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Meta-Analysis of Web-based Treatments for PTSD in Women Exposed to Intimate Partner Violence and Sexual Abuse

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Abstract

Aggression towards women can lead to serious psychopathological consequences such as PTSD, and web-based treatments can be promising tools to reduce this symptomatology, reaching as large a population as possible. This study presents a meta-analysis of web-based online treatments to reduce PTSD in women exposed to intimate partner violence, sexual abuse or maltreatment. A systematic review and meta-analysis were carried out. The search for studies was conducted in SCOPUS, PsycINFO, PSICODOC, PsycARTICLES and Medline, between 2010 and 2022, in September 2022. A random-effects model was used to obtain the effect size and the analysis of moderator variables. Effect sizes were calculated for PTSD, Anxiety and Depression variables in two different ways, analyzing exclusively treatment groups and comparing treatment groups with control groups and waiting lists. 9 articles were included in the meta-analysis. The effect size of PTSD when comparing treatment groups was high (*d*= -.809; 95% *CI*: -1.237/-.381; *k*= 8). It was smaller when compared with active control groups (*d*= -.315; 95% *CI*: -.942/.312; *k*= 4) or waiting lists (*d*= -.302; 95% *CI*: -.515/-.089; *k*= 3). Web-based treatments for women exposed to intimate partner violence, sexual abuse or maltreatment are effective and can improve the quality of care for this population.

Key words: sexual assault, forensic interview, delayed reporting, FETI interview, consumer acceptability.

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Novelty and Significance

What is already known about the topic?

- Violence against women can generate several psychopathological affectations, such as PTSD.
- Web-based psychological treatments can help reduce these symptoms.

What this paper adds?

- Analyzes the efficacy of web-based psychological treatments in reducing PTSD in women exposed to intimate partner violence, sexual abuse or maltreatment.

Post Traumatic Stress Disorder (PTSD) is characterized by the presence of symptoms of intrusion, avoidance, cognitive and mood disturbances, and alterations in alertness and reactivity, associated with a traumatic event (American Psychiatric Association, 2013). There are a multitude of traumatic events (Allen, 2008), which can be categorized into impersonal events unrelated to human action, interpersonal events derived from intentional or reckless human conduct, and interpersonal events in the context of attachment relationships that chronically and systematically occur in caregiving/dependency relationships. Some studies have observed more severe post-traumatic symptomatology as one moves up this hierarchy (Cervera, López Soler, Alcántara López, Castro Sáez, Fernández Fernández, & Martínez Pérez, 2020; Huang, Chen, Su, & Kung 2017), such that interpersonal traumatic events, such as maltreatment, intimate partner violence or sexual abuse would generate more severe PTSD symptoms. However, some contextual, traumatic event, and victim characteristics, such as being male, having various leisure activities, problem-oriented conflict resolution, social support, emotional intelligence,

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self-regulation, having diverse relationships with various groups, etcetera (Cadamuro, Birtel, Di Bernardo, Crapolicchio, Vezzali, & Drury, 2021; Crescentini, Feruglio, Matiz, Paschetto, Vidal, Cogo, & Fabbro. 2020; Flores, Caqueo Urízar, Ramírez, Arancio, & Cofré, 2020; Mostan, Bar-Kalifa, Yirmiya, & Feldman, 2021), have been shown to be protective factors that modulate the development of post-traumatic symptomatology after a traumatic event.

The prevalence of the types of interpersonal traumatic events towards women, specifically intimate partner violence, sexual abuse or maltreatment, has varied according to the type of sample analyzed. Among married women, intimate partner violence (72.2%) was the most common traumatic event, followed by physical violence (57.8%), emotional violence (53.3%) and sexual abuse (7.8%), and of these, 41.1% presented PTSD and 32.2% presented depression (Sabri, 2021). In university women exposed to intimate partner violence, 43% presented depressive symptoms and 9% presented PTSD (Machisa *et alia*, 2022).

Extensive meta-analytic research has shown that face-to-face interventions for women who have experienced intimate partner violence or sexual abuse are effective in reducing victimization (Arroyo, Lundahl, Butters, Vanderloo, & Wood, 2017; Hill, Pallitto, McCleary, & García Moreno, 2016; Rivas *et alia*, 2015; Tirado Muñoz, Gilchrist, Farré, Hegarty, & Torrens, 2014). On the other hand, other meta-analytic studies have shown that psychological treatment programs, administered through new technologies, such as web-based treatments or tele-therapies, are effective in reducing PTSD in adults exposed to impersonal or interpersonal traumatic events (Fu, Burger, Arjadi, & Bockting, 2020; Lewis, Roberts, Bethell, Robertson, & Bisson, 2018; Simon *et alia*, 2021; Wagner, Rosenberg, Hofmann, & Maass, 2020).

Another meta-analysis (Linde, Bakiewicz, Normann, Hansen, Lundh, & Rasch, 2020) analyzed psychological interventions in electronic format, including tele-therapies, telephone therapies, e-mail therapies, and internet forum-based therapies, but did not analyze web-based treatments, in order to measure whether they reduced PTSD and depression among women exposed to intimate partner violence. They observed that they managed to reduce PTSD (d= -0.11) and depression (d= 0.13).

Due to the fact that psychological treatments in online format have been shown to be effective, to the social relevance derived from the need to treat as many women as possible exposed to interpersonal traumatic events, where web-based treatments are a good alternative to reach a larger population (Heber *et alia*, 2017) and are economically profitable (Mitchell, Joshi, Patel, Lu, & Naslund, 2021), and because there are no meta-analytic studies evaluating the effectiveness of web-based treatments exclusively for this population, it was necessary to develop the present study. The aim of this study was to conduct a meta-analysis of the efficacy of web-based psychological intervention programs in reducing PTSD symptoms in women exposed to intimate partner violence, sexual abuse or maltreatment.

METHOD

This systematic review and meta-analysis followed the presentation format and guidelines proposed by the PRISMA statement (Page *et alia*, 2021). A review protocol was prepared and is available on request from the corresponding author.

Selection Criteria

To be included in the meta-analysis, each study had to meet the following PICOS criteria (Amir-Behghadami & Janati, 2020): a) Adult women aged 18-65 years who have been exposed to an interpersonal traumatic event due to intimate partner violence, sexual abuse or maltreatment; b) Online psychological intervention administered through a web-based protocol; c) The results were to provide a single, quantitative measure of PTSD symptomatology, with the necessary statistical data to calculate the effect size; e) Only randomized or non-randomized controlled trials, written in English or Spanish and published between 2010–2022 (both included), were accepted, in order to find the most current studies on the area.

Search Strategy

Several search strategies were used to locate the studies. First, several electronic databases were consulted between 2010 and 2022, in September 2022: SCOPUS, PsycINFO, PSICODOC, PsycARTICLES and Medline. The following keywords were combined: ["Internet based intervention" OR "Internet intervention" OR "Web based intervention" OR "Web intervention" OR "Online based intervention" OR "Online intervention" OR "Multimedia based intervention" OR "Multimedia intervention" OR "Internet based treatment" OR "Internet treatment" OR "Web based treatment" OR "Web treatment" OR "Online based treatment" OR "Online treatment" OR "Multimedia based treatment" OR "Multimedia treatment" OR "Internet based therapy" OR "Internet therapy" OR "Web based therapy" OR "Web therapy" OR "Online based therapy" OR "Online therapy" OR "Multimedia based therapy" OR "Multimedia therapy"] AND [Adult* OR "Young Adult"] AND [PTSD OR Posttraumatic OR Post-traumatic]. Second, references from some meta-analyses and systematic reviews were reviewed (Arroyo *et alia*, 2017; Ashford, Olander, & Ayers, 2016; Carter, Araya, Anjur, Deng, & Naslund, 2021; Fu *et alia*, 2020; Hill *et alia*, 2016; Kuester, Niemeyer, & Knaevelsrud, 2016; Lewis *et alia*, 2018; Linde *et alia*, 2020; Rempel, Donelle, Hall, & Rodger, 2019; Rivas *et alia*, 2015; Simon *et alia*, 2021; Tirado Muñoz *et alia*, 2014). Finally, the references of the localized and included studies were reviewed. The flow chart shown in Figure 1 describes the literature search process.

The search strategy produced a total of 538 references. Duplicate references were excluded and the remaining references were reviewed by two independent, blinded reviewers. The result of the search process allowed the selection of 9 studies (Andersson *et alia*, 2021; Fiorillo, McLean, Pistorello, Hayes, & Follette, 2017; Ford-Gilboe *et alia*, 2020; Glass *et alia*, 2017; Koziol-McLain *et alia*, 2018; Lehavot *et alia*, 2021; Littleton, Buck, Rosman, & Grills, 2012; Littleton, Grills, Kline, Schoemann, & Dodd, 2016; Stappenbeck, Gulati, Jaffe, Blayney, & Kaysen, 2021), providing a total of 9 treatment groups and 7 comparative groups. The degree of agreement between the evaluators was satisfactory (Cohen's Kappa= .854). Disagreements were resolved by consensus.

Coding of moderator variables

In order to examine the potential influence of study characteristics on effect sizes, the authors developed a coding manual (available by request to the correspondence author), and the following variables were coded:

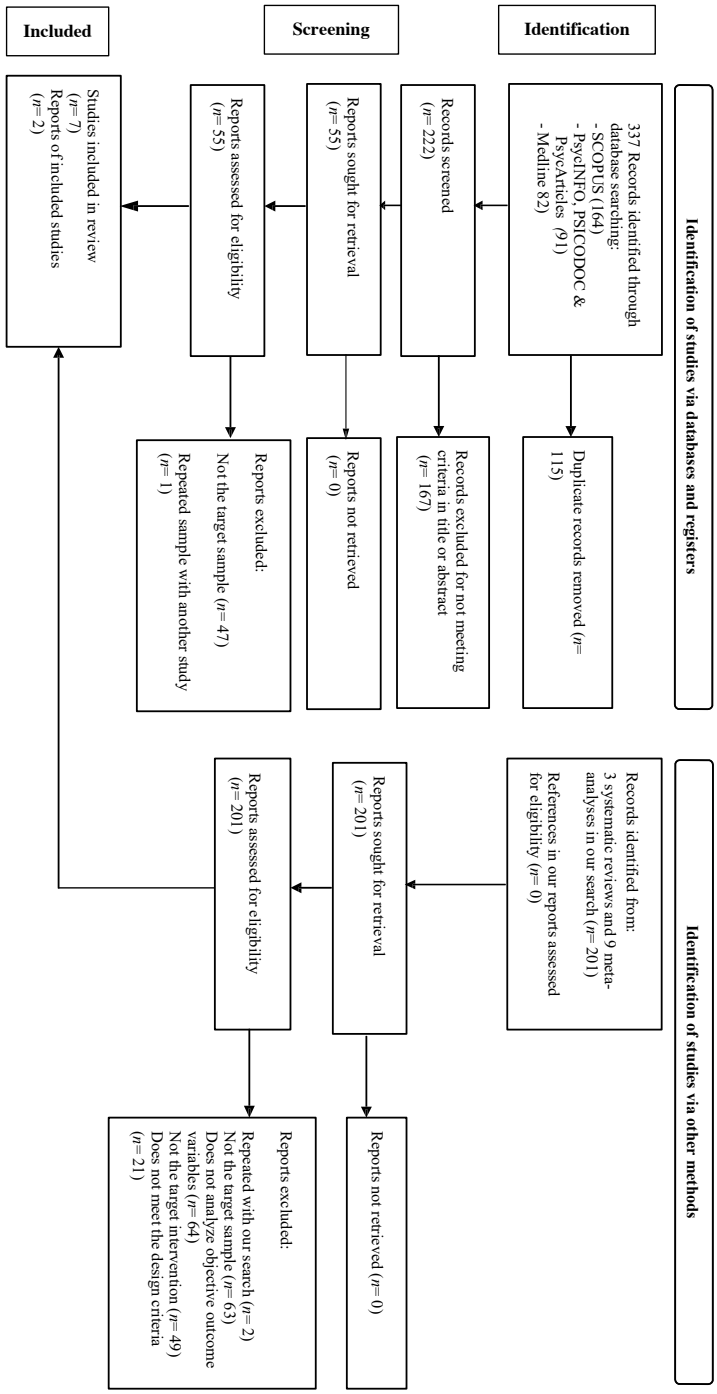

Figure 1. PRISMA 2020 flow Diagram.

(a) General aspects: mean age, geographic location, psychometric instrument for measuring PTSD, Depression and Anxiety, and type of comparison group; (b) Socio-demographic profile: educational level (high, medium or low), employment status (working, unemployed, other situations), cohabitation (with partner, without partner), number of children, socio-economic status (low, medium, high) and percentage of subjects in each variable (indicated by a number from 0 to 1); (c) Clinical profile of sample: percentage of subjects diagnosed with PTSD, depression, anxiety, comorbid diagnoses, or no diagnoses (indicated by a number from 0 to 1); percentage of women exposed to intimate partner violence (physical, sexual or psychological), non-partner sexual abuse, childhood sexual abuse and maltreatment (indicated by a number from 0 to 1); percentage of women who were taking medication, and who were in psychological treatment in the past (indicated by a number from 0 to 1); (d) Characteristics of web-based treatments: theoretical side of treatment; number of program modules; program components [psychoeducation on the type of trauma, on PTSD and on emotion regulation; cognitive restructuring; relaxation; exposure to aversive stimuli; life history processing (e.g., letter writing); development of action/coping plans; relapse prevention; information on other comorbid disorders (such as anxiety and depression); mindfulness; homework outside of the treatment program)]; therapist involvement [high (phone calls or content application), low (chat, or reminders) or none at all (without participation)]; Intensity of treatment (number of hours per week); duration of treatment (in weeks); and magnitude of treatment (total hours per participant).

Two researchers independently coded the studies, and there was good overall agreement on all variables, reaching an adequate mean degree of agreement (Cohen's Kappa= .860). Inconsistencies were resolved by consensus.

The methodological quality of the studies was also coded. Based on a review of scales (Jarde, Losilla, & Vives, 2012; Verhagen *et alia*, 1998) an ad hoc scale of 9 dichotomously rated items was developed (1 meet criteria; 0 does not meet criteria). Items were: (a) Number of groups in the study; (b) Representative sample (with diagnosis according to DSM or ICD); (c) Random assignment to groups; (d) Comparison of dropouts-completers on socio-demographic and clinical characteristics. They should be matched on at least two variables; (e) Masking; (f) No reporting bias; (g) Psychometrically validated instruments; (h) Results were presented for all subjects or, if there were dropouts, an intention-to-treat analysis was applied; (h) Experimental mortality rate.

Two researchers independently coded the methodological quality of the studies, reaching an adequate degree of agreement (Cohen's Kappa= .845). Inconsistencies were resolved by consensus.

Data Analysis

The effect size index used for PTSD, Depression and Anxiety outcomes was Cohen's *d* index. To calculate it, the means, standard deviations and number of subjects in the pre- and post-test of the treatment group were used. This index is methodologically weaker than the comparison of post-test scores of the treatment group with those of the control group, as there is more risk of bias due to the passage of time, maturational processes, history effects or spontaneous remission. However, in order to avoid eliminating studies from the analyses, this option was chosen. The effect sizes of the two-group studies are also presented in secondary form, comparing the post-test scores of the treatment group with those of the control group, differentiating by type of comparison group.

A descriptive analysis of the characteristics of the studies was carried out. The mean effect size, its 95% confidence interval and its statistical significance were calculated, also for each individual study. The analyses were carried out assuming a random effects model, as they are considered more realistic than fixed effects models (Cooper, Hedges, & Valentine, 2009) and high heterogeneity between studies was expected to be found, as in other meta-analyses of treatments for PTSD in maltreatment women (Arroyo *et alia*, 2017; Hill *et alia*, 2016; Rivas *et alia*, 2015; Tirado Muñoz *et alia*, 2014).

To examine the heterogeneity of the effect sizes, Q de Cochran statistic and I2 index were calculated. To analyze whether publication bias could threaten the validity of the overall effect size found for each response variable, Egger's test was applied with a *p*-value set at <.05.

The possible influence of qualitative and quantitative moderating variables was examined. For qualitative variables, mixed-effects ANOVAs were applied. For continuous variables, linear regression models were used, assuming mixed effects. A multiple meta-regression model was applied, including the moderating variables that were significant, to include the most relevant sub-groups of moderating variables that explained the variability of effect sizes.

Statistical analyses were performed with IBM SPSS v. 28 for Windows.

RESULTS

Regarding the descriptive characteristics of the studies (see Table 1), the mean sample size per study at post-test was 94.67 subjects (*SD*= 117.693). A total of 1725 subjects were analyzed with a mean age of 32.32 years (*SD*= 9.61). The samples came from the countries of the USA (66.7%), Switzerland (11.1%), UK (11.1%) and New Zealand (11.1%). Of the total papers included in this review, in 33.3% of the studies the intervention group was compared with a waiting list, in 44.4% with an active control group and 22.2% of the studies had no comparative group.

As for the assessment instruments used in the different studies, four different instruments were used to measure PTSD, which were the PCL-5 (33.3%), PCL-C (33.3%), PSS-I (22.2%), and PDS (11.1%) questionnaires. Of the studies that assessed depression, 71.4% used the CESD-R questionnaire, 14.3% the BDI-II questionnaire, and 14.3% the DASS-21 questionnaire. Of the studies that measured anxiety, 50% used the FADS questionnaire, 25% the BAI questionnaire and 25% the DASS-21 questionnaire.

In reference to the sociodemographic data provided by the studies on the samples, 77.8% of the studies provided information on educational level and professional occupation, 66.7% on cohabitation, 33.3% on whether the sample had children and 44.4% provided information on socio-economic status.

In terms of the diagnoses of the study samples (Table 1), it was observed that in 44.4% of the studies, the sample had at least one diagnosis of PTSD. Concerning the type of maltreatment suffered, it was observed that in 66.6% of the studies, part of the sample suffered some type of intimate partner violence, in 55.5% sexual abuse, in 44.4% child sexual abuse, and in 22.22% maltreatment outside the couple relationship.

Regarding the characteristics of the web-based psychological treatments (Table 1), it was observed that in 77.8% of the treatments analyzed, the theoretical aspect was cognitive-behavioral, and in the rest, it was social-cognitive (11.1%) and acceptance and commitment (11.1%). All treatments followed a manualized protocol, and of the total treatments, 77.8% included a component of psychoeducation about the type of trauma,

Table 1. Description of the characteristics of the studies included in the meta-analysis.

	Andersson *et alia* (2021)	Stappenbeck *et alia* (2021)	Ford-Gilboe *et alia* (2020)	Littleton *et alia* (2016)	Lehavot *et alia* (2021)	Kozlol-McLain *et alia* (2018)	Glass *et alia* (2017)	Littleton *et alia* (2012)	Fiorillo *et alia* (2017)
CGType	WL	WL	AC	AC	WL	AC	AC	-	-
n Pre	64	189	462	87	102	412	725	5	25
n Post	58	125	419	55	91	231	720	5	21
M Age (*SD*)	43.03 (9.13)	21.1 (3.6)	34.84 (10.8)	22 (6)	49.9 (11.3)	29	33.37 (10.49)	18.6	39.12 (16)
PTSD	PDS	PCL-5	PCL-C	PSS-I	PCL-5	PCL-C	PCL-C	PSS-I	PCL-5
QDepression	BDI-II	-	CESD-R	CESD-R	-	CESD-R	CESD-R	CESD-R	DASS-21-D
QAnxiety	BAI	-	-	FDAS	-	-	-	FDAS	DASS-21-A
Country	Switzerland	USA	UK	USA	USA	New Zealand	USA	USA	USA
Education	6.3% L; 18.8% M; 75% H	100% H	12.5% L; 53.2% M; 34.2% H	100% H	4% M; 96% H	-	5.7% L; 14.8% M; 79.5% H	-	64% M; 36% H
Occupation	78.1% e; 9.4% ue; 81.2% o	-	48.9% e; 5.11% ue	-	47% e; 14% ue; 39% o	39.1% e 29.2% ue; 28.7% o	46.3% e; 53.7% ue	-	2% e; 16% ue; 36% o
Cohabitation	50% couple; 50% alone	-	26.4% couple; 73.2% alone	-	43% couple; 57% alone	57.4% couple; 41.1% alone	58.5% couple; 41.4% alone	-	48% couple; 40% alone
Children	-	-	-	-	-	44.6% yes	44.3% yes	-	-
SS	46.9% L; 18.8% M; 34.4% H	-	49.4% L; 44.6% M; 6.1% H	-	24% L; 51% M; 25% H	-	-	-	40% L; 44% M; 16% H
Diagnostic	56.3% D; 78.1% A; 90.6% CO	100% NoD	100% NoD	100% PTSD	100% PTSD	100% NoD	100% NoD	100% PTSD	100% NoD
Trauma type	100% IPV (100% ph; 68.8% sex; 100% ps)	100% SA; 33% CSA	100% IPV (88.7% ph; 99.6% ps)	15.2% IPV; 100% SA; 32.6% CSA; 24.4% MOC	55% SA; 10% CSA	100% IPV	100% IPV	100% SA	48% IPV; 96% SA; 60% CSA; 84% MOC
Other data	25% CM; 71.9% PPT	-	-	-	100% PPT	-	-	-	-
TTS	CBT	SCT	CBT	CBT	CBT	CBT	CBT	CBT	ACT
n modules	8	14	8	9	6	3	3	9	6
Components	PTT; PP; PER; CR; R; E; LH; AP; RP; OD; H	PER; CR; R; AP; OD	PTT; PP; AP	PTT; PP; PER; CR; R; AP	CR; E; LH; AP; RP; HW	PTT; AP	PTT; AP	PTT; PP; PER; CR; R; AP	PTT; CR; MF
TI	High	None	None	Low	Low	Low	Low	Low	Low
Intensity	1	1.16	1	1	2	-	-	1	1
Duration	8	2	6	8	8	-	-	8	6
Magnitude	8	2.33	6	8	16	-	-	8	6

Notes: A= Anxiety; AC= Active Control Group; ACT= Acceptance and Commitment Therapy; AP= Action plan/coping strategies; BAI= Beck Anxiety Inventory; BDI-II= Beck Depression Inventory; CBT= Cognitive Behavioral Therapy; CESD-R= Center for Epidemiologic Studies Revised Depression Scale; CGType= Comparative Group Type; CM= current medication; CO= comorbidity; CR= Cognitive Restructuring; CSA= Child Sexual Abuse; D= Depression; DASS-21= Depression, Anxiety and Stress Scale; e= employed; E= Exposure; FDAS= Four-Dimensional Anxiety Scale; H= high; HW= Homework; IPV= Intimate Partner Violence; L= low; LH= elaboration of Life History; M= medium; ME= Mindfulness; MOC= Maltreatment Outside the Couple; NoD= undiagnosed; OD= information about Other comorbid Disorders; PCL-5= DSM-5 PTSD Checklist; PCL-C= PTSD Checklist Civilian Version; PDS= Post-traumatic Stress Diagnostic Scale; PER= Psychoeducation Emotional Regulation;

44.4% psychoeducation about PTSD and emotional regulation, 66.7% cognitive restructuring, 44.4% relaxation, 22.2% a component of exposure and life history elaboration, 88.9% included development of an action plan or maintenance strategies, 22.2% included relapse prevention and information about other disorders, 11.1% mindfulness, and 22.2% homework. In terms of therapist involvement, it was low in 66.7% of treatments, high in 11.1%, and no involvement in 22.2%. The mean intensity of the treatments was 1.17 hours/week (*SD*= 0.373), the mean duration was 6.57 weeks (*SD*= 2.22) and the mean magnitude was 7.76 hours (*SD*= 4.15).

Regarding the methodological quality of the studies analyzed, all the studies met the criterion of using psychometrically validated instruments. Most of the studies met the criterion of intention-to-treat analysis (88.9%), followed by the criterion of using at least two groups (77.8%), randomization (77.8%), absence of reporting bias (77.8%), use of a representative sample (44.4%), completers vs. dropouts analysis (44.4%), and masking (33.3%). The quality score of the studies had a mean of 5.44 (*SD*= 1.59), with a range between 2 and 7 points (Table 2).

Table 2. Assessment of the methodological quality of the studies included in the meta-analysis.

Studies	N Groups	RS	Randomization	CvD	Masking	No reporting bias	VI	ITT	Mortality	Total score (0-8)
Andersson *et alia* (2021)	Two	Yes	Yes	No	No	Yes	Yes	Yes	9%	6
Stappenbeck *et alia* (2021)	Two	No	Yes	Yes	No	Yes	Yes	Yes	33%	6
Ford-Gilboe *et alia* (2020)	Two	No	Yes	No	Yes	Yes	Yes	Yes	9%	6
Littleton *et alia* (2016)	Two	Yes	Yes	Yes	No	Yes	Yes	Yes	36%	7
Lehavot *et alia* (2021)	Two	Yes	Yes	Yes	No	Yes	Yes	Yes	10%	7
Koziol-McLain *et alia* (2018)	Two	No	Yes	No	Yes	No*	Yes	Yes	43%	5
Glass *et alia* (2017)	Two	No	Yes	No	Yes	Yes	Yes	Yes	6%	6
Littleton *et alia* (2012)	One	Yes	No	Yes	No	No**	Yes	Yes	0%	4
Fiorillo *et alia* (2017)	One	No	No	No	No	Yes	Yes	No	16%	2

Notes: *= No pre-test data provided; **= Only direct scores, *M* and *SD* were calculated; CvD= Completers vs Dropout; ITT= Results for all subjects or Intention-To-Treat analysis; RS= Representative sample; VI= Validated Instruments.

The effect size (Table 3) was calculated by comparing the post-test scores with the pre-test scores of the treatment groups. One study was eliminated for not providing pre-test scores (Koziol-McLain *et alia*, 2018). A mean effect size of *d*= -.809 (*CI* 95%: -1.237/-.381; *k*= 8) was found for PTSD, *d*= -.415 (*CI* 95%: -593/-.236; *k*= 6) for depression, and *d*= -.518 (*CI* 95%: -793/-.243; *k*= 4) for anxiety. High heterogeneity was found for PTSD ($Q(7)$= 54.627; p <.001; I^2= 92.7%), but low heterogeneity for depression ($Q(5)$= 7.025; p= .219; I^2 = 42.4%) and for anxiety ($Q(3)$= 0.578; p= .901; I^2= 0%). Egger's test allowed us to rule out publication bias as a threat against the validity of the results for PTSD ($t(7)$= -1.059; p= .331), depression ($t(5)$= -2.269; p= .086) and anxiety ($t(3)$= -.874; p= .474).

Due to the high heterogeneity found in the PTSD results, the possible influence of moderating variables was examined. The following variables were analyzed as potential moderators: (a) General aspects; (b) Socio-demographic profile; (c) Clinical profile; (d) Treatment characteristics; (e) Methodological quality. Of the moderating variables, only three were statistically related to the effect sizes.

Table 3. Mean effect size and studies included in the meta-analysis.

		Overall effect	Andersson *et alia* (2021)	Stappenbeck *et alia* (2021)	Ford-Gilboe *et alia* (2020)	Littleton *et alia* (2016)	Lehavot *et alia* (2021)	Glass *et alia* (2017)	Littleton *et alia* (2012)	Fiorillo *et alia* (2017)
PTSD	*d*	-.809	-.413	-.438	-.347	-2.029	-1.075	-.332	-1.111	-1.118
	SE	.2527	.2527	.1453	.0937	.2566	.2214	.0745	.6795	.3181
	z	-3.707*	-1.636	-3.013*	-3.702**	-7.907**	-4.856**	-4.46 **	-1.635	-3.513**
	CI 95%	-1.237, -.381	-.909, .082	-.723, -.153	-.531, -.163	-2.532, -1.526	-1.509, -.641	-.479, -.186	-2.443; .221	-1.741, -.494
Depression	*d*	-.415	-.695	-	-.344	-.756	-	-.268	-.143	-.528
	SE	.0911	.2574	-	.0937	.2158	-	.0744	.6333	.3011
	z	-4.554**	-2.701*	-	-3.666**	-3.505**	-	-3.604**	-.225	-1.753
	CI 95%	-.593, -.236	-1.200, -.191	-	-.527, -.160	-1.180, -.333	-	-.414, -.122	-1.384; 1.099	-1.118; .062
Anxiety	*d*	-.518	-.442	-	-	-.467	-	-	-.650	-.709
	SE	.1402	.2530	-	-	.2113	-	-	.6881	.3051
	z	-3.694**	-1.747	-	-	-2.209*	-	-	-.944	-2.325*
	CI 95%	-.793, -.243	-.938, .054	-	-	-.881, -.053	-	-	-1.998; .699	-1.30, -.111

Notes: *d*= Cohen's effect size; *SE*= Standard error; CI= Confidence Interval; *= $p \leq .05$; **= $p \leq .001$.

First, the number of women diagnosed with PTSD was marginally significant ($F_{1, 7}$= 4.356; p= .082), with a moderate percentage of variance explained (R^2= 42.1%). Second, the number of women who were sexually abused was marginally significant ($F_{1, 7}$= 5.016; p= .066), with a moderate percentage of variance explained (R^2= 45.5%).

A multiple meta-regression model was applied in order to analyze part of the variability found (Table 4). Model predictors were selected if these variables had a marginally significant relationship with effect sizes. Therefore, the moderating variables were: (a) number of women diagnosed with PTSD, and (b) number of women who have suffered sexual abuse. The number of women diagnosed with PTSD was marginally significant ($t(1)$= -2.374; p= .055), with 51.2% of variance explained. The number of women who suffered sexual abuse did not reach statistical significance ($t(1)$= -2.033; p <.088), with 35.1% of variance explained. When all variables were entered into the full model, the model did not reach statistical significance ($t(5)$= -1.134; p= .308), and failed to reduce the high heterogeneity found in the PTSD results was reduced ($Q(5)$= 13.777; p= .017; I^2= 78.1%).

Table 4. Meta-regression model for PTSD.

		b	*SE*	*t*	*p*
Moderating variable	Intersection	-.227	.2000	-1.134	.308
	PTSD diagnosis	-.707	.3066	-2.307	.069
	Sexual abuse	-.589	.2971	-1.983	.104

To calculate the overall effect size of PTSD for studies that had at least two comparative groups, two studies were excluded (Fiorillo *et alia*, 2017; Littleton *et alia*, 2012). The overall effect size was not significant (d= -.324; *CI* 95%: -.675/.027; k= 7), and high heterogeneity was found ($Q(6)$= 66.296; p<.001; I^2= 91.6%). No publication bias was found ($t(6)$= -.354; p= .738).

However, when analyzing the effect size for PTSD of studies with at least two groups, taking into account the type of group they were compared to, it was observed that the effect size for online treatments that were compared to a waiting list was significant (d= -.302; *CI* 95%: -.515/-.089; k= 3) and statistical significance was not reached for online treatments that were compared to an active control group (d= -.315; *CI* 95%: -.942/.312; k= 4). Furthermore, no heterogeneity was found when treatments were compared to a waiting list ($Q(2)$= 0.686; p= .710; I^2= 0%), and heterogeneity was found when compared to an active control group ($Q(3)$= 64.798; p <.001; I^2= 96.8%). Publication bias was discarded for treatments compared to a waiting list ($t(2)$= 0.101; p= .936), and for treatments compared to an active control group ($t(3)$= -.253; p= .824).

DISCUSSION

The purpose of this study was to analyze whether online psychological treatments delivered through the web reduce PTSD symptomatology in women exposed to intimate partner violence, sexual abuse or maltreatment. To date, this is the first meta-analysis that has analyzed the efficacy of these treatments exclusively for women exposed to interpersonal traumatic events.

The results of this study have indicated that the overall effect sizes for PTSD (*d*= -.809), Depression (d= -.415), and Anxiety (*d*= -.518), are high (Cohen, 1988) and significant, suggesting that these types of treatments for this sample are effective. Other meta-analyses (Linde *et alia*, 2020) with similar population but with electronic treatments (not exclusively web-based treatments), found low but significant effect sizes for PTSD symptoms (*d*= -0.11) and depression (*d*= -0.13). This discrepancy may be due to the fact that in the study of Linde *et alia* (2020), the effect size was calculated using the scores of the treatment and control groups, and in our study only the scores of the treatment group were taken into account. These differences disappeared when comparing the scores of the treatment groups with the comparative groups, finding an effect size for PTSD of low magnitude (*d*= -.324) and not significant. However, higher and statistically significant effect sizes were found when treatments were compared to a waiting list (*d*= -.302; *z*= -2.782; *p*<.005), compared to active control groups (*d*= -.315; *z*= -.985; *p*= .325). We believe that this discrepancy between comparative groups may have been due to the fact that, being a sample exposed to interpersonal traumatic events, which generate more severe post-traumatic symptomatology than impersonal type events (Cervera *et alia*, 2020; Huang *et alia*, 2017), psychoeducational type interventions, such as those found in the active control groups of this study, may have therapeutic value.

No variability was found between the measures of Depression and Anxiety. However, the heterogeneity exhibited in the PTSD results led us to analyze potentially moderating variables for these results. The meta-regression model failed toreduce the high initial heterogeneity (I^2= 94.3%; 78.1%). The results reflected that there are probably other moderating variables of the effect sizes of the interventions, such as the contextual characteristics of the traumatic events or characteristics of the victims (Cadamuro *et alia*, 2021; Crescentini *et alia*, 2020; Flores *et alia*, 2020; Mostan *et alia*, 2021) that have not been taken into account in this study, mainly because they were not included in the original studies.

The characteristics of the treatments analyzed were as diverse as the types of intervention available to treat PTSD (Arroyo *et alia*, 2017; Hill *et alia*, 2016; Rivas *et alia*, 2015; Tirado Muñoz *et alia*, 2014), although it was observed that the treatments of the most effective studies to reduce PTSD symptomatology in a sample of women diagnosed with PTSD and exposed to intimate partner violence (Littleton *et alia*, 2016), contained psychoeducational components on the type of trauma, PTSD symptoms and emotional regulation, cognitive restructuring, relaxation, and the development of an action plan or the development of coping strategies. In addition, they were cognitive-behavioral, had nine modules and the therapist's involvement was low.

Our study had several limitations. First, there are few studies analyzing the efficacy of web-based treatments for women exposed to interpersonal traumatic events (*k*= 9). Second, only *k*= 8 of these studies provided a comparative group, and *k*= 1 did not provide pre-test scores. Third, due to the low number of studies, there may be some moderating variables yet to be discovered (Cadamuro *et alia*, 2021; Crescentini *et alia*,

2020; Flores *et alia*, 2020; Mostan *et alia*, 2021). Fourth, due to the low number of studies included in each subgroup of the meta-regressions and ANOVA tests, the results of the moderator variables of the effect sizes are very limited.

It is also worth highlighting several strengths of our study. First, the exhaustive systematic review through five databases makes it difficult to find relevant studies that have not been located. Second, the studies were screened and coded by two independent evaluators, following an updated coding manual and search protocol, which enhances the objectivity and rigor of the study.

With the data presented, we conclude that there is not enough scientific evidence to consider that web-based treatments are effective in reducing PTSD in a population of women victims of intimate partner violence, sexual abuse and maltreatment due to the small number of publications, high heterogeneity of effect sizes and diversity of assessment tools used. Although it is possible that they may achieve a significant reduction in the associated anxious/depressive symptomatology. Further research related to this symptomatology is required and that exhaustively describes the contextual and personal characteristics of the sample, since the high heterogeneity found in PTSD results indicates that there may be hidden variables that model the results of the treatments.

Future research should comprehensively describe the traumatic exposure characteristics of the sample and treatments. To the extent possible, measurements of post-traumatic symptomatology should be standardized. The development of randomized trials should also be prioritized over non-randomized trials, since the former provide greater methodological rigor and effect sizes when comparing a treatment group to a control group are more robust.

In terms of practical implications, this meta-analysis may help to reveal which components of web-based treatments are most effective in reducing posttraumatic symptomatology in women exposed to interpersonal traumatic events, and thus foster the development of programs that ensure therapeutic success.

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