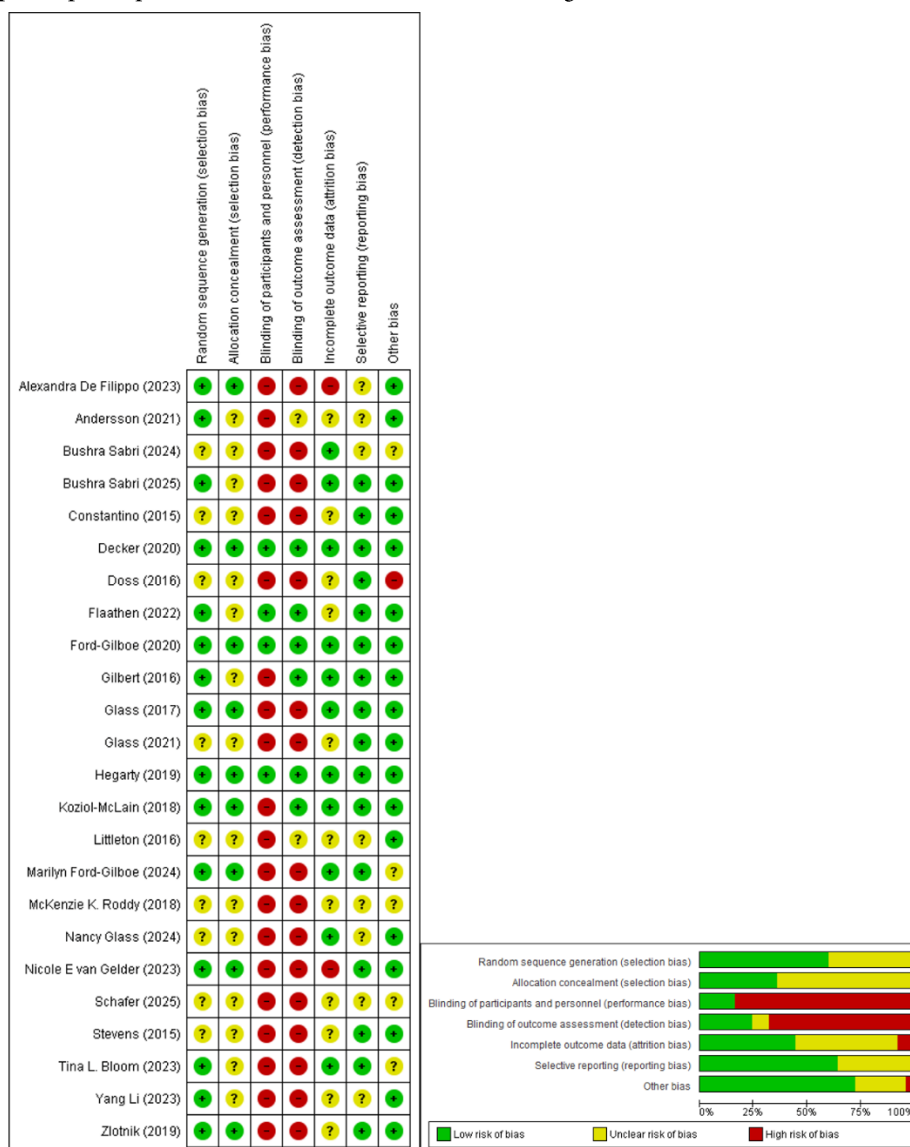


Figure 7

Risk of Bias

Publication Bias

Publication bias was explored using funnel plots for each quantitative synthesis (as presented alongside the forest plots for depression, anxiety, physical outcomes, sexual victimization, and PTSD). Egger's regression test was pre-specified for meta-analyses including at least 10 studies. However, several pooled analyses included fewer studies, limiting the power and interpretability of asymmetry tests in this evidence base. Overall, publication-bias assessments should therefore be interpreted cautiously, and small-study effects cannot be fully excluded.

Discussion and Conclusion

This review suggests that digital interventions may provide potential benefits across selected psychological and violence-related outcomes, including anxiety, PTSD, and victimization-related measures. However, these findings should be interpreted cautiously. The pooled estimates were accompanied by substantial to extreme heterogeneity in several analyses, before sensitivity analysis, indicating marked between-study variability in intervention structure, participant characteristics, outcome measurement, and follow-up duration. Accordingly, the present findings are more appropriately interpreted as evidence of potential effectiveness in specific domains and timeframes, rather than definitive proof of consistent effectiveness across all digital IPV-related interventions.

Depression and Anxiety

The clearest signal observed was short-term psychological outcomes, particularly depression and anxiety. Pooled estimates suggested early improvements at 0–3 months, although the depression findings were sensitive to outlier removal. This pattern may indicate that digital interventions are more likely to influence proximal outcomes such as distress, emotional burden, and perceived coping capacity before producing measurable changes in violence exposure itself (Decker et al., 2020; Ford-Gilboe et al., 2020; van Gelder et al., 2023). Even so, these pooled effects should not be overgeneralized. The observed benefits may reflect differences in baseline symptom severity, intervention intensity, user engagement, concurrent access

to advocacy or counseling services, and the measurement properties of the included scales. Therefore, the present review supports the interpretation that digital interventions can function as a useful early supportive modality, but not as a stand-alone substitute for comprehensive survivor-centered care (Emezue, 2020; Emezue et al., 2022).

A more component-linked interpretation is also warranted. Interventions that included tailored safety planning and decision-support tools appeared more plausibly related to outcomes such as decisional conflict, safety preparedness, and, indirectly, reduced anxiety (Emezue, 2020; Emezue et al., 2022). These components may help survivors organize options, anticipate risk, and increase perceived control in the short term. Interventions incorporating psychoeducation, empowerment content, or guided cognitive-behavioral modules may be more relevant to reductions in depressive or trauma-related symptoms because they target coping, self-efficacy, cognitive reframing, and emotional processing (Decker et al., 2020; van Gelder et al., 2023). Programs with interactive support features, including chat, lay-support, or therapist guidance, may also have greater potential for sustained mental health benefit than fully self-guided tools, although the current dataset does not allow firm component-level causal inference. The findings therefore support a more modest conclusion: digital intervention effects likely depend not merely on the delivery platform, but on which therapeutic or safety-oriented elements are embedded within that platform (Emezue, 2020; Micklitz et al., 2023).

Physical

The result for physical outcomes at 3–6 months should likewise be interpreted conservatively. Improvement in this domain may reflect downstream effects of better safety behavior, lower stress burden, or improved functioning rather than a direct effect on physical victimization alone (Decker et al., 2020; van Gelder et al., 2023). Moreover, “physical outcomes” were not conceptually identical across studies. Some studies captured physical violence exposure, whereas others assessed broader physical health or functioning. This non-equivalence limits the interpretability

of a single pooled estimate and highlights the need to avoid overly concrete mechanistic interpretations.

Digital safety decision-making and tailored safety planning can increase agency and protective actions, supporting downstream physical/functional gains (Decker et al., 2020; van Gelder et al., 2023). Evidence synthesis of digital IPV interventions also reports reduced physical violence victimization within 0–6 months, making mid-term physical benefits clinically plausible (Emezue et al., 2022). Some physical complaints (chronic pain) may persist even when quality of life improves, leading to smaller or mixed effects across physical indicators (Ford-Gilboe et al., 2024). Technology-facilitated abuse and device monitoring risks highlight the need for safety-by-design features to avoid increasing harm or distress (Commission, 2024; Rogers et al., 2023).

Sexual Victimization

The pooled estimate at 3–6 months indicates a statistically significant difference in sexual victimization. Sexual violence within IPV is shaped by coercive control, safety constraints, and relational dependence, making incidence harder to shift than psychological distress. Digital interventions may influence distress and safety behaviors earlier than they change sexual-violence exposure (Baird et al., 2022; Emezue et al., 2022). The score changes reflect reduced victimization, increased recognition of coercive sexual experiences, or greater willingness to disclose such experiences after intervention exposure. Therefore, this result should not be framed as straightforward evidence that digital interventions definitively reduce sexual victimization within a short follow-up window.

Awareness-raising interventions have reported improved capacity to identify sexual-violence acts post-intervention (Berenguer-Simon et al., 2024). Safety decision aids and tailored safety planning can promote protective actions, help-seeking, and service linkage; effects on sexual-violence exposure may be delayed and context dependent (Decker et al., 2020; van Gelder et al., 2023).

PTSD

The PTSD findings illustrate this point further. A significant pooled benefit was observed at 3–6 months, but

heterogeneity was very high until outlier removal, and a clearer pattern emerged at follow-up beyond 6 months. This trajectory is clinically plausible, as trauma-related symptom improvement may require a longer interval than immediate distress reduction. Nonetheless, the evidence does not justify a strong mechanistic claim that digital interventions directly improve PTSD through a single pathway. A more defensible interpretation is that interventions with trauma-informed content, repeated engagement, and linkage to formal support services may create conditions that facilitate longer-term symptom improvement (Ragucci et al., 2024; van Gelder et al., 2023). Differences in baseline trauma severity, level of professional support, intervention adherence, and outcome instruments likely contributed substantially to the pooled estimates.

The more pronounced effect observed beyond 6 months further supports the interpretation that improvements in PTSD symptoms may emerge more clearly over longer follow-up periods, which is consistent with the time course typically required for trauma-related symptom recovery. Taken together, these results indicate that digital interventions may offer meaningful benefit for PTSD outcomes, particularly when sustained engagement and adequate follow-up duration are present, although the magnitude of effect may reasonably vary across intervention contexts. Improvement (Emezue et al., 2022; van Gelder et al., 2023). Online based intervention support can be a safer entry point for trauma support, but safety-by-design is essential because technology-facilitated abuse (device monitoring, digital control) can increase risk and reduce uptake. Linking digital tools to trauma-informed services may strengthen longer-term effects (Organization, 2023; Rogers et al., 2023).

Digital interventions are often described as scalable and accessible, but access is not evenly distributed. Their real-world effectiveness depends on digital literacy, private device ownership, stable internet access, language suitability, and the user's ability to engage safely without perpetrator monitoring. For survivors living under coercive control, digital access may itself be surveilled or weaponized. This means that implementation should not assume digital

delivery is universally low-risk or universally inclusive. More broadly, digital mental health interventions should not be evaluated solely in terms of technological accessibility or efficiency; culturally responsive design, embodied experience, relational factors, and meaningful human connection remain essential for ensuring that digital care is psychologically safe and responsive to users' lived contexts (Seyed Alitabar, 2026). In practice, digital IPV interventions

are likely to be most appropriate when paired with explicit privacy safeguards, rapid-exit functions, discreet interface design, data-minimization strategies, and clear guidance on safe device use. Interpretation of trial findings should therefore account for the fact that positive effects observed in relatively supported research settings may not translate directly to settings where digital surveillance risk, poor connectivity, or low privacy are common (Table 2).

Table 2

Grade of The Studies

Outcome	Studies/Participants	Pooled effect	Heterogeneity	Certainty of evidence	GRADE judgment	Interpretation
Depressive symptoms, 0–3 months	8 studies / 2,101 participants; sensitivity analysis: 7 studies / 2,080 participants	MD = -0.77 [-1.32, -0.23]; after outlier removal MD = -0.58 [-1.13, -0.03]	$I^2 = 75\%$; after outlier removal $I^2 = 0\%$	Moderate	Downgraded one level for risk of bias. Inconsistency was not downgraded after sensitivity analysis because heterogeneity decreased to 0% and the effect remained significant.	Online/digital interventions probably reduce short-term depressive symptoms, although the magnitude of effect should be interpreted cautiously because the estimate was attenuated after outlier removal.
Anxiety symptoms, 0–3 months	5 studies / 771 participants	MD = -1.60 [-2.38, -0.82]	$I^2 = 0\%$	Moderate	Downgraded one level for risk of bias because anxiety outcomes were self-reported and blinding was difficult in digital behavioral trials. No downgrade was applied for inconsistency or imprecision.	Online/digital interventions probably reduce short-term anxiety symptoms.
Physical outcomes, 3–6 months	7 studies / 1,899 participants	MD = -0.75 [-0.95, -0.56]	$I^2 = 5\%$	Moderate	Downgraded one level for risk of bias. No downgrade was applied for inconsistency because heterogeneity was low and the confidence interval was precise.	Online/digital interventions probably improve physical-related outcomes at 3–6 months, although outcome definitions varied across studies.
Sexual victimization, 3–6 months	3 studies / 1,202 participants	MD = 0.37 [-0.01, 0.75]	$I^2 = 36\%$	Low	Downgraded for risk of bias and indirectness/measurement uncertainty due to differences in scoring direction, disclosure, and interpretation of sexual victimization measures.	The effect on sexual victimization remains uncertain and should not be used as the main basis for an effectiveness claim.
PTSD symptoms, 3–6 months	6 studies / 2,529 participants; sensitivity analysis: 5 studies / 2,253 participants	MD = -0.31 [-0.48, -0.14]; after outlier removal MD = -0.21 [-0.38, -0.04]	$I^2 = 99\%$; after outlier removal $I^2 = 0\%$	Low	Downgraded for risk of bias and serious inconsistency/outlier sensitivity. Although sensitivity analysis improved heterogeneity, the primary analysis showed extreme heterogeneity.	Online/digital interventions may reduce PTSD symptoms at 3–6 months, but certainty remains limited because the primary estimate was highly heterogeneous.

PTSD symptoms, >6 months	6 studies / 1,069 participants	MD = -1.12 [-1.33, -0.91]	I ² = 0%	Moderate	Downgraded one level for risk of bias. No downgrade was applied for inconsistency or imprecision because the effect was consistent and the confidence interval was precise.	Online/digital interventions probably reduce PTSD symptoms at longer follow-up.
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Cultural adaptation also has practical implications rather than being merely a background consideration. Interventions developed in one sociocultural setting may not transfer directly to another without adaptation in language, examples, help-seeking pathways, gender norms, and perceptions of safety. This is especially important for immigrant populations, adolescents, and communities in which family, legal, or social consequences of disclosure differ substantially. Thus, future implementation should prioritize locally relevant adaptation and co-design, and future trials should report contextual factors more explicitly so that intervention effects can be interpreted against the realities of setting and population.

Graphical Abstract

Figure 8 summarizes the pooled effects of online and digital app interventions on outcomes related to relationship violence (Figure 8). The meta-analytic results indicate improvements in depression at 0–3 months (MD = -0.65) and anxiety at 0–3 months (MD = -1.40), alongside improvement in the physical domain at 3–6 months (MD = -0.55). PTSD shows a smaller effect at 3–6 months (MD = -0.25) and a larger effect beyond 6 months (MD = -0.85). Sexual victimization also decreases (MD = -0.30). Visually, all arrows point toward “intervention better,” consistent with the convention that negative mean differences favor the intervention arm.

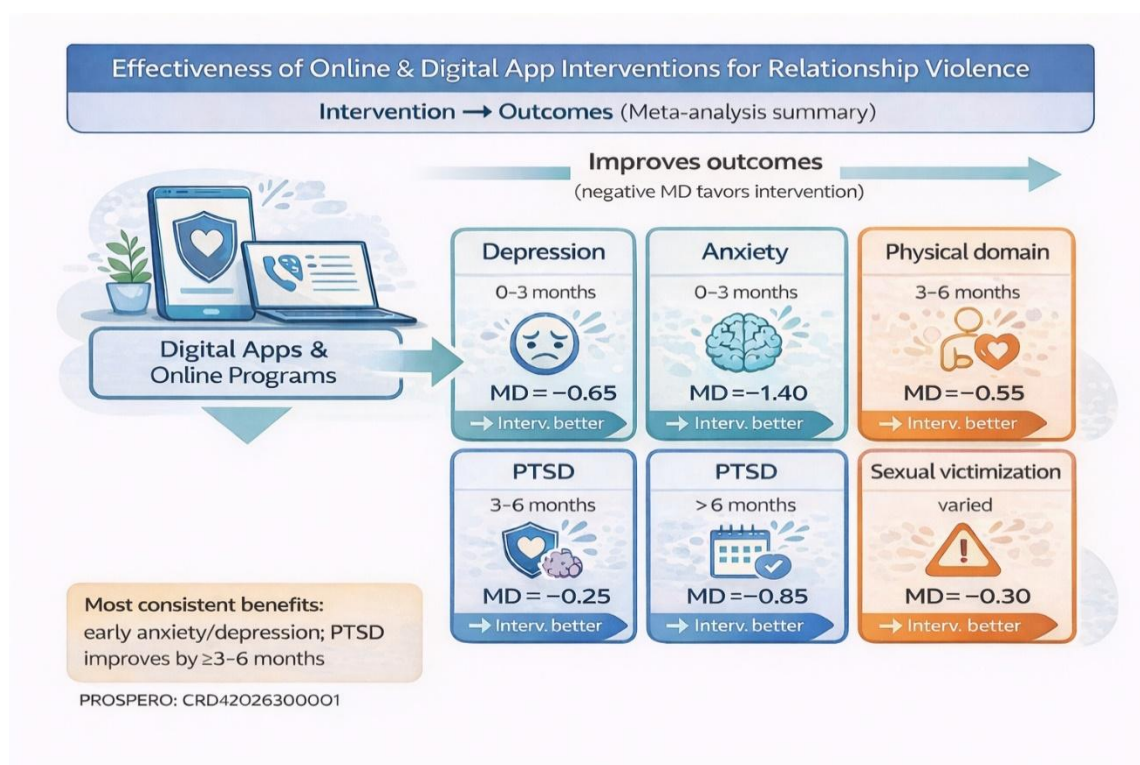


Figure 8

Graphical abstract of the effects of online and digital app–based interventions on outcomes related to relationship violence.

This pattern is plausible because digital tools often deliver rapid, on-demand support that may reduce early distress (depressive symptoms), while sustained symptom change in trauma-related outcomes (PTSD) typically requires longer engagement and consolidation of coping strategies. Newer studies illustrate how digital IPV-related interventions are diversifying, including digital chatbot-based parenting interventions integrating IPV prevention content and tracking preliminary IPV-related changes and online dating-violence prevention programs highlighting downstream mental health burdens such as depression and anxiety (Barroso-Corroto et al., 2025; Schafer et al., 2025). Meanwhile, recent public health commentary stresses that digital health tools can be weaponized as part of technology-facilitated violence, making safety-by-design and privacy protections essential when deploying app/web interventions (Kluge, 2025).

This review has several limitations that should be considered when interpreting the findings. First, the evidence base was characterized by substantial clinical and methodological heterogeneity, including variation in intervention content, delivery intensity, comparator conditions, participant populations, and follow-up duration. Second, several pooled outcomes were affected by outcome non-equivalence, because conceptually related constructs were measured using different instruments or scoring systems, limiting comparability across studies. Third, timing variability remained important even after grouping follow-up periods, since interventions may exert effects on different outcomes over different therapeutic windows. Fourth, some pooled estimates were highly sensitive to outliers, indicating that summary effects were not always stable. Fifth, many outcomes were self-reported and blinding was difficult, increasing vulnerability to performance and detection bias. Finally, publication bias and small-study effects could not be confidently excluded because several meta-analyses included only a limited number of studies. These limitations mean that pooled estimates should be interpreted as suggestive rather than definitive.

Conclusion

Online/digital interventions show benefits mainly for short-term mental health outcomes, including reduced anxiety and depression at 0–3 months, and potentially clearer PTSD improvements at longer follow-up, with physical outcomes improving over time. Sexual victimization findings require cautious interpretation because they are highly sensitive to measurement differences and scoring direction. Digital tools should be implemented as adjuncts to trauma-informed services, with strong emphasis on privacy and digital safety.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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