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META-ANALYSIS

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Efficacy of expressive writing versus positive writing in different populations: Systematic review and meta-analysis

Jiawei Lai[1] | Huijuan Song[2,3] | Ying Wang[4] | Ying Ren[5] | Shuang Li[2] | Feng Xiao[2] | Shaona Liao[2] | Tingping Xie[5] | Weihuan Zhuang[1]

[1]Department of Oncology, Nanfang Hospital, Southern Medical University, Guangzhou, China

[2]Department of Nursing, Nanfang Hospital, Southern Medical University, Guangzhou, China

[3]China Nanfang Nursing Centre for Evidence-based Practice: A Joanna Briggs Institute Affiliated Group, Guangzhou, China

[4]Department of Burn, Nanfang Hospital, Southern Medical University, Guangzhou, China

[5]Department of Neurosurgery, Nanfang Hospital, Southern Medical University, Guangzhou, China

Correspondence
Huijuan Song, Department of Nursing, Nanfang Hospital, Southern Medical University, 1838 Guangzhou North Avenue, Baiyun District, Guangzhou 510515, China.
Email: 13189097211@163.com

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Abstract

Aim: To evaluate the efficacy of expressive writing (EW) versus positive writing (PW) in different populations focusing on mood, health and writing content and to provide a basis for nurses to carry out the targeted treatment.

Design: Systematic review and meta-analysis.

Methods: This study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Twelve electronic databases and references from articles were searched. All randomized controlled trials (RCTs) comparing EW and PW were included. Statistical analyses were executed using Stata 15.0 software.

Results: Twenty-four RCTs and a total of 1558 participants were analysed. The results showed that for the general population, PW was more positive on mood than EW and could offer more changes in cognitive mechanisms. Among patients, although PW was more conducive to generating positive emotions, EW could stimulate cognitive changes more. Nursing staff should clarify the mechanism of PW and EW, combine the advantages of both and implement intervention according to the characteristics of different populations.

No Patient or Public Contribution: It does not apply to your work because this study is an analysis of published studies and does not involve patients or the public.

KEYWORDS
cognition, emotion, expressive writing, health, nursing, positive writing

1 | INTRODUCTION

Psychological intervention is an indispensable part of nursing, reflecting the people-oriented service concept. With the transformation of the Bio-psychosocial Medical Model, clinical workers have paid more and more attention to the psychological condition of patients and tried to influence or change their psychological state and social behavior in the course of nursing, which could promote the healthy development. As a powerful tool for psychological intervention, therapeutic writing is convenient, cheap and practical. Through writing, the expresser could understand the event from a new perspective, deepen cognition and comprehension, and make the processing of information more stable, improving mood and reducing chronic stress (Ruini & Mortara, 2022).

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As a kind of writing therapy, expressive writing (EW) has been extensively implemented in clinical practice to study the physiological and psychological effects of emotional expression. In this method, participants are asked to put their thoughts and feelings into written words to cope with the pain caused by traumatic events or situations (Pennebaker & Chung, 2011). Numerous studies have shown that therapeutic expressive writing has beneficial physical and mental-health effects in different user groups, such as chronically ill populations, informal caregivers, clinic nurses and students (Guo, 2023; Qian et al., 2020).

2 | THE REVIEW

Expressive writing (EW), also known as written expression and written emotional disclosure, was pioneered by Pennebaker and Beall (1986). The classic EW paradigm involves 15–20 min for 3–4 days within a short period, in which participants are encouraged to express their thoughts and feelings openly about a stressful or traumatic real-life event without paying attention to grammar or spelling. The theory was based on the act of writing as a means of modifying someone's life story and reconstructing the elements that survivors want to change. Pennebaker et al. (2007) used a computer program to analyze participants' emotional and cognitive processes, showing that EW increased the use of causal terms (e.g. because, effect, etc.) and insight words (e.g. consider, know, etc.), which indicated that participants' ability to establish causal links between life events and to be introspective was enhanced in writing. Thus, the benefits of writing stem from re-examining traumatic events, becoming more organized and reorganizing meaningful stories (Chu et al., 2020; Glass et al., 2019).

With the advancement of the psychotherapy environment, the paradigm of expressive writing has evolved, and positive psychotherapy has been integrated into writing activities. Positive writing (PW) and benefit-finding writing (BF) have been developed, which are devoted to guiding participants to emphasize the positive aspects of life. Unlike the writing prompts of EW that specifically focus on overcoming negative events and psychological symptoms, PW puts more emphasis on writing down positive emotions, coping strategies, future expectations and goals to improve participants' well-being and help them to deal with negative emotions and traumatic events (Segal et al., 2009).

Up till the present moment, the classical expressive writing developed by Pennebaker and Beall (1986) and the positive psychotherapy-oriented writing developed later have been applied in multiple applications. Deng and colleagues reported that the immediate effect of positive topics was significantly better than that of trauma topics, but the effect of long-term (>3 months) intervention was not statistically significant (Deng, 2012). Stanton et al. (2002) applied therapeutic writing to the people with breast cancer and found that EW had a positive effect for women with low avoidance behaviour, whereas PW was more beneficial for those with high avoidance behaviour. However, in 2011, O'Connor and colleagues found that for informal caregivers, PW had more benefits than EW, so participants were not encouraged to narrate stressful or traumatic experiences. These contradictory results attracted our attention. It seems that EW and PW had specific user groups and the effects were different.

The data integration of expressive writing mainly focuses on the efficacy analysis of classic expressive writing in people with cancer, trauma survivors, adolescents and so on (Guo, 2023; Qian et al., 2020; Zhou et al., 2015). Meta-analyses on the differences in the efficacy of EW and PW have not been published. To determine the effects of EW and PW in different populations, we used a meta-analysis and systematic review to assess the differences in mood, health and writing contents after using EW and PW in the general population and patients.

3 | AIM

To evaluate the efficacy of EW versus PW in different populations focusing on mood, health and writing content and to provide a basis for nurses to carry out the targeted treatment.

4 | METHODS

4.1 | Design

The study was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

4.2 | Search methods

A systematic literature search of PubMed, Web of Science, Cochrane Library, Embase, CINAHL, PsycINFO, Ovid-EBM Reviews, Clinical Trials and Chinese databases (Sinomed, CNKI, CQVIP, Wanfang) for identification of articles published (from 1986 to December 2020) was performed independently by two investigators (Jiawei Lai and Ying Ren). The language restriction was English or Chinese. We searched for studies with the keywords related to EW, PW and BF (we considered BF to be a type of PW). For example, the complete search strategy for PubMed was: ((Therapeutic writing) OR (expressive writing)) OR (written emotional expression)) OR (written emotional disclosure)) OR (written expression)) AND (((positive writing) OR (positive emotional expression)) OR (positive emotional disclosure)) OR (positive expression)) OR (((benefit finding writing) OR (benefit finding expressive writing)) OR (benefit finding emotional expression)) OR (benefit finding emotional disclosure)) OR (benefit finding expression))) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Review, Systematic Review, Chinese, English, from 1986 to 2020. We did not

restrict the population. The reference lists of identified original and review articles were searched manually to identify potential additional articles.

4.3 | Inclusion and exclusion criteria

The inclusion criteria were: (i) RCTs comparing EW and PW; (ii) the results including any combination of emotion, stress, pain, health and writing contents; (iii) studies using variations of the EW and PW program (different length, frequency or duration of the program).

The exclusion criteria were: (i) mixed interventions of negative prompts and positive prompts, or interventions mixed with other psychotherapies. (ii) studies that did not obtain precise values for the mean and standard deviation (SD) or effect sizes.

4.4 | Search outcome

Two investigators (Jiawei Lai and Ying Ren) undertook the main tasks. In total, 4626 articles were identified and duplicates were removed. Subsequently, 4199 titles and abstracts were screened based on the inclusion and exclusion criteria, and 66 articles with full texts were carefully reviewed. Forty articles were excluded due to lack of full text or complete data, non-RCTs, mixing of other psychological interventions and mixing EW and PW. Among the remaining 26 articles, three articles reported separate outcomes for one RCT (Creswell et al., 2007; Low et al., 2006; Stanton et al., 2002). Two articles reported separate outcomes for one RCT (Chu et al., 2019; Lu et al., 2017). One article conducted separate interventions in two populations (Graves et al., 2005), which were treated as two separate studies in our analysis. Finally, 24 RCTs were included for qualitative analysis. The flowchart of article selection is displayed in Figure 1.

4.5 | Quality appraisal

Risk of bias was assessed independently by two investigators (Jiawei Lai and Ying Ren) using the risk-of-bias tool within the Cochrane Collaboration (www.cochrane.org/; Higgins et al., 2022). Disagreements were resolved by a third investigator (Huijuan Song).

4.6 | Data abstraction

Three investigators (Ying Wang, Shuang Li and Feng Xiao) extracted data on the characteristics of the study (e.g. trial design, randomization and blinding), demographic characteristics (e.g. sample size, population and age) and intervention conditions (e.g. intervention type, prompts, length and frequency), and outcome measures and results. If data were missing, a researcher contacted the author to obtain the relevant information. If information was not available, it was marked as 'not reported' (Zhou et al., 2015).

4.7 | Synthesis

Data analyses were conducted by two researchers (Jiawei Lai and Ying Wang). Primary outcome measures were positive effect (PE), negative effect (NE), depression, anxiety, stress, health and writing contents after the writing intervention. Indicators of health include overall health, pain, languidness (Pennebaker's Inventory of Limbic Languidness, PILL), physical symptoms and health visits. Assessment of writing contents includes self-rating of the essay and analysis of written words. Self-rating was done according to participants' feelings about the writing tasks. Participants were asked mainly about how personal their essays were, how much they revealed emotions in their essays, how much writing increased their understanding of their experience, and how valuable the experiment was to them. Levels of scoring were employed to assess changes in the feeling of writing tasks. The analysis of writing words adopted Linguistic Inquiry and Word Count (LIWC), which is used to calculate the proportion of certain words used by participants (e.g. positive words and insight words) and to observe changes in words used in different writing tasks.

Stata 15.0 (Stata) was used for analyses. Measurement data are the mean difference (MD) and 95% confidence interval (CI). Weighted (W)MD and standardized (S)MD were used as the effective indices for data measured by the same method and by different methods, respectively. Inverse variance was employed to merge and analyse the data of the included studies according to $\alpha = 0.05$. The chi-squared test was used to assess heterogeneity among studies (test level: $p = 0.10$), and I^2 was used to determine the degree of heterogeneity. $p > 0.10$ and $I^2 < 50\%$ indicated no statistically significant heterogeneity, in which case a fixed-effects model (FEM) was used; $p \leq 0.10$ and $I^2 \geq 50\%$ indicated statistically significant heterogeneity, in which case a random-effects model (REM) was employed and subgroup analysis was done to explore the heterogeneity source (Higgins & Thompson, 2002). Egger's test was employed to evaluate publication bias, with $p < 0.05$ suggesting that bias was present (Egger et al., 1997).

5 | RESULTS

5.1 | Study characteristics and quality assessment

Table 1 shows the key characteristics of the included studies. Ultimately, 26 full-text articles were included in the analysis (Amiri et al., 2019; Ashley et al., 2011; Baikie et al., 2012; Burton & King, 2008; Chu et al., 2019; Creswell et al., 2007; Danoff-Burg et al., 2006; Graves et al., 2005; Harvey et al., 2018; King, 2001; King & Miner, 2000; Klein & Boals, 2001; Kloss & Lisman, 2002; Li, 2014;

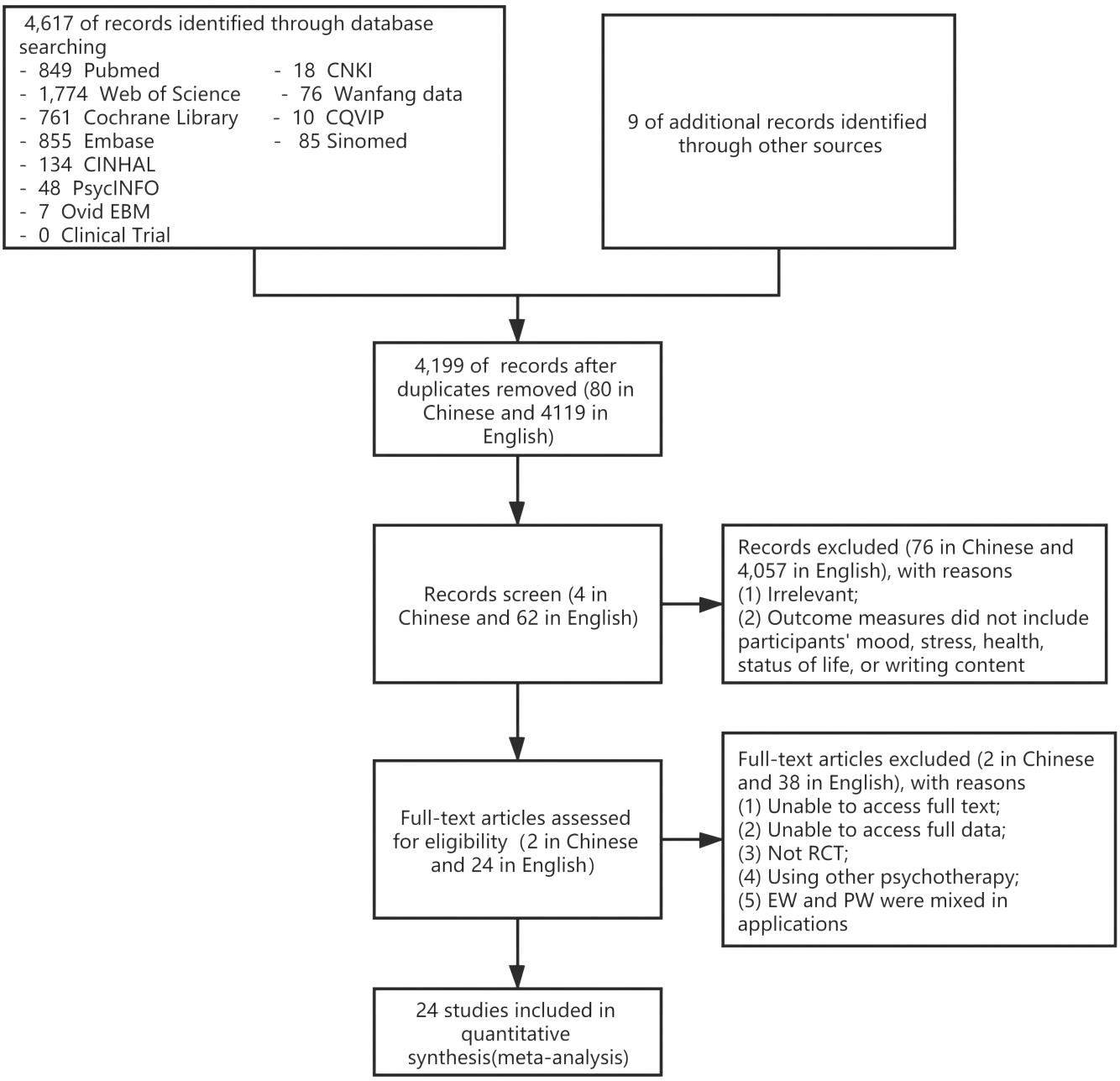


FIGURE 1 Flowchart of the literature search.

Lichtenthal & Cruess, 2010; Low et al., 2006; Lu et al., 2017; Lumley et al., 2011; Lyubomirsky et al., 2006; McCullough et al., 2006; Norman et al., 2004; O'Connor et al., 2011, 2013; Segal et al., 2009; Stanton et al., 2002; Zhou & Zhu, 2014).

There were 1558 participants: 796 participants in the EW group and 762 in the PW group. The population groups were divided into 'patients' and 'general population'. The former with a specific disease diagnosis comprised patients with cancer, immune disease, chronic pain or mental-health problems; the latter without a specific disease diagnosis comprised college students studying psychology, informal caregivers and other member of the general people (e.g. female group). The studies were conducted in USA (17), UK (3), China (2), Australia (1) and Iran (1).

The results of study quality assessed using the Cochrane Collaboration are shown in Table 2. Overall, the evidence had a high risk of reporting and selection bias, 'unclear' risk of detection and performance bias and low risk of attrition and other types of bias.

5.2 | Outcomes

We regarded PW as the intervention group and EW as the control group. When the number of included studies was >5, we divided subgroups into different populations for analysis. Due to the large differences in writing-time settings, to control for heterogeneity, we attempted to select data at similar time points when analysing

TABLE 1 Characteristics of the studies using expressive writing (EW) and positive writing (PW) included in the meta-analysis.

Studies	State	Populations	Patients (*N*)		Age (years, $M \pm SD$, range)		Contents for EW	Contents for PW	Frequency	Follow-up (months [m]/ weeks [w])	Outcome
			EW	PW	EW	PW					
Amiri et al. (2019)	IRAN	Patients in the open-heart surgery department	25	25	57.1 ± 2.0	58.0 ± 8.3	Negative emotions and unpleasant memories	Positive emotions and positive memories	10–15 min each time, 4 times for lasting a week	1 w, 1 m	DASS
Ashley et al. (2011)	UK	Informal caregivers	51	51	57.2 ± 11.6	54.1 ± 12.3	Emotions and thoughts about the role as a caregiver	Emotions and thoughts about the positive and happy experiences	20 min each day for 3 days	2 w, 2 m, 6 m	BSI, LIWC, MC
Baikie et al. (2012)	AU	People with mood disorders	70	69	40.2 ± 11.6		Thoughts and feelings about the most traumatic experience	Thoughts and feelings about the most intensely positive experience	20 min each time, 4 times for lasting 2 weeks	1 m, 4 m	CES-D, DASS, PILL, OHQ
Burton and King (2008)	USA	Undergraduate psychology students	15	15	NR		The trauma	The positive experience	one time a day, 2 min each time, 2 days in total	4–6 w	Mood, PILL, LIWC
Chu et al. (2019); Lu et al. (2017)	USA	Chinese American breast cancer survivors	34	29	54.5 ± 7.9 (15–62)		Thoughts and feelings about the cancer	Emotional disclosure, coping and benefit-finding	30 min each time, 3 times a week for 3 weeks	1 m, 3 m, 6 m	MC, LIWC
Creswell et al. (2007), Low et al. (2006), Stanton et al. (2002)	USA	Early-stage patients with breast cancer	21	21	49.5 ± 12.2 (21–76)		Thoughts and feelings about the breast cancer	Positive thoughts and feelings about the breast cancer	20 min each time, 4 times for lasting 3 weeks	1 m, 3 m	POMS, HI, LIWC, MC
Danoff-Burg et al. (2006)	USA	Adults with lupus or rheumatoid arthritis (RA)	24	27	51.2 ± 13.3		Thoughts and feelings about the rheumatic disease	Positive thoughts and feelings about the illness experience	20 min each time, 4 times for lasting 3 weeks	1 m, 3 m	CES-D, POMS, Pain, STAS

(Continues)

TABLE 1 (Continued)

Studies	State	Populations	Patients (*N*)		Age (years, $M \pm SD$, range)		Contents for EW	Contents for PW	Frequency	Follow-up (months [m]/ weeks [w])	Outcome
			EW	PW	EW	PW					
Graves et al. (2005)	USA	Patients with breast cancer	12	12	57.8 ± 10.5		The most traumatic and upsetting experiences	The most joyful and happy experiences	20 min, only once	N/A	CES-D, PANAS, LIWC
		Healthy individuals	12	12	57.0 ± 12.2						
Harvey et al. (2018)	USA	Spousal cancer caregivers	22	22	56.6 ± 12.1		Undisclosed thoughts/feelings related to the cancer experience	Positive outcomes in light of the cancer experience	15 min each time, once a week for 3 weeks	N/A	PSS, PHQ, MC
King and Miner (2000)	USA	Psychology students	38	32	21.0 (18–36)		Traumatic event or traumatic loss experience	Benefit experience made better to meet the challenges	20 min each time, once a day for 3 days	N/A	Mood, LIWC, HI, MC
King (2001)	USA	Psychology students	22	19	21.0 ± 3.2 (18–42)		Traumatic event or loss experience	Visions of a better life in the future	20 min each time, once a day for 4 days	N/A	Mood, HI, MC
Klein and Boals (2001)	USA	College students	34	33	NR		Thoughts and feelings about the negative event	Thoughts and feelings about the positive event	5 times in one semester	N/A	LIWC, MC
Kloss and Lisman (2002)	USA	College students	43	43	18–19		The most traumatic and upsetting experiences	The happiest experience	20 min each time, once a day for 3 days	2 m, 3 m	HI, MC, BDI, STAI, PILL, PANAS,
Li (2014)	CN	College students	15	15	19–25		Social anxiety events	Positive attitudes and actions about the negative events	20 min each time, once a day for 4 days	1 m	LSAS
Lichtenthal and Cruess (2010)	USA	Undergraduate students in introductory psychology courses	16	17	19.2 ± 1.3	20.4 ± 5.1	Thoughts and emotions related to the loss	Positive life changes related to the loss	20 min each time, 3 times for lasting 1 week	3 m	CES-D, PCL-C, HI, MC
Lumley et al. (2011)	USA	Adults with RA	43	24	55.4 ± 11.7	53.1 ± 10.0	The stressful or traumatic event or experience	Positive emotional events	20 min each time, once a day for lasting a week	1 m, 3 m, 6 m	MPQ, PANAS, LIWC, MC

TABLE 1 (Continued)

Studies	State	Populations	Patients (*N*)		Age (years, $M \pm SD$, range)		Contents for EW	Contents for PW	Frequency	Follow-up (months [m]/ weeks [w])	Outcome
			EW	PW	EW	PW					
Lyubomirsky et al. (2006)	USA	Undergraduate psychology students	20	24	19.4 ± 2.6 (17–38)		The traumatic or negative event	The happiest life event	15 min each time, once a day for 3 days	1 m	PANAS, HI, MC
McCullough et al. (2006)	USA	College students	101	102	19.3 ± 2.8 (18–45		The negative event and feelings and the negative effects	The negative event and the positive effects/potential effects	20 min, only one time	N/A	LIWC
Norman et al. (2004)	USA	Women with chronic pelvic pain (CPP	28	20	38.2 (18–64)		The negative emotional experiences related to CPP	The positive emotional experiences unrelated to CPP	At least 20 min each time, once a day for 3 days	2 m	PANAS, MPQ, MC
O'Connor et al. (2011)	UK	Female	51	53	19.5 (18–22		The stressful or traumatic issue/ event about the body	Reading six body image success stories vignettes and writing about them	15 min each time, once a day for 3 days	4w	CES-D, LIWC
O'Connor et al. (2013)	UK	Healthy staff and students	39	41	22.7 (18–41)		The most upsetting experience	The most positive and happiest experiences	20 min each time, once a day for 3 days	1 m, 6 m	CES-D, HI, MC
Segal et al. (2009)	USA	Psychology of undergraduate students	30	30	24.0 ± 8.2 (17–53)		The most traumatic and upsetting experiences	The most positive feelings and thoughts	20 min each time, once every 2–3 days for lasting a week	1 m	PANAS, MC
Zhou and Zhu (2014)	CN	Senior high school students	27	29	16.6 ± 0.6 (14–18)		The strong negative emotional events and the deepest emotions	The strong positive emotional events and the deepest emotions	20 min each time, once a day for 3 days	2 w	POMS, CES-D

Abbreviations: BDI, Beck Depression Inventory; BSI, Brief Symptom Inventory; CES-D, The Center for Epidemiological Studies Depression Scale; DASS, Depression Anxiety Stress Scales; HI, Health indices, Health Service visits and illnesses or symptoms; LIWC, linguistic inquiry and word count; LSAS, Liebowitz social anxiety scale; MC, manipulation checks, self-ratings of participants' feelings about the writing tasks; Mood, Rating the positive/negative moods on a scale of 1 (not at all) to 5 (a great deal) in different emotional words; MPQ, McGill Pain Questionnaire-Short Form; OHQ, overall health questions; Pain, Average level of pain during the past week was measured using a visual analogue scale; PANAS, positive and negative affect schedule; PCL-C, the Post-traumatic Stress Checklist-Civilian Version; PHQ, Patient Health Questionnaire; PILL, Pennebaker's Inventory of Limbic Languidness; POMS, profile of mood states; PSS, 10-item Perceived Stress Scale; STAS, State–Trait Anxiety Scale.

TABLE 2 Risk of bias.

Reference	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Amiri et al. (2019)	Yes	Unclear	Unclear	Unclear	Yes	Yes	Yes
Ashley et al. (2011)	Yes	No	Yes	Unclear	Yes	Yes	Yes
Baikie et al. (2012)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes
Burton and King (2008)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Unclear
Chu et al. (2019), Lu et al. (2017)	Yes	Yes	Yes	Yes	Yes	No	Yes
Creswell et al. (2007), Low et al. (2006), Stanton et al. (2002)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Danoff-Burg et al. (2006)	Yes	Yes	Yes	Yes	Yes	No	Yes
Graves et al. (2005)	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes
Harvey et al. (2018)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes
King and Miner (2000)	Unclear	Yes	Yes	Yes	Yes	Yes	Yes
King (2001)	Unclear	Yes	Yes	Yes	Yes	No	Yes
Klein and Boals (2001)	Unclear	Unclear	Yes	Unclear	Yes	Yes	Unclear
Kloss and Lisman (2002)	Yes	Unclear	Unclear	Unclear	Yes	Yes	Yes
Li (2014)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes
Lichtenthal and Cruess (2010)	Unclear	Unclear	Unclear	Unclear	Yes	No	Yes
Lumley et al. (2011)	Yes	Yes	Unclear	Unclear	Yes	No	Yes
Lyubomirsky et al. (2006)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes
McCullough et al. (2006)	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes
Norman et al. (2004)	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
O'Connor et al. (2011)	Unclear	Unclear	Unclear	Unclear	Yes	No	Yes
O'Connor et al. (2013)	Unclear	Unclear	Unclear	Unclear	Yes	No	Yes
Segal et al. (2009)	Unclear	Unclear	Unclear	Yes	Yes	No	Yes
Zhou and Zhu (2014)	Unclear	Unclear	Yes	Unclear	Yes	No	Yes

emotion and health. We thought that time had little effect on evaluation of writing content, so the data were included directly in the analysis.

5.2.1 | Influence on mood

Seven studies evaluated the NE in participants. Since the data were derived from the results of three measurement tools (Mood, Profile of Mood States and Positive and Negative Affect Schedule), SMD was used as the effect indicator for data consolidation. Two studies (Burton & King, 2008; Segal et al., 2009) reported only the MD, we used this along with the *p*-value and sample size to obtain the SD (Liu, 2011) and then included the data in the meta-analysis. The REM was used for statistical analyses (Figure 2a). Members of the EW group had a higher prevalence of negative emotions than that in the PW group (MD = −0.46, 95%CI: −0.76, −0.16, $p = 0.002$). To further analyse the effects in different populations, we divided the subgroups into patients and general population. There was no statistically significant difference between the two types of prompt writing in patients ($p = 0.374$). The main effect of the overall difference arose from the general population (MD = −0.51, 95% CI: −0.85, −0.16, $p = 0.004$).

Seven studies evaluated the PE in participants. The data-processing methods were identical to those described above. SMD was used as the effect indicator, and the FEM was used for statistical analyses ($p = 0.247$, $I^2 = 23.8\%$; Figure 2b). The result showed that the positive emotion of the EW group was lower (MD = 0.41, 95% CI: 0.20, 0.62, $p < 0.001$). Among the general population, PW elicited more benefits (MD = 0.45, 95% CI: 0.18, 0.71, $p = 0.001$), whereas, for patients, there was just a marginally statistically significant difference between the two writing prompts (MD = 0.35, 95% CI: 0.01, 0.69, $p = 0.042$).

The analysis of depression was based on REM ($p = 0.073$, $I^2 = 46.1\%$), and anxiety ($p = 0.196$, $I^2 = 33.8\%$) and stress ($p = 0.380$, $I^2 = 0\%$) were based on FEM. The SMD was employed as the effect indicator. We found no statistically significant difference between the two prompts in different populations (both $p > 0.10$).

5.2.2 | Influence on health

We explored the health status of participants. The number of studies on all projects was no more than five, so the population was not divided into subgroups for analysis. SMD was used as an effective indicator, and FEM was used for analyses ($p > 0.10$, $I^2 = 0\%$). Overall health, pain, PILL, physical symptoms and health visits under the two writing conditions were not statistically significantly different (all $p > 0.20$).

5.2.3 | Assessment of writing contents

We conducted the REM to examine the group difference in participants' ratings on the extent to which their writing essays were personal ($p = 0.041$, $I^2 = 68.6\%$) and meaningful ($p = 0.084$, $I^2 = 48.5\%$), and the FEM to the emotion revealing ($p = 0.108$, $I^2 = 40.6\%$), upsetting ($p = 0.498$, $I^2 = 0\%$) and difficult ($p = 0.516$, $I^2 = 0\%$). Since different levels of the Likert scale were involved, SMD was used as the effect indicator. The ratings for emotion revealing, upsetting and difficult in general population were higher among the EW group ($p < 0.001$), but the rating for meaningful in patients was lower ($p = 0.018$). There was no statistically significant difference in personality between the two groups ($p = 0.139$).

Weighted mean difference was used as the effect indicator in the analysis of writing words, including positive words (e.g. love and sweet), negative words (e.g. hurt and nasty), cognitive mechanisms (e.g. cause and ought) and insight (e.g. think and know). Using the REM in both negative words ($p < 0.001$, $I^2 = 77.5\%$) and positive words ($p = 0.002$, $I^2 = 68.0\%$), whether it was general population or patients, the EW group used more negative words ($p < 0.001$), and the PW group used more positive words ($p < 0.001$), which was consistent with the requirements of writing prompts. FEM in insight ($p = 0.398$, $I^2 = 1.4\%$) revealed that in the general population and patients, the EW group used more insight words than the PW group ($p < 0.001$). However, when using REM to analyse the cognitive mechanism of the two groups, there was extremely high heterogeneity ($p < 0.001$, $I^2 = 98.5\%$) with a completely opposite result in patients and the general population. Patients were more inclined to show cognitive mechanisms in EW (MD = −2.61, 95%CI: −3.59, −1.63, $p < 0.001$), whereas the general population disclosed more cognitive mechanism changes in PW (MD = 3.63, 95% CI: 0.09, 7.16, $p = 0.044$).

5.2.4 | Publication bias

There was no evidence of publication bias (Egger test, $p > 0.05$) except for studies on anxiety (Egger's test, $p = 0.006$), positive words (Egger's test, $p = 0.021$) and PILL (Egger's test, $p = 0.038$).

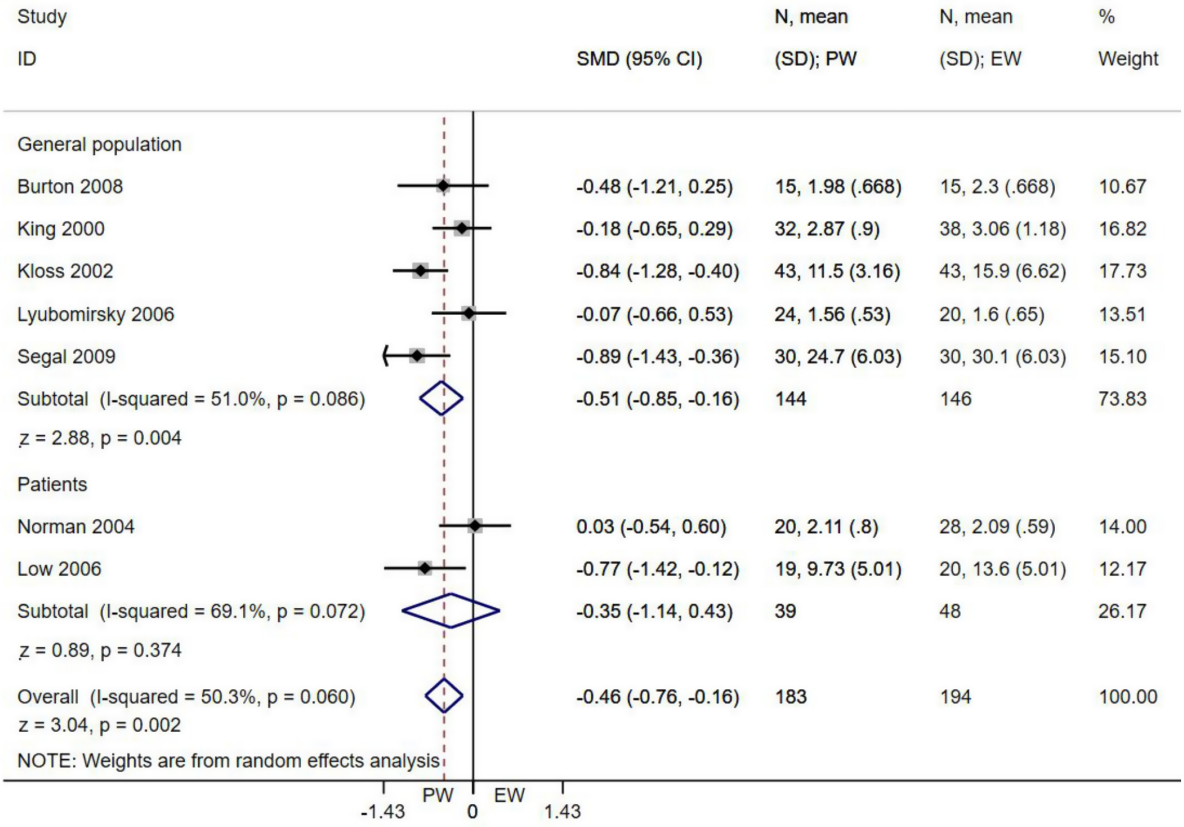
6 | DISCUSSION

To our knowledge, this study is the first to analyse the difference in efficacy between EW and PW in terms of mood, health and writing contents in different groups. However, several aspects related to these results should be interpreted with caution.

6.1 | Writing and mood

The random-effects model of this meta-analysis achieved a statistically significant effect size of SMD indicating that members of the EW group in general population had higher negative emotions and lower positive emotions than that in the PW group. The lack of similar metadata made it difficult to compare the results with previous studies. However, there are two possible explanations for this finding. First, writing about traumatic experiences in the general

(a) Forest plots comparing negative effect



(b) Forest plots comparing positive effect

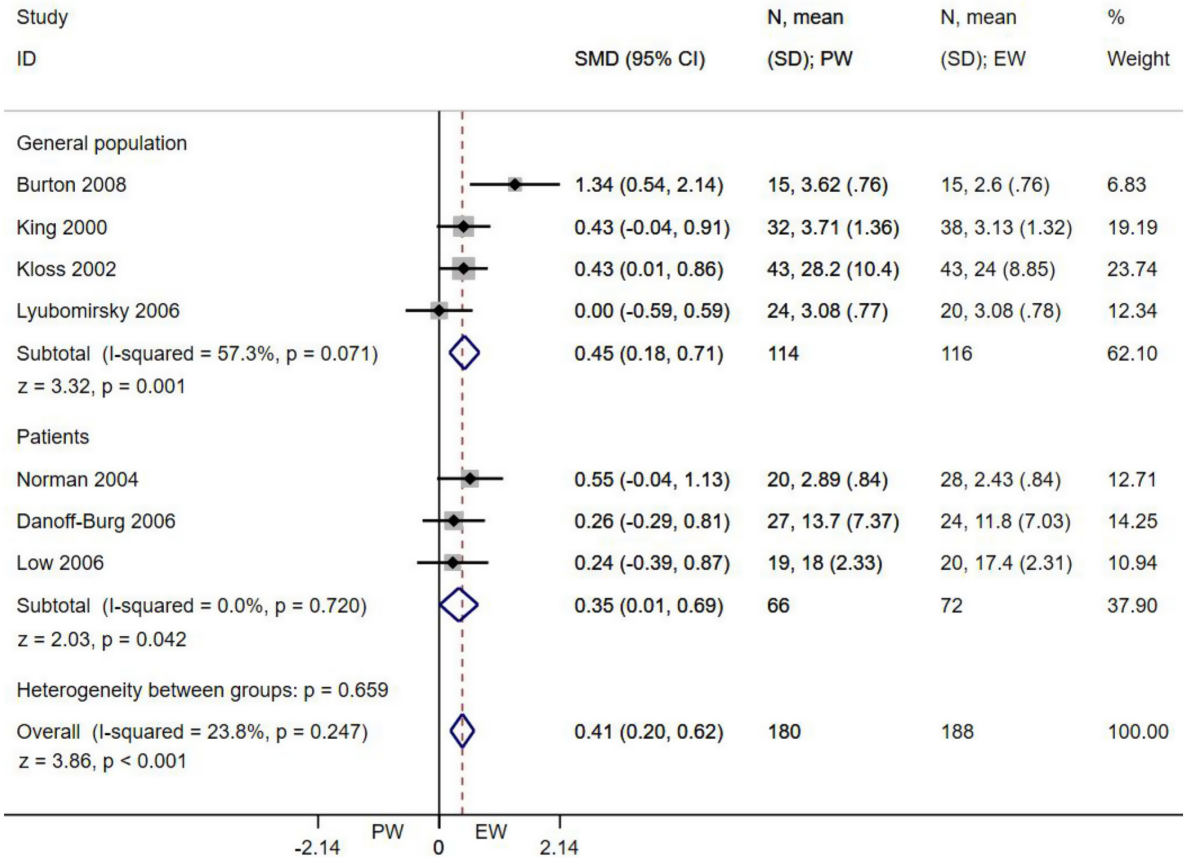


FIGURE 2 Forest plots comparing negative effect (a) and positive effect (b).

population may be viewed as a fear activation rather than a problem-solving process, and exposure increases especially for people who write about repeated events continuously (Kloss & Lisman, 2002). Positive writing may lead participants to turn aversive experiences into opportunities to cultivate resilience and positive outcomes, thus reducing negative reactions (Saldanha & Barclay, 2021). Second, we found from the previous research that content disclosed by the general population is often popular and common with less pressure (Doucet et al., 2018). According to the ratings of writing tasks in the general population, we could infer that PW was less difficult and upsetting, which could be why it had more advantages in general population. It suggests that PW may be more appropriate for the general population with less stress, such as informal caregivers and clinical workers.

Another finding was that the PW group of patients had higher positive emotions than the EW group with a small statistically significant difference. It was inconsistent with the meta-analysis from Lim and Tierney (2023) on the effects of positive psychology interventions and other positive interventions on patients with depression, which had shown an insignificant result. There are three possible reasons. First, patients with early breast cancer, rheumatoid arthritis and chronic pelvic pain were included in the study. For these patients, their disease was not traumatic enough to trigger the beneficial effects of EW, especially during the recovery phase, which may be the floor effect. Previous studies have also confirmed that for patients with long-term illness, EW has no statistically significant effect on mental health (Nyssen et al., 2016). Different from the mechanism of EW, PW does not target anxiety and depression symptoms but emphasizes the importance of holding a positive attitude toward the past, present and future. Thereby cultivating future-oriented positive cognition and emotions, such as optimism and hope. Secondly, PW was more meaningful based on ratings of the writing task in patients, suggesting that PW might benefit patients by improving their ability to assign meaning to their experience. PW was able to guide patients to adjust their mindset and change cognition, discover the positive meaning of past experiences and thus increased coping resources and provided positive emotions (Ruini & Mortara, 2022). Thirdly, the patients involved in this study were mostly female. It was found that women in PW used fewer emotion expression suppression strategies, and the ability to induce or change the experience of a certain emotion by writing about positive experiences may have enhanced the skills of female participants to regulate their emotions by expressing positive or negative influences more frequently in their daily lives (Suhr et al., 2017). PW thus has certain positive effects on patients, especially female patients who may benefit more from PW. We should pay attention to the gender of patients and consider their differences in emotional expression when providing psychological rehabilitation services.

There was no statistically significant difference between groups in patients with negative emotions, perhaps because only two studies were included and fewer data could be analysed. The two studies involved patients with different diseases (early breast cancer and chronic pelvic pain), and the data were extracted at different time points (3 weeks and 2 months after the end of the intervention), leading to high heterogeneity in the result. Subsequent intervention studies using writing therapy in clinical patients should be increased, and measures should be harmonized as far as possible to obtain data that can be integrated for analysis.

In addition, there were no statistically significant differences between groups for specific negative emotions–depression, anxiety and stress–in the general population or among patients. It shows that PW and EW had the same effect on single negative emotion. This seems to contradict the above finding that PW has an advantage in reducing negative emotions, which might be influenced by the limited number of studies. Future work should focus on the influence and mechanism of different writing paradigms on negative emotional characteristics in order to obtain more reliable results.

6.2 | Writing and health

Different types of writing had no statistically significant effect on participants' health, suggesting that EW and PW had essentially the same effect on health. Although samples from different groups were not divided into subgroups for analysis due to the limited number of studies, the heterogeneity of the studies was small, which made the conclusion more reliable. Several causes may account for these results. For example, both types of writing could improve participants' health. The study has shown that writing therapy can promote the behaviour of rethinking, causing changes in cognition and coping, and thus have similar health consequences through long-term activation of the hypothalamus, pituitary gland, adrenal gland and/or immune system (Creswell et al., 2007). There was also case in which neither type of writing made any difference to the participants' health (O'Connor et al., 2013). Most data were collected over a period of more than 2 months. The study has found that writing therapy was affected by dosage and its positive effects might not last for a long time (Guo, 2023). The problem with all the studies was that the indicators used to assess health were complex, affected by multiple factors and difficult to follow up. Therefore, we recommend that clinical workers should focus on more specific indicators and analyse participants' health problems through objective data. For example, Patient-Reported Outcomes Instruments System for Chronic Diseases (PROMIS) and Ecological Momentary Assessment (EMA) can be combined with e-health to obtain more regular, uniform and accurate follow-up data.

6.3 | Writing and writing contents

We found that insight words involved in cognitive mechanisms were used more often in EW regardless of the population. However, patients used more cognitive words in EW, while general population used more cognitive words in PW. The Study has shown that EW could benefit patients by activating their cognitive processing,

strengthening self-reflection, re-evaluating constantly and promoting changes in cognition and coping (Niles et al., 2016). Similarly, PW allowed participants to make connections between their current lives and future dreams or to reflect on their relationships with meaningful others, which might promote self-exploration and understanding. We believe that qualitative research could be carried out to explore the changing paths of cognition in EW and PW, identify the effective components and establish a more targeted mode of therapeutic writing. For example, Seyedfatemi et al. (2021) used the conventional content analysis approach to analyse the writing content and combined it with the semi-structured interview to understand the experience and feelings of participants in the intervention process. Choi et al. (2023) adopted descriptive phenomenology and used expressive writing as a tool to explore the life experiences of Chinese American immigrant breast cancer survivors. The results showed great heterogeneity, which might be related to the writing length and incorrect recognition by the LIWC (Tang & Ryan, 2020). Therefore, we should rely not only on software when analysing writing content, but instead combine it with manual evaluation to explore the deeper meaning of the data.

6.4 | Limitations

The limited number of current meta-analyses of PW and EW were poorly homogenous–including our study–reflecting the fact that the research on writing therapy as adjunctive therapy for patients remains diverse. Assessment tools, indicators, outcome measures, included samples, indications, intervention methods and conclusions are varied. The poor homogeneity of RCTs also led to the major limitations of our meta-analysis. First of all, due to inconsistent outcome measurements and incomplete data from different tools, most indicators could not be combined for meta-analysis. Some data were estimated based on sample size and secondary statistics (such as *p*-value), which might affect the accuracy of results. Second, inconsistent factors or indicators, such as the characteristics of the subjects and the timing of data collection, might lead to a bias in the results. In addition, the limited number of studies available made it difficult to investigate potential publication bias affecting the analysis. Although suggestive of publication bias, the power of the Egger test was too low (it is generally accepted that the Egger test should be performed over 10 studies) to distinguish chance from true asymmetry. Finally, we divided groups into general population and patients and failed to consider the influence of basic emotions, ethnicities and cultures, which should be considered in future studies.

7 | CONCLUSIONS

This systematic review and meta-analysis showed that PW provided more positive emotions and alleviated negative emotions than EW in both the general population and patients. In addition, PW promotes the cognitive mechanism in the general population, while EW contributes to cognitive improvement in patients. Therefore, PW could be used for intervention in non-clinical populations, such as informal caregivers and medical staff. For clinical patients, it might be necessary to further explore the mechanism of PW and EW and combine the benefits of both emotional and cognitive mechanisms to form a multi-mode intervention.

AUTHOR CONTRIBUTIONS

Conceptualization (Jiawei Lai), Methodology (Jiawei Lai and Ying Ren), Formal analysis (Jiawei Lai and Ying Wang), Data visualization (Jiawei Lai), Manuscript drafting (Jiawei Lai), Manuscript review and editing (Huijuan Song and Ying Wang), Supervision (Huijuan Song), Project administration (Huijuan Song), Provision of resources (Shuang Li, Feng Xiao and Shaona Liao), Data curation (Tingping Xie and Weihuan Zhuang). Jiawei Lai and Huijuan Song contributed equally to this work and should both be considered first authors.

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CONFLICT OF INTEREST STATEMENT

Authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

Data sharing does not apply to this article as no datasets were generated or analyzed during the current study.

ETHICAL STATEMENTS

There are no human participants in this article and informed consent is not applicable.

ORCID

Jiawei Lai https://orcid.org/0000-0002-7267-9863
Huijuan Song https://orcid.org/0000-0001-5255-0213

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