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Does written emotional disclosure improve the psychological and physical health of caregivers? A systematic review and meta-analysis

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Abstract

1
2 There are 5.8 million caregivers providing support to the infirm, disabled or elderly in the
3 United Kingdom. Caregivers experience adverse physical and mental health outcomes and
4 increased mortality. Low cost, effective interventions are needed to increase the wellbeing of
5 caregivers. Written emotional disclosure (WED) has been shown to improve health in a range
6 of populations. This systematic review and meta-analysis aimed to establish whether WED
7 improves the psychological and physical health of caregivers. Searches were conducted in
8 Medline, EMBASE, CINAHL, BNI, PsycINFO, Cochrane Library from 1986 to 2015. Ten
9 trials investigating WED (625 participants) met the inclusion criteria. Results from four
10 studies (n=118) indicated that WED reduces trauma (SMD=-0.46, 95% CI -0.82, -0.09). Data
11 from three studies (n=102) suggest that WED improves general psychological health (SMD=-
12 0.46, 95% CI -0.86, -0.06). There was no evidence that WED improves depression, anxiety,
13 physical symptoms, quality of life or burden. Observations suggest WED may be more
14 effective for caregivers of less than 5 years. Studies were highly heterogeneous in regards to
15 caregiver age, relationship to care recipient, impairment of care recipient, follow up period
16 and outcome measures, with high or unclear bias often observed. More rigorous RCTs, with
17 clearly described interventions and standardised outcome measures, are needed to confirm
18 these findings.

19
20 **Keywords (3-6):** caregivers; psychological intervention; written emotional disclosure;
21 Pennebaker; systematic review; meta-analysis

Abbreviations:

24 UK United Kingdom
25 WED Written emotional disclosure

26	PRISMA	Preferred Reporting Items of Systematic Reviews and Meta-analyses
27	SMD	Standardised mean difference
28	RCT	Randomised controlled trial
29	CI	Confidence interval
30	US	United States
31	ADHD	Attention deficit hyperactivity disorder
32	ADD	Attention deficit disorder
33	SQ	Symptom questionnaire
34	BSI	Brief symptom inventory
35	GHQ	General health questionnaire
36	MASQ	Mood and anxiety symptom questionnaire
37	PHQ-9	Patient health questionnaire
38	IES-R	Impact of events scale- revised
39	IES	Impact of events
40	PTDS	Posttraumatic diagnostic scale
41	ZBI	Zarit burden interview
42	ECI	Experiences of caregiving inventory
43	SCL-90-R	Symptom checklist 90-R
44	HADS	Hospital anxiety and depression scale
45	CES-D	Center for epidemiological studies depression scale

46

47 Background

48 A caregiver is an unpaid individual who assists another person with day-to-day activities
49 including eating, personal hygiene and other essential tasks (Care Act, 2014). In the United
50 Kingdom (UK), there are approximately 5.8 million caregivers (1 in 10 adults) providing
51 support to the infirm, disabled or very elderly (Office for National Statistics, 2013). The
52 caregiving role can lead to increased depression, anxiety, burden, post-traumatic stress and
53 decreased self-efficacy (Bandeira et al., 2007; Obeidat, Bond, & Callister, 2009; Ory,
54 Hoffman, Yee, Tennstedt, & Schulz, 1999; Pinquart & Sorensen, 2007; Raina et al., 2005;
55 Schulz et al., 2003; Schulz & Sherwood, 2008). Caregivers are more likely than non-
56 caregivers to neglect their own physical health and to have poorer health, including higher
57 blood pressure, impaired immune responses and increased mortality (Kiecolt-Glaser, Glaser,
58 Gravenstein, Malarkey, & Sheridan, 1996; Schulz & Beach, 1999; Schulz & Sherwood,
59 2008; Shaw et al., 1999).

60
61 Various interventions to support caregivers have been evaluated. Short courses of combined
62 cognitive behavioural and family therapy have been trialled with caregivers of children with
63 cancer, with resultant improvement of post-traumatic stress symptoms (Kazak et al., 2004).
64 Counselling, support groups, combined educational and psychological support sessions and
65 family meetings have been shown to help caregivers of people with dementia, but these
66 interventions have to be time intensive and multi-dimensional to be effective (Pinquart &
67 Sorensen, 2006; Zarit, 2008; Zarit &, 1982). Such interventions are costly, requiring intensive
68 support from highly trained professionals. Caregivers, who often find it difficult to attend
69 support sessions because of caregiving commitments, would benefit from an intervention
70 which can be easily accessed, not time intensive and one that can be undertaken at or close to
71 home.

72

73 An example of a potentially appropriate intervention is written emotional disclosure (WED),
74 a form of writing therapy first described by James Pennebaker and Sandra Beall in 1986
75 (Pennebaker & Beall, 1986). WED usually involves participants writing about a traumatic
76 experience for 15-30 minutes a day for three to five days (Pennebaker & Beall, 1986).
77 Individuals are instructed to write continuously and freely about their deepest feelings,
78 without concern for spelling and grammar (Pennebaker & Beall, 1986; Pennebaker, 1997). In
79 a large meta-analysis of a highly heterogeneous sample, WED appears to have psychological
80 and physical health benefits (Frattaroli, 2006). Individual studies have shown a range of
81 positive effects, such as reduced symptoms in patients with rheumatoid arthritis, improved
82 lung function in patients with asthma and fewer health centre visits among first year
83 university students (Smyth, Stone, Hurewitz, & Kaell, 1999; Smith et al., 2015; Pennebaker,
84 Colder, & Sharp, 1990). However the impact of WED is not universally positive: in some
85 groups a null effect has been found (e.g. WED had no effect on suicidal ideation or feelings
86 of bereavement) (Kovac & Range, 2011; Stroebe, Stroebe, Schut, Zech, & van den Bout,
87 2002) suggesting that it may be an effective therapy for some sub-groups but not for all.
88 Given there is evidence that intensive psychological interventions are beneficial but
89 impractical for caregivers, we conducted a systematic review and meta-analysis to determine
90 if WED, a brief, easily accessible and low cost alternative intervention, can improve
91 caregivers' psychological and physical health.

92

93 **Methods**

94 This systematic review and meta-analysis follows the Preferred Reporting Items for
95 Systematic Reviews and Meta-analyses guidelines (PRISMA) (Moher, Liberati, Tetzlaff &
96 Altman, 2009).

97

98 *Eligibility criteria*

99 Trials were eligible for inclusion if they 1) were randomised controlled trials (RCTs) or
100 controlled trials, 2) investigated the use of WED as described by Pennebaker and Beall
101 (Pennebaker & Beall, 1986), 3) reported quantitative outcome measures, 4) included
102 participants who were caregivers (defined as unpaid individuals providing care to others
103 including, but not limited to, family members, children, parents and spouses) (Care Act,
104 2014). If the trial involved more than one intervention it was included if WED was a separate
105 arm, enabling extrapolation of the effects of WED alone. Studies were excluded if they were
106 solely qualitative. Similarly, studies that used subsets of data published in full elsewhere were
107 not included, thus to preventing any duplication of data.

108

109 *Search strategy*

110 Three methods were used to search for studies testing the effects of WED in caregivers.
111 Firstly, keyword searches were carried out in Medline, EMBASE, CINHALL, BNI, PsycINFO
112 and the Cochrane library (Appendix 1) for the period 1986 (the year of publication of the
113 WED paradigm) (Pennebaker & Beall, 1986) to July 2015. The language or publication type
114 was not limited. Secondly, reference lists of all primary studies, qualitative studies and
115 review articles on the topic were searched for additional references. Citations were screened
116 by one reviewer (PR) and 20% were checked independently by the two other reviewers (HS
117 & CJ). All three reviewers confirmed the eligibility of the identified studies. Thirdly, to find
118 studies nearing publication, experts in the field were contacted and the British Psychological
119 Society was asked to email their members requesting details of any ongoing work that used
120 writing therapy with caregivers.

121

122 *Data extraction*

123 Data extracted from each study were entered into a summary table to enable comparison of
124 study characteristics. The table was compiled by one reviewer (PR) and checked for accuracy
125 by the other reviewers (HS & CJ) (Table 1). Where studies were eligible but not all relevant
126 data could be obtained from the publication, authors were contacted. As there was variation
127 in the frequency and duration of follow-up measurement between studies, data were extracted
128 only for the final follow-up.

129

130 *Quality assessment of studies*

131 Each study was analysed for bias using the Cochrane Collaboration's criteria (Higgins &
132 Green, 2011). The risk of bias in each subcategory was classified as high, low or unclear. The
133 assessment of bias was conducted independently by two authors (PR and CJ) and decisions
134 were compared and discussed to achieve consensus (Table 3).

135

136 *Data Analysis*

137 All outcomes were measured as continuous data. End point scores were expressed as mean
138 differences (MDs) or standardised mean differences (SMDs) with 95% confidence intervals
139 (CIs). Heterogeneity of the studies was assessed by visual inspection of the forest plots and
140 calculation of the I^2 statistic using RevMan 5.2 (RevMan, 2012). An I^2 up to 25% indicates
141 low heterogeneity; up to 50% indicates moderate heterogeneity; and 75% or greater, high
142 heterogeneity. Investigation of heterogeneity was not performed as a minimum of 10 studies
143 are required for subgroup analyses (Higgins & Green, 2011). We performed the meta-
144 analysis using RevMan 5.2 software (RevMan, 2012), using random effect models if $I^2 \geq 50\%$,
145 and fixed effects if $I^2 < 50\%$.

146

147 Results*148 Study selection*

149 The search strategy identified 2287 studies for possible inclusion, 2267 were excluded after
150 reading the title or abstract. The full texts of 20 studies were accessed to determine eligibility
151 and ten met the inclusion criteria (Figure 1). These ten were reviewed for study design,
152 participant characteristics, intervention and outcomes and the relevant data were entered into
153 Review Manager (RevMan, 2012).

154

155 Study characteristics

156 Eight studies measured seven outcomes and supplied data suitable for meta-analysis (Ashley,
157 O'Connor, & Jones, 2011; Barry & Singer, 2001; Barton & Jackson, 2008; Duncan et al.,
158 2007; Jones et al., 2015; Mackenzie, Wiprzycka, Hasher, & Goldstein, 2007; Martino, Freda,
159 & Camera, 2013; Schwartz & Drotar, 2004). There were five studies which measured four
160 outcomes that could not be pooled due to insufficient detail or only a single study reported on
161 that outcome (Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski, Musil,
162 Burant, & Au, 2014; Martino, Freda, & Camera, 2013; Jones et al., 2015). Attempts to obtain
163 extra information about these studies were unsuccessful as authors were uncontactable or
164 unable to provide the required information. The results were therefore divided into two
165 sections to report meta-analytic results and review results.

166

167 Nine of the studies were published between 2001 and 2014, and one study was in press
168 (Jones et al., 2015). Follow up periods varied between the immediate post-intervention
169 assessment and six months. Four of the studies were conducted in the United States (US)
170 (Barry & Singer, 2001; Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski et
171 al., 2014), three in the UK (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015),

172 one in Canada (Mackenzie et al., 2007), Israel (Duncan et al., 2007) and Italy (Martino et al.,
173 2013). Six studies had one intervention group and one control group (Barry & Singer, 2001;
174 Barton & Jackson, 2008; Jones et al., 2015; Martino et al., 2013; Schwartz & Drotar, 2004;
175 Whitney & Smith, 2014), two studies had two intervention groups and one control group
176 (Ashley et al., 2011; Mackenzie et al., 2007), and one study had four intervention groups and
177 one control group (Zauszniewski et al., 2014). In one study the same group acted as both
178 control and intervention (Duncan et al., 2007) (Table 1).

179

180 A total of 625 participants were included in this review. Four studies trialled WED in
181 caregivers of adults (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015;
182 Mackenzie et al., 2007) and the other six were conducted in caregivers of babies or children
183 (Barry & Singer, 2001; Duncan et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004;
184 Whitney & Smith, 2014; Zauszniewski et al., 2014). Caregivers of adults were parents,
185 spouses, children or sisters, and they were caring for individuals with a range of mental and
186 physical problems, such as dementia, cognitive impairment, physical disability, cancer
187 (Ashley et al., 2011; Mackenzie et al., 2007), and psychosis (Barton & Jackson, 2008; Jones
188 et al., 2015). Caregivers of children were predominantly biological parents (in particular
189 mothers) as well as adopted mothers, aunts and grandmothers. The care recipients were
190 babies on neonatal intensive care units (Barry & Singer, 2001), children at the start of their
191 off-therapy phase of Acute Lymphoblastic Leukaemia (Martino et al., 2013), healthy
192 grandchildren (Zauszniewski et al., 2014), children with cancer (Duncan et al., 2007), “hard
193 to parent” children with conditions such as Asperger’s Syndrome, autism, sensory processing
194 disorder, ADHD/ADD, oppositional defiant disorder (Whitney & Smith, 2014) and children
195 with chronic disease (Schwartz & Drotar, 2004). Details of the interventions used and a full
196 list of outcomes and measures used in each study are described in Tables 1 and 2.

197

198 *Meta-analytic findings*199 *General psychological health*

200 Three studies reported data that were suitable for pooling for this outcome (n=102) (Barry &
201 Singer, 2001; Barton & Jackson, 2008; Mackenzie et al., 2008). The data showed a
202 significant improvement in the WED group compared with control: WED was effective in
203 reducing impairment in general psychological health (SMD=-0.46, 95%CI=-0.82,-0.06). The
204 data had low heterogeneity ($I^2=14%$ p=0.31) (Figure 2).

205

206 *Trauma*

207 Data from four studies measuring trauma were pooled (n=118) (Barry & Singer, 2001;
208 Barton & Jackson, 2008; Duncan et al., 2007; Mackenzie et al., 2007). The data showed that
209 WED was effective in reducing trauma (SMD=-0.46, 95% CI=-0.82, -0.09). The data had low
210 heterogeneity ($I^2=0%$ p=0.48) (Figure 3).

211

212 *Other measures of psychological and physical wellbeing*

213 Evidence from seven studies (n=363) (Ashley et al., 2011; Barton & Jackson, 2008; Duncan
214 et al., 2007; Jones et al., 2015; Mackenzie et al., 2007; Martino et al., 2013; Schwartz &
215 Drotar, 2004) showed no effect of WED on depression (SMD=0.00, 95% CI = -0.23, 0.23).
216 Six studies (n=355) (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015;
217 Mackenzie et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004) showed no effect of
218 WED on anxiety (SMD=0.01, 95% CI=-0.44, 0.46). Two studies (n=77) (Barton & Jackson,
219 2008; Mackenzie et al., 2007) showed no effect on burden (SMD= 0.11, 95% CI -0.39, 0.60).
220 Four studies (n=177) (Barton & Jackson, 2008; Mackenzie et al., 2007; Martino et al., 2013;
221 Schwartz & Drotar, 2004) showed no effect on somatic symptoms or physical health (SMD=-

222 0.19, 95% CI=-0.67, 0.28). Two studies (n=82) (Jones et al., 2015; Schwartz & Drotar, 2004)
223 showed no effect on physical (SMD=-0.29, 95% CI -0.78, 0.20) or mental health related
224 quality of life (SMD=0.43, 95% CI -0.02, 0.88).

225

226 Review findings

227 *Stress, mood, depression and health related quality of life*

228 There were three studies reporting outcomes for stress (Schwartz & Drotar, 2004; Whitney &
229 Smith, 2014; Zauszniewski et al., 2014). One study found that the intervention group
230 experienced higher total stress post intervention (mean (SD) = 36.97(1.12)) compared with
231 the control (mean (SD) = 35.44 (.79)) (p=.017) (Whitney & Smith, 2014). Schwartz and
232 Drotar (2004) found no differences between intervention and control group for stress
233 (Intervention follow up mean (SD) = 29.98 (8.93); Control follow up mean (SD) = 27.46
234 (9.97))(p=0.74). Only one study found significantly reduced stress, this was in written and
235 spoken emotional disclosure groups compared with control groups (p<.05) (Zauszniewski et
236 al., 2014).

237

238 Schwartz and Drotar (2004) measured short term and long term mood. Controlling for
239 baseline scores, they found no significant difference between intervention and control groups
240 for either long term or short term mood (Schwartz & Drotar, 2004). Martino et al. (2013) also
241 measured long term mood, but only reported on subscale scores and not total scores. They
242 found that the intervention group showed improved scores on the tension-anxiety
243 (F(1,41)=9.82, p=<.01) and fatigue-inertia subscales (F(1,41)=4.25, p<.05), but that there was
244 no significant difference between intervention and control groups for depression-dejection
245 (F(1,41)=1.81, p>.05), anger-hostility (F(1,41)=2.58, p>.05) or confusion-bewilderment
246 (F(1,41)=3.66, p>.05) (Martino et al., 2013).

247

248 Two studies reported data regarding depression. Jones et al., (2015) reported data from two
249 depression measurement scales (PHQ-9 and HADS). As only one measure from each study
250 can be included under each construct for meta-analysis, the PHQ-9 data were pooled as its
251 primary outcome for depression. Controlling for baseline scores, there was no significant
252 difference between intervention and controls for depression ($F(1,27)=.17, p=.69$).

253 Zauszniewski et al. (2014) concluded that there was no significant change in depressive
254 symptoms for participants receiving only expressive writing or spoken emotional disclosure
255 compared with controls at 18 week follow up ($p<.05$).

256

257 *Overall health related quality of life*

258 Only one study reported on quality of life: Zauszniewski et al.'s (2014) assessments using the
259 Short Form-12 showed no difference at final follow up between control and expressive
260 writing or spoken emotional disclosure for general quality of life ($p>.05$).

261

262 Risk of bias

263 Overall, the methods of the included studies were of poor quality: risk of bias in most
264 domains was classified as unclear or high. The areas in which studies were found to be
265 particularly lacking were incomplete outcome data and selective outcome reporting. The
266 details of risk of bias assessment for each study are presented (Table 3).

267

268

Discussion

269 This review and meta-analysis investigated the effect of written emotional disclosure (WED),
270 a form of writing therapy, on the mental and physical health of informal caregivers. Meta-
271 analysis demonstrated that WED alleviates symptoms of trauma and avoidance (a subscale of

272 trauma) and can significantly improve general psychological health in caregivers. Our meta-
273 analysis found no evidence of efficacy on outcomes of depression, anxiety, burden, intrusion,
274 somatic symptoms/physical health, health-related quality of life (physical and mental).

275 Assessment of the review findings showed conflicting results regarding the impact of WED
276 on stress and long term mood, with some studies showing benefit and others no effect. The
277 review also showed no effect on depression or health-related quality of life which is
278 consistent with the results of the meta-analysis.

279

280 Our meta-analysis showed that for the majority of physical and psychological outcome
281 measures, WED had no effect. However, a moderate reduction in impaired general
282 psychological health was reported across three studies (Barry & Singer, 2011; Barton &
283 Jackson, 2008; MacKenzie et al., 2007) and reduced trauma across four (Barry & Singer,
284 2011; Barton & Jackson, 2008; MacKenzie et al., 2007; Duncan et al., 2007). The moderate
285 effect size in both outcomes (SMD=-0.46) compare favourably to the most recent meta-
286 analytic findings of WED in cancer patients which reported no significant effects on
287 participants' psychological and physical health (Zachariae & O'Toole, 2015). This supports
288 the theory that participants need to be sufficiently impaired to show benefit, but not so
289 impaired that the biological disease processes override the potential psychosocial influences
290 of WED (Smith et al., 2015).

291

292 One possible explanation for the improvement in trauma and general psychological health
293 may be that the duration of caregiving is moderating any effect of WED on outcomes. In the
294 studies which demonstrated improvements, all three studies measuring trauma and all four
295 studies measuring general psychological health, included caregivers of less than five years
296 compared to the 7-14 year range reported in other studies. This may suggest that WED is

297 effective for those participants with less established caregiver-related impairment of
298 psychological health and trauma. Possible mechanisms to explain this effect should be
299 investigated in further trials of WED in caregivers.

300

301 There is an apparent anomaly in our observations where improvement has only been found
302 for general psychological health and trauma and not anxiety and depression which you would
303 usually expect to be strongly related. This may be explained by the longer duration of
304 caregiving in the studies measuring anxiety and depression. The majority of studies (four of
305 the six studies measuring anxiety and four of the seven studies measuring depression)
306 included caregivers of more than seven years. This in turn may mean that the benefit of WED
307 is diluted by the inclusion of longer-term caregivers.

308

309 **Strengths and limitations**

310 This is the first meta-analysis to focus on WED in caregivers, previously caregivers have
311 been included within diverse patient groups. In the largest meta-analysis of WED reporting
312 benefit in a wide range of healthy and unwell participants, only one study of caregivers was
313 included (Frattaroli, 2006). A further strength of this review and meta-analysis is that it
314 examines a specific psychological intervention. Previous reviews of treatments for caregivers
315 have not focussed on one therapy but instead examined a range of therapies. For example, a
316 review of 21 RCTs examining interventions to support caregivers of people with severe
317 mental illness found evidence from three studies that psychoeducation, support groups and
318 problem solving bibliotherapy reduce psychological distress for up to six months, but the
319 authors were unable to conclude which intervention to recommend (Yesufu-Udechuku A. et
320 al., 2015).

321

322 Whilst the methodology of the review and meta-analysis are robust the included studies do
323 have some limitations. There was wide variation in the period of follow up, nature of
324 impairment of the care-recipient, and outcome measures used for assessment of participants.
325 The nature of impairment of the care-recipient is likely to have a substantial influence on the
326 experience of caregiving. For example, distress is found to be twice as likely in caregivers of
327 people with neurological conditions compared with those caring for people without (Mitchell
328 et al., 2015). Care-recipient impairment should be considered in future sub-group analyses if
329 there are sufficient numbers of trials available.

330
331 A further limitation of the included studies was the overall quality: risk of bias was unclear
332 or high in many of the domains assessed and many of the trials did not report a sample size
333 calculation, with some studies including very small samples. Our conduct of a meta-analysis
334 is within recognised practice, however we acknowledge that with such few studies available,
335 results should be interpreted with caution. This review and meta-analysis could potentially be
336 enhanced by the inclusion of data from some unpublished studies. In particular we identified
337 abstracts where the data was contained in doctoral and master's theses held in libraries in the
338 US. Extensive effort was made to obtain these dissertations, including contacting the authors,
339 their supervisors and the libraries, but all to no avail. Due to the low number of studies (<10),
340 tests for funnel plot asymmetry were inappropriate as the power of the tests is too low to
341 distinguish chance from real asymmetry (Higgins & Green, 2011).

342

343 **Implications for practice**

344 We found some support for the beneficial role of WED for informal caregivers. Results
345 indicate that individuals relatively new to caregiving may infer greater benefit, suggesting
346 that early intervention is important in this population. None of the studies reported on safety,

347 but because WED is generally thought to be a safe intervention, with only transient distress
348 reported (Hockemeyer, Smyth & Anderson, 1999), this lack of formal safety data would not
349 deter implementation. Given the practicality and inexpensive nature of the intervention, WED
350 could be offered widely, however our analysis suggests it may be more beneficial to those
351 with a shorter duration of caregiving.

352

353 **Implications for research**

354 Many of the trials included in this review were of poor methodological quality. To rectify this
355 future RCTs need to be powered adequately, they need to select validated and previously
356 used outcome measures to facilitate meta-analyses, and to publish the study protocol in
357 advance to reduce the risk of bias when reporting outcomes. There is justification for further
358 research investigating the duration of caregiving and its potential moderating effect on
359 physical and psychological health. The longest follow up assessment reported in the studies
360 was six months: a longer term follow up would be useful to determine sustainability of the
361 effect of WED. Very few studies in this review investigated caregiver physical health. WED
362 is known to improve physical health in other populations, and as caregivers are at higher risk
363 of physical illnesses, this outcome should be investigated further. Similarly, there is a need to
364 ascertain and report any adverse events and not just assume WED is safe.

365

366 Caregivers require assistance beyond that which is made available to the care recipient.

367 Caregivers are patients in their own right and their needs must be assessed and met. This
368 review has shown that WED may be an effective intervention to improve caregiver's general
369 psychological health and reduce trauma, particularly amongst those relatively new to the
370 caregiving role. As our population ages and community care becomes more prevalent, it will

371 become increasingly important to support caregivers, reducing their psychological and
372 physical burden and so further research will be needed in application of WED.

373

ACCEPTED MANUSCRIPT

374

References

- 375 Ashley, L., O'Connor, D. B., & Jones, F. (2011). Effects of emotional disclosure in caregivers:
376 moderating role of alexithymia. *Stress and Health, 27*, 376-387. doi:10.1002/smi.1388
- 377 Bandeira, D. R., Pawlowski, J., Gonçaves, T. R., Hilgert, J. B., Bozzetti, M. C., & Hugo, F.
378 N. (2007). Psychological distress in Brazilian caregivers of relatives with dementia.
379 *Aging & Mental Health, 11*, 14-19. doi:10.1080/13607860600640814
- 380 Barry, L. M., & Singer, G. H. S. (2001). Reducing maternal psychological distress after the
381 NICU experience through journal writing. *Journal of Early Intervention, 24*, 287-297.
382 doi:10.1177/105381510102400404
- 383 Barton, K., & Jackson, C. (2008). Reducing symptoms of trauma among carers of people with
384 psychosis: pilot study examining the impact of writing about caregiving experiences.
385 *Australian and New Zealand Journal of Psychiatry, 42*, 693-701.
386 doi:10.1080/00048670802203434
- 387 Care Act, § 23 (2014) (U.K.).
- 388 Dellasega, C., & Haagen, B. (2004). A different kind of caregiving support group. *J Journal of*
389 *Psychosocial Nursing and Mental Health Services, 42*, 46-55. Retrieved from
390 <http://www.ncbi.nlm.nih.gov/pubmed/15354598>
- 391 Duncan, E., Gidron, Y., Rabin, E., Gouchberg, L., Moser, A. M., & Kapelushnik, J. (2007). The
392 effects of guided written disclosure on psychological symptoms among parents of
393 children with cancer. *Journal of Family Nursing, 13*, 370-384.
394 doi:10.1177/1074840707303843
- 395 Frattaroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *American*
396 *Psychological Association, 132*, 823-865. doi:10.1037/0033-2909.132.6.823
- 397 Garrouste-Orgeas, M., Coquet, I., Perier, A., Timsit, J. F., Pochard, F., Lancrin, F., Misset, B.
398 (2012). Impact of an intensive care unit diary on psychological distress in patients and
399 relatives. *Critical Care Medicine, 40*, 2033-2040.
400 doi:10.1097/CCM.0b013e31824e1b43
- 401 Higgins, J. P. T., Green, S., (2011). Cochrane handbook for systematic reviews of interventions,
402 Version 5.1.0: Chichester: The Cochrane Collaboration. Retrieved
403 from: www.cochrane-handbook.org.
- 404 Hockemeyer, J. R., Smyth, J. M., Anderson, C. F., et al (1999) Is it safe to write? Evaluating
405 the short-term distress produced by writing about emotionally traumatic experiences.
406 *Psychosomatic Medicine, 61* (1), 99.
- 407 Jones, C., Hayward, M., Brown A., Clark, E., Bird, D., Harwood, G.,... Scott, C. (2015).
408 Feasibility and participant experiences of a written emotional disclosure intervention for
409 parental caregivers of people with psychosis. *Stress and Health*, [early view]
410 doi: 10.1002/smi.2644
- 411 Kazak, A. E., Alderfer, M., Rourke, M. T., Simms, S., Streisand, R., & Grossman, J. R. (2004).
412 Posttraumatic stress disorder (PTSD) and posttraumatic stress symptoms (PTSS) in
413 families of adolescent childhood cancer survivors. *Journal of Pediatric Psychology, 29*,
414 211-219. doi:10.1093/jpepsy/jsh022
- 415 Kidd, L. I., Zauszniewski, J. A., & Morris, D. L. (2011). Benefits of a poetry writing
416 intervention for family caregivers of elders with dementia. *Issues in Mental Health*
417 *Nursing, 32*(9), 598-604. doi:10.3109/01612840.2011.576801
- 418 Kiecolt-Glaser, J. K., Glaser, R., Gravenstein, S., Malarkey, W. B., & Sheridan, J. (1996).
419 Chronic stress alters the immune response to influenza virus vaccine in older adults.
420 *Proceedings of the National Academy of Sciences of the United States of America,*
421 *93*(7), 3043-3047. doi:10.1073/pnas.93.7.3043

- 422 Kloos, J. A., Daly., B. J., (2008). Effect of a family-maintained progress journal on anxiety of
423 families of critically ill patients. *Critical Care Nursing Quarterly*, *31*, 96-107. doi:
424 10.1097/01.CNQ.0000314469.41507.cb.
- 425 Kovac, S. H., Range, L.M., (2011). Does Writing About Suicidal Thoughts and Feelings
426 Reduce Them? *Suicide and Life-Threatening Behavior*, *32*(4), 428-440.
427 doi:10.1521/suli.32.4.428.22335
- 428 Lovell, B., Moss, M., Wetherell, M. A., (2015). Assessing the feasibility and efficacy of written
429 benefit-finding for caregivers of children with autism: a pilot study. *Journal of Family*
430 *Studies*, *21*, 1-11. doi:10.1080/13229400.2015.1020987
- 431 Mackenzie, C. S., Wiprzycka, U. J., Hasher, L., & Goldstein, D. (2007). Does expressive
432 writing reduce stress and improve health for family caregivers of older adults?
433 *Gerontologist*, *47*(3), 296-306. doi: 10.1093/geront/47.3.296.
- 434 Mackenzie, C. S., Wiprzycka, U. J., Hasher, L., & Goldstein, D. (2008). Seeing the glass half
435 full: optimistic expressive writing improves mental health among chronically stressed
436 caregivers. *British Journal of Health Psychology*, *13*, 73-76.
437 doi:10.1348/135910707x251153
- 438 Martino, M. L., Freda, M. F., & Camera, F. (2013). Effects of Guided Written Disclosure
439 Protocol on mood states and psychological symptoms among parents of off-therapy
440 acute lymphoblastic leukemia children. *Journal of Health Psychology*, *18*, 727-736.
441 doi:10.1177/1359105312462434
- 442 Mitchell, L.A., Hirdes, J., Poss, J.W., Slegers-Boyd, C., Caldarelli, H., & Martin, L. (2015).
443 Informal caregivers of clients with neurological conditions: profiles, patterns and risk
444 factors for distress from a home care prevalence study. *BMC Health Services Research*,
445 *15*, 350. doi: 10.1186/s12913-015-1010-1
- 446 Moher, D., Liberatti, A. Tetzlaff, J. Altman, D. G. (2009). Preferred Reporting Items for
447 Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Medicine*, *6*(7),
448 e1000097. doi: 10.1371/journal.pmed.1000097
- 449 Obeidat, H. M., Bond, E. A., & Callister, L. C. (2009). The Parental Experience of Having an
450 Infant in the Newborn Intensive Care Unit. *The Journal of Perinatal Education*, *18*(3),
451 23-29. doi:10.1624/105812409x461199
- 452 Office for National Statistics. (2013). More than 1 in 10 providing unpaid care as numbers rise
453 to 5.8 million [Press release]. Retrieved from [http://www.ons.gov.uk/ons/rel/mro/news-](http://www.ons.gov.uk/ons/rel/mro/news-release/how-much-unpaid-care-are-the-residents-of-england-and-wales-providing-in-2011/unpaid-care-in-england-and-wales.html)
454 [release/how-much-unpaid-care-are-the-residents-of-england-and-wales-providing-in-](http://www.ons.gov.uk/ons/rel/mro/news-release/how-much-unpaid-care-are-the-residents-of-england-and-wales-providing-in-2011/unpaid-care-in-england-and-wales.html)
455 [2011/unpaid-care-in-england-and-wales.html](http://www.ons.gov.uk/ons/rel/mro/news-release/how-much-unpaid-care-are-the-residents-of-england-and-wales-providing-in-2011/unpaid-care-in-england-and-wales.html)
- 456 Ory, M. G., Hoffman, R. R., Yee, J. L., Tennstedt, S., & Schulz, R. (1999). Prevalence and
457 impact of caregiving: a detailed comparison between dementia and nondementia
458 caregivers. *Gerontologist*, *39*(2), 177-185. doi:10.1093/geront/39.2.177
- 459 Paudyal, P., Hine, P., Theadom, A., Apfelbacher, C. J., Jones, C. J., Yorke, J., . . . Smith, H. E.
460 (2014). Written emotional disclosure for asthma. *The Cochrane Database of Systematic*
461 *Reviews*, *5*, CD007676. doi:10.1002/14651858.CD007676.pub2
- 462 Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: toward an
463 understanding of inhibition and disease. *Journal of Abnormal Psychology*, *95*(3), 274-
464 281. doi: <http://dx.doi.org/10.1037/0021-843X.95.3.274>
- 465 Pennebaker, J. W., Colder, M., & Sharp, L. K. (1990). Accelerating the coping process. *Journal*
466 *of Personality and Social Psychology*, *58*, 528-537. doi:10.1037/0022-3514.58.3.528
- 467 Pennebaker, J. (1997). Writing about emotional experiences as a therapeutic process.
468 *Psychological Science*, *8*(3), 162-166. doi: 10.1111/j.1467-9280.1997.tb00403.x
- 469 Pinquart, M., & Sörensen, S. (2006). Helping caregivers of persons with dementia: which
470 interventions work and how large are their effects? *International Psychogeriatrics*,
471 *18*(4), 577-595. doi:doi:10.1017/S1041610206003462

- 472 Pinquart, M., & Sorensen, S. (2007). Correlates of physical health of informal caregivers: a
473 meta-analysis. *The Journals of Gerontology: Psychological Sciences and Social*
474 *Sciences*, 62, 126-137. doi: 10.1093/geronb/62.2.P126
- 475 Raina, P., O'Donnell, M., Rosenbaum, P., Brehaut, J., Walter, S. D., Russell, D., . . . Wood, E.
476 (2005). The health and well-being of caregivers of children with cerebral palsy.
477 *Pediatrics*, 115(6), e626-636. doi:10.1542/peds.2004-1689
- 478 Schulz, R., & Beach, S. R. (1999). Caregiving as a risk factor for mortality: the Caregiver
479 Health Effects Study. *Journal of the American Medical Association*, 282(23), 2215-
480 2219. doi:10.1001/jama.282.23.2215.
- 481 Schulz, R., Mendelsohn, A. B., Haley, W. E., Mahoney, D., Allen, R. S., Zhang, S., . . . Belle,
482 S. H. (2003). End-of-life care and the effects of bereavement on family caregivers of
483 persons with dementia. *New England Journal of Medicine*, 349(20), 1936-1942.
484 doi:10.1056/NEJMsa035373
- 485 Schulz, R., & Sherwood, P. R. (2008). Physical and Mental Health Effects of Family
486 Caregiving. *American Journal of Nursing*, 108(9 Suppl), 23-27.
487 doi:10.1097/01.NAJ.0000336406.45248.4c
- 488 Schwartz, L., & Drotar, D. (2004). Effects of Written Emotional Disclosure on Caregivers of
489 Children and Adolescents with Chronic Illness. *Journal of Pediatric Psychology*, 29(2),
490 105-118. doi:10.1093/jpepsy/jsh014
- 491 Shaw, W.S., Patterson, T. L., Ziegler, M.G., Dimsdale, J.E., Semple S.J., Grant, I., (1999).
492 Accelerated risk of hypertensive blood pressure recordings among alzheimer caregivers.
493 *Journal of Psychosomatic Research*, 46, 215-227. doi:10.1016/S0022-3999(98)00084-1
- 494 Smith, H.E., Jones, C. J., Hankins, M., Field, A.P., Theadom, A., Bowskill, R... Frew, A.
495 (2015). The effects of expressive writing on lung function, quality of life, medication
496 use and symptoms in adults with asthma: a randomized controlled trial. *Psychosomatic*
497 *Medicine*, 77, 429-37. doi: 10.1097/PSY.0000000000000166.
- 498 Smyth, J. M., Stone, A. A., Hurewitz, A., & Kaell, A. (1999). Effects of writing about stressful
499 experiences on symptom reduction in patients with asthma or rheumatoid arthritis: a
500 randomized trial. *Journal of the American Medical Association*, 281, 1304-1309.
501 doi:10.1001/jama.281.14.1304
- 502 Stroebe, M., Stroebe, W., Schut, H., Zech, E., & van den Bout, J. (2002). Does disclosure of
503 emotions facilitate recovery from bereavement? Evidence from two prospective studies.
504 *Journal of Consulting & Clinical Psychology*, 70, 169-178. doi: 10.1037//0022-
505 006X.70.1.169
- 506 Yesufu-Udechuku A., Harrison B., Mayo-Wilson E., Young N., Woodhams P., Shiers D.,
507 ... Kuipers E. (2015). Interventions to improve the experience of caring for people with
508 severe mental illness: systematic review and meta-analysis. *British Journal of*
509 *Psychiatry*, 206(4), 268-274. doi:10.1192/bjp.bp.114.147561
- 510 Whitney, R. V., & Smith, G. (2014). Emotional Disclosure Through Journal Writing:
511 Telehealth Intervention for Maternal Stress and Mother-Child Relationships. *Journal of*
512 *Autism Developmental Disorders*.,doi:10.1007/s10803-014-2332-2
- 513 Zachariae, R., & O'Toole, M.S. (2015). The effect of expressive writing intervention on
514 psychological and physical health outcomes in cancer patients--a systematic review and
515 meta-analysis. *Psychooncology*, 24(11), 1349-1359. doi: 10.1002/pon.3802.
- 516 Zarit, S. H., & Zarit, J. M. (1982). Families under stress: Interventions for caregivers of senile
517 dementia patients. *Psychotherapy: Theory, Research & Practice*, 19, 461.
518 doi:10.1037/h0088459
- 519 Zarit, S. F., Elia. (2008). Behavioral and Psychosocial Interventions for Family Caregivers.
520 *American Journal of Nursing*, 108, 47-53. doi: 10.1097/01.NAJ.0000336415.60495.34

521 Zauszniewski, J. A., Musil, C. M., Burant, C. J., & Au, T. Y. (2014). Resourcefulness training
522 for grandmothers: preliminary evidence of effectiveness. *Research in Nursing & Health*,
523 37(1), 42-52. doi:10.1002/nur.21574

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525 **Appendix 1**

526 Capital letters indicates the use of MESH terms.

527 **PsycINFO, Medline, BNI, CINHAL, EMBASE**

- 528 1. Exp CAREGIVERS/
- 529 2. Exp PARENTS/
- 530 3. Exp FAMILY MEMBERS/
- 531 4. Exp CREATIVE WRITING/OR exp JOURNAL WRITING/
- 532 5. Exp WRITTEN COMMUNICATION/
- 533 6. Pennebaker ti,ab
- 534 7. 1 OR 2 OR 3
- 535 8. 4 OR 5 OR 6
- 536 9. 7 AND 8

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538 **COCHRANE Library**

- 539 1. WRITTEN EMOTIONAL DISCLOSURE
- 540 2. WRITING THERAPY

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544 **Figure 1– PRISMA diagram displaying procedure for article selection (Moher et al**
 545 **(Moher, 2009, Jul 21.).**

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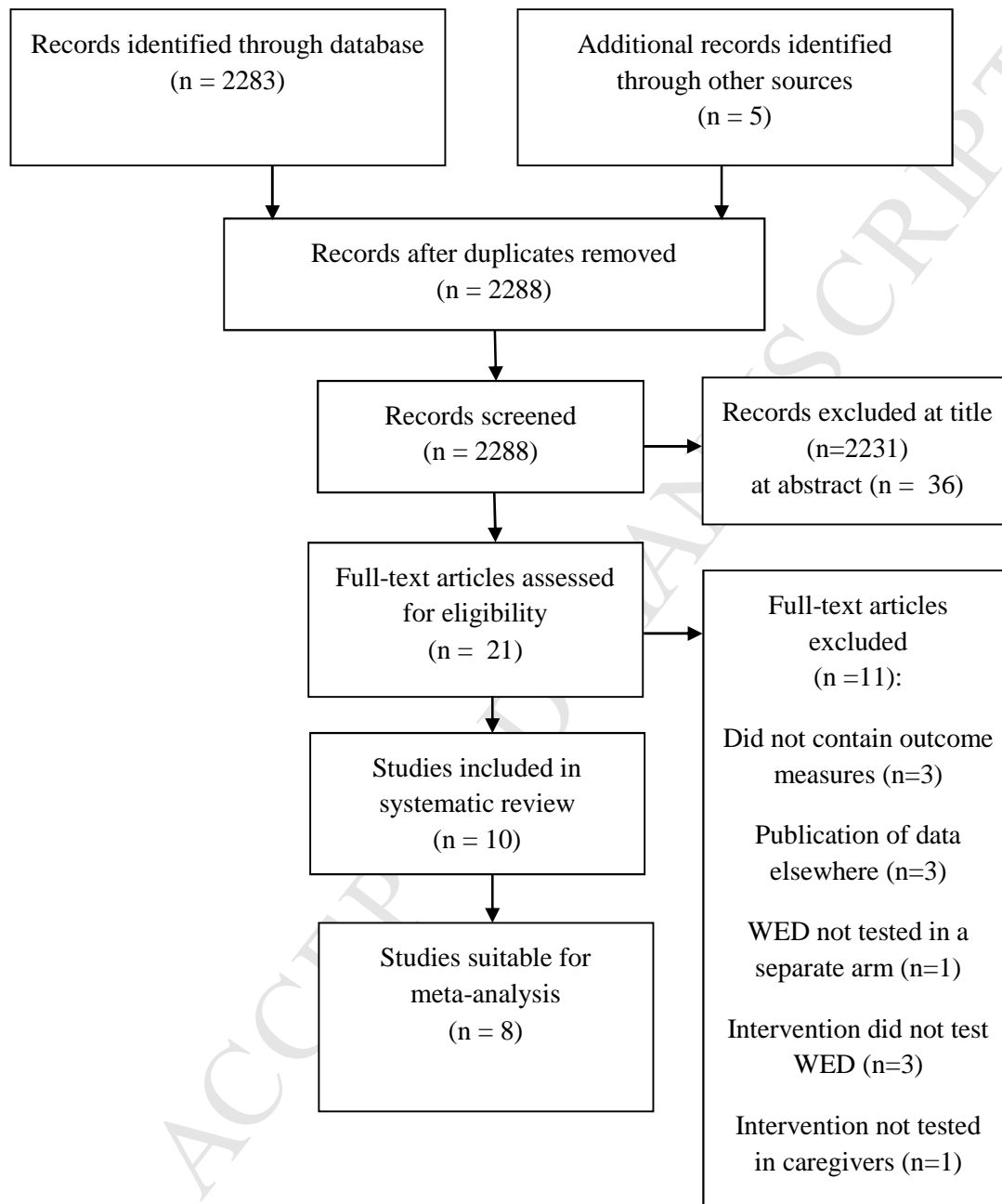
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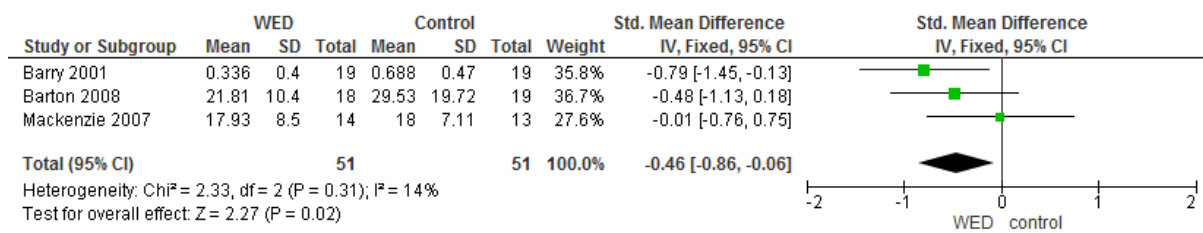
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567 **Figure 2 – table and forest plot of pooled data comparing the efficacy of WED against**
 568 **control for general psychological health**

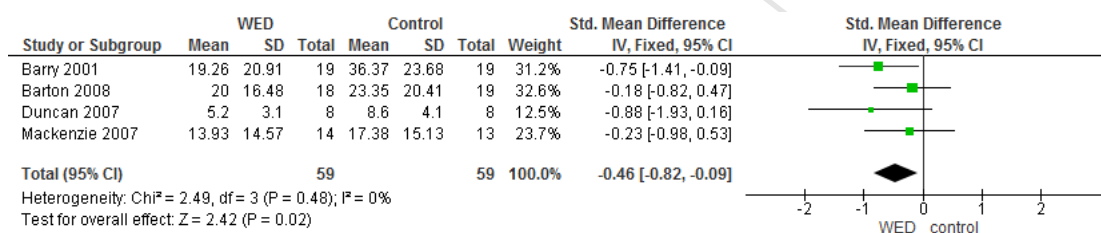


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573 **Figure 3 – table and forest plot of pooled data comparing the efficacy of WED against**
 574 **control for trauma**



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WED in caregivers

Table 1 Characteristics of included studies

Author, date, study design	Participants	Intervention	Follow up period	Measures	Key Results
Ashley et al. 2011 RCT	150 informal carers. Age, mean years: 56 Ethnicity: 90% white Gender: 85% female Years caring, mean: 10 Caregivers were relatives, friends, or neighbours of the carer and had a variety of day-to-day needs or disabilities.	Writing about stressful caregiving experience (n=51) vs writing about positive events (n=51) vs control: factual writing describing landscape pictures (n=48) Participants instructed to write at home for 20 minutes on three consecutive days without regard for spelling/ grammar; quiet room; assured of confidentiality and no feedback	At baseline then at 2 weeks, 2 months and 4 months after intervention	Psychological distress (Depression and Anxiety subscales of the Brief Symptom Inventory) Alexithymia – (Toronto Alexithymia Scale completed at baseline.) Regression checks conducted to see if alexithymia affected outcome.	The three writing groups had similar levels of depression and anxiety throughout follow up. Multivariate analyses found that lower levels of alexithymia were associated with reduced depression and anxiety in control and positive writing groups, but not the WED ('stress') group
Barry and Singer 2001 RCT	38 mothers of infants in a NICU for at least 1 week in past 14 months. Maternal Age, mean years: 33 Ethnicity: 71% Anglo-Caucasian (Gender and Years spent caring N/A)	Expressive writing about emotional experiences from pregnancy to present day (n=19) vs control: assigned to a waiting list (n=19) Participants instructed to write in a journal for at least 30 minutes on 4 consecutive days. Asked to try to write alone in a quiet and relaxed place. Control group received a letter telling them they were on a waiting list.	Pre-test and 4 weeks after intervention	Psychological distress – (Symptom Check List-90-R (SCL-90-R)) Trauma: intrusion, avoidance and hyper-arousal subscales (Impact of Events Scale-Revised (IES-R))	The treatment group improved in both outcome measures whereas the control group did not.
Barton and Jackson 2008 RCT	37 informal caregivers. Age, mean years: 45 Ethnicity: 38% Black British/ Caribbean, 27% White European, 22% Asian	Expressive writing or speaking about the first psychotic episode (n=18) vs control: writing about time management (n=19) Participants instructed to write (or speak) on three occasions for 20	At baseline, immediately after the intervention and 12 weeks later	Trauma – (Impact of Events Scale – Revised (IES-R)) Physical and Psychological health - (General Health	Those participants reporting symptoms of traumatic stress were most likely to experience reduced trauma as a result of the intervention. Otherwise, there was no significant effect of intervention on any outcome

WED in caregivers

	Pakistan/ India, 14% Other Gender: 89% Female Years caring, mean: 3	minutes over a 3 week period. Participants choose where sessions took place (90% elected at home).		Questionnaire-28 (GHQ-28))	measure.
	The majority of caregivers were the mother of the care recipient. Care recipients met the ICD-10 criteria for psychosis.			Caregiver burden – (Experience of Caregiving Inventory (ECI))	
Duncan et al. 2007	8 parents with a child who was diagnosed with cancer at least 2 months before the start of the study.	Guided Written Disclosure (WED) regarding child's cancer diagnosis. One session carried out individually at outpatient clinic. Writing carried out by parent alone. Full session lasted 30 minutes.	Parents assessed twice (one month gap between measuring) before undergoing intervention (to create control group) and one month after the GDP.	Post-traumatic stress syndrome (PTSS) - (Posttraumatic Diagnostic Scale (PTDS))	Post intervention symptoms of PTSS were reduced but symptoms of depression were not. However after controlling for child gender, the changes in PTSS were not significant.
Single group intervention	Parent age mean years:36 Child age, years:7.5 Months since diagnosis: 14.7 Parent gender: 87.5 % Female	Control group: treatment group acted as a control group before undergoing intervention (measures taken twice before undergoing GDP)		Depression – (Center for Epidemiological Studies Depression Scale).	
Jones et al 2015	28 parents of adults with psychosis	Treatment group: WED regarding a stressful experience that continues to bother caregiver (n=14) vs control: subjective writing regarding a typical day's activities (day 1), previous day's food consumption (day 2), how leisure time is spent (day 3) (n=14).	1 month and 3 months post intervention	Depression (PHQ-9)/HADS Depression. Anxiety (HADS Anxiety)	Feasibility study focusing on acceptability of WED for caregivers of people with psychosis.
RCT (pilot/feasibility)	Age, mean: 59.5 Gender: 96.4% female Ethnicity :Not supplied Mean age of care recipient: Not supplied Years caring, mean:14			Health related quality of life (RAND)	Study authors did not comment on the quantitative scores supplied.
Mackenzie et al. 2007	40 informal caregivers. Age, mean years: 62 Ethnicity: 100% white Gender: 73% Female Years caring, mean: 5	Expressive writing regarding current caregiver stress and burden (n=14) vs factual writing about time management (n=13) vs control: factual writing about historical events (n=13)	At baseline and one month after intervention	Caregiver burden (Zarit Burden Interview (ZBI)) Trauma: intrusion and avoidance subscales (Impact of events scales (IES))	There was no significant difference between expressive writing or historical writing groups throughout follow up. However the time management group showed improvement on a range of outcomes at follow up.
RCT	Most care recipients were either parents of or spouses	Participants instructed to write in a			

WED in caregivers

	to the carer. Care recipients were physically and cognitively disabled older people.	private, quiet room for 20 minutes on four non-consecutive days within a two week period, without regard for spelling/ grammar; assured of confidentiality and no feedback		Physical and psychological health, including Anxiety & Insomnia and Severe Depression subscales (General Health Questionnaire (GHQ)) Mood – (POMS)	
Martino et al. 2013 Control trial	46 parents of children at the start of off-therapy phase for Acute Lymphoblastic Leukaemia (ALL). Age mean years: 40 Gender: 57% Female Ethnicity: Not supplied Years spent caring: not supplied (age of child supplied) Mean age of children four – eight years (different mean ages reported for sex of child and arm of study)	Treatment group performed written disclosure over 3 sessions in a quiet room in the hospital. First session parents asked to describe events, in chronological order Second session, asked to write about their emotions at the time of the described events. In final sessions, asked to write about expectation of the future n=23 vs control group - no writing or other task assigned, received standard care/support (n=23)	Post-intervention (10-15 days) – T1 and Follow up –T2 (40-45 days)	Anxiety, Depression, Somatic Symptoms, Hostility - (Symptom Questionnaire (SQ)) Emotional processing – (EP Scale)	The experimental group showed improved anxiety, depression, somatic symptoms, hostility, tension-anxiety and fatigue-inertia at follow up. The control group did not. Written disclosure is effective among those participants who show good emotional processing skills, the benefits of disclosure are impeded in those with poor emotional processing skills.
Schwartz and Drotar 2004 RCT	54 caregivers of hospitalized children and adolescents with a chronic illness Age mean years: 37 Ethnicity: 64% White 30% African American 6% Latino Parent gender: female 91% Mean age of children: Not supplied	Treatment group intervention in 2009 and control group collected in 2010 Treatment group asked to write about the most traumatic and upsetting experiences of their entire life (n=29) vs control group asked to write about what they did last summer (n=25). Participants instructed to write (generally in the hospital room of their child) for 20 minutes on three days without regard for spelling/ grammar; assured of confidentiality and no feedback	Immediately after writing (each session) and 4 months later	Depression and anxiety – (Mood and Anxiety Symptom Questionnaire (MASQ)) Long term Mood – Profile of Mood States (POMS) Health related QOL – (Short Form Health Status Questionnaire) Caregiver stress (Caregiver Appraisal Scale) Physical Symptoms – (Pennebaker's Physical	There were no significant differences between intervention and control groups on most outcomes. The control group showed more vitality at final follow up than the intervention group and the intervention group had better physical functioning at final follow up compared with the control group.

WED in caregivers

				Symptom Scale)	
Whitney and Smith 2014	122 mothers with children aged 3-18 who have a “difficult” or “hard-to-parent” child due to “socially disruptive conduct” resulting from diagnoses such as Autism, Asperger’s, non-verbal learning disorder and sensory processing disorder.	Treatment group: Emotional disclosure through online journal (n=56) vs control: placed on a waiting list and completed the intervention 8 weeks after treatment group (n=64)	Treatment group: before assigned to a group (T1) and after writing (T2)	Short term Mood – (Brief Mood Rating Scale) Parenting stress – (Parenting Stress Index)	The intervention group showed higher stress levels at follow up than the control group. The intervention group also had higher levels of at follow up compared to baseline.
RCT	Age, mean: 41 Ethnicity: 91% Caucasian Mean age of Children: Not supplied		Control group: Before assigned to group (T1), immediately before writing (T2), after writing (T3)		However, the control group showed a significant reduction in stress after they received the intervention.
Zauszniewski et al. 2014.	102 grandmothers caring for grandchildren. Age, mean: 58 Ethnicity: 60% African American, 32% Caucasian 2% Asian, 1% American Indian, 5% did not report Years caring, mean: 7	5 groups: Resourcefulness training (RT) consisting of personal and social strategies to increase resourcefulness reinforced by expressive writing about caring for grandchild (EW) n=20 vs RT reinforced by verbal disclosure (VD) (n=20) vs EW without RT (n=21) vs VD without RT (n=20) vs Attention control (AO) condition (n=21)	Baseline (T1) 2 weeks post intervention (T2) 6 weeks post (T3) 12 weeks post intervention (T4)	Stress – (Perceived Stress Scale (PSS)) Depression - (Center for Epidemiological Studies-Depression Scale (CES-D)) Quality of life: 2 subscales measuring psychological well-being and physical function - (Short Form 12 (SF-12)).	Means and SDs supplied but not sample size of intervention and control groups Resourcefulness training plus written/spoken disclosure groups improved the most but written/spoken disclosure groups alone also improved compared with control. Unpublished mean scores supplied but no SDs.
RCT		Write daily in a journal 3-5 pages or record verbal disclosure 5-7 minutes a day. 4 week intervention period. Attention control: Received weekly telephone calls from a research team member between T1 and T2.			

WED in caregivers

Table 2. Outcome measures used by study

Domain	Outcome Measure	Study
Anxiety	Symptom Questionnaire (SQ) anxiety subscale	Martino et al., 2013 ^a
	Brief Symptom Inventory (BSI) anxiety subscale	Ashley et al., 2011 ^a
	Mood and Anxiety Symptom Questionnaire (MASQ) General distress: Anxiety subscale	Schwartz & Drotar, 2004 ^a
	Hospital Anxiety and Depression (HADS): Anxiety subscale	Jones et al., 2015 ^a
	General Health Questionnaire (GHQ) anxiety subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
Depression	SQ depression subscale	Martino et al., 2013 ^a
	BSI depression subscale	Ashley et al., 2011 ^a
	Patient Health Questionnaire 9 (PHQ-9)	Jones et al., 2015 ^a
	MASQ General Distress: depression subscale	Schwartz & Drotar, 2004 ^a
	Center for Epidemiological Studies Depression Scale	Duncan et al., 2007 ^a ; Zauszniewski et al., 2014 ^b
Trauma	GHQ depression subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
	HADS: depression subscale	Jones et al., 2015 ^c
	Impact of Events Scale (IES)	Mackenzie et al., 2007 ^a
	Posttraumatic Diagnostic Scale (PTDS)	Duncan et al., 2007 ^a
	Impact of Events Scale-Revised (IES-R)	Barry & Singer, 2001 ^a ; Barton & Jackson, 2008 ^a
Burden	Zarit Burden Interview (ZBI)	Barton & Jackson, 2008 ^a
	Experience of Caregiving Inventory (ECI)	Mackenzie et al., 2007 ^a
General psychological health	Symptom Check List-90-R (SCL-90-R)	Barry & Singer, 2001 ^a
	GHQ total score	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
	Pennebaker's Physical Symptom Scale	Schwartz & Drotar, 2004 ^a
Somatic symptoms/ physical health	SQ physical health subscale	Martino et al., 2013 ^a
	GHQ-28 physical health subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
Health-related quality of life	RAND Physical Health and RAND Mental Health subscales	Jones et al., 2015 ^a
	Short Form Health Status Questionnaire Physical Health Summary Score and Mental Health Summary Score subscales	Schwartz & Drotar, 2004 ^a

WED in caregivers

Stress	Short Form 12	Zauszniewski et al., 2014 ^b
	Caregiver Appraisal of Stressors Scale	Schwartz & Drotar, 2004 ^b
	Parenting Stress Index	Whitney & Smith, 2014 ^b
	Perceived Stress Scale	Zauszniewski et al., 2014 ^b
Mood	Profile of Mood States	Schwartz & Drotar, 2004 ^b ; Martino et al., 2013 ^b
	Brief Mood Rating Scale	Schwartz & Drotar, 2004 ^b

^aOutcome included in meta-analysis^bOutcome included in review as insufficient data to include in meta-analysis^cOutcome included in review as multiple outcomes used for same domain

WED in caregivers

Table 3. Risk of bias

Reference (first author)	Sequence generation (low/unclear/high risk of bias)	Allocation concealment (low/unclear/high risk of bias)	Blinding (low/unclear/high risk of bias)	Incomplete outcome data (low/unclear/high risk of bias)	Selective outcome reporting (low/unclear/high risk of bias)	Other sources of bias (low/unclear/high risk of bias)
Ashley Mackenzie Barton	Low	High	High	High	High	Unclear
	High	Unclear	Unclear	High	High	Unclear
	Unclear	Unclear	Unclear	High	High	High – eight participants opted to speak rather than write about their experiences
Barry	Low	Unclear	High	Low	High	High – payment for participation; no check of intervention fidelity;
Martino	High	High	Unclear	High	High	High – control group not assigned a writing task
Duncan	Low	Unclear	Unclear	High	High	High – control group was also intervention group
Zauszniewski	Unclear	Unclear	High	High	High	High – payment for participation
Schwartz	Unclear	Unclear	Low/Unclear	High	High	Unclear
Whitney	Low	Unclear	Unclear	High	High	High – control group not assigned a writing task; control and intervention group were not comparable
Jones	Low	Unclear	Low	Low	High	Unclear

Highlights

- This systematic review and meta-analysis aimed to establish whether written emotional disclosure (WED) improves caregiver psychological and physical health
- WED was found to reduce symptoms of trauma and improve general psychological health of informal caregivers
- There was no effect of WED on depression, anxiety, somatic symptoms, quality of life or caregiver burden
- WED appears to be more effective for caregivers of less than five years
- More rigorous RCTs with clearly described interventions and standardised outcome measures are required

Conflicts of interest

Ms J. P. Riddle, Prof H.E. Smith and Dr C.J. Jones declare that they have no conflict of interest.

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