



A randomized controlled trial of the “positive diary” intervention for family caregivers of people with dementia

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Abstract

Purpose: We examined the effectiveness of the “positive diary,” in which family caregivers of people with dementia write down three good things that happened with reasons at the end of each day.

Design and Methods: In this randomized controlled trial, the intervention group used the “positive diary,” while the control group kept a record of each meal for 4 weeks.

Findings: The intervention group showed improvement on several measures of wellbeing including Neuropsychiatric Inventory Questionnaire and Center for Epidemiologic Studies Depression Scale.

Practice Implications: The “positive diary” is a useful self-care tool for caregivers of people with dementia.

KEYWORDS

caregiver burden, dementia, family caregiver, positive psychology, randomized controlled trial

The prevalence of dementia is increasing in our aging population at an alarming rate. To address this issue, the Government of Japan formulated an updated national dementia plan, which recommends that people with dementia should live in their familiar environments as much as possible (Ministry of Health Labour and Welfare of Japan, 2019). Consequently, it is essential that family members provide care, although it is not compulsory. Further, family caregivers of people with dementia tend to be more stressed than caregivers of people with physical disabilities (Boots et al., 2016), and are at a higher risk for health problems (World Health Organization, 2017). Therefore, family caregivers,

as well as people with dementia, require adequate support (Cheng et al., 2019).

Studies regarding support for family caregivers of people with dementia have mostly focused on family education, such as cognitive-behavioral therapy (Verreault et al., 2021), leisure activities at home (Hirano et al., 2016), mindfulness (Liu et al., 2018), online support services (Parra-Vidales et al., 2017; Pot et al., 2019), and STRategies for RelaTives (START) (Cooper et al., 2016). While family education programs are useful for dementia care, there are difficulties such as planning, retaining human resources, and requiring families' effort to travel to the program. Moreover, a recent

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This research presentation includes some information we previously presented at the 68th Annual Meeting of the KITAKANTO Medical Society, the 22nd Annual Meeting of the Japanese Society for Dementia Care, and the Regional IPA/JPS Meeting.

Other information: The “positive diary” is freely available on Taiga Fujii's website (<https://taigafuji.wixsite.com/positive-lab/positivediary>).

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meta-analysis reported that the effect sizes of such interventions are not large (Cheng & Zhang, 2020). While educational interventions such as care techniques and knowledge are important, psychological interventions are also critical and require further study (Cheng et al., 2019).

To our knowledge, there are no evidence-based standard techniques for dementia care. We consider psychological interventions to be important to support family caregivers of people with dementia. Although conventional assessments of psychological aspects of family caregivers have focused on caregiver burden, several recent studies have examined the positive aspects of caregiving and acknowledged that positive feelings of family caregivers are important for promoting willingness to continue caregiving and reducing caregiver burden (Fuju et al., 2018; Yamaguchi, 2017). Family caregivers must learn to value the positive aspects of various negative experiences in dementia care (Yamaguchi, 2017).

Japan has a long-term care insurance system that helps citizens to use services such as day care and short stay. These services may reduce caregiver burden and promote caregivers' persistence. However, social security costs have been increasing owing to the growing elderly population and costs related to caregiving among social security costs are estimated to rise to 24.6 trillion yen (235.8 billion U.S. dollars) by fiscal year 2040 (2.3 times more than that of fiscal year 2018) (Cabinet Secretariat Cabinet Office Ministry of Finance Ministry of Health Labour and Welfare of Japan, 2018). Therefore, informal supports (e.g., groups of family caregivers of people with dementia and Dementia Cafés, where people with dementia, their family and friends, care professionals, and those who are interested in dementia can meet and interact) are important (Ministry of Health Labour and Welfare of Japan, 2019). Evidence-based interventions for caregivers are considered to be important on a global levels as they can reduce depressive and anxiety symptoms in the long term and be cost-effective (Livingston et al., 2020).

Considering this background, we searched for an easier intervention method that could be performed individually without any financial burden and could promote family caregivers to notice the positive aspects of caregiving. In the field of positive psychology, a widely known intervention method—"three good things (TGT)"—asks participants to describe three positive things that happened in their day with reasons. This intervention has shown effectiveness in decreasing depression and increasing happiness (Seligman et al., 2005). Based on these backgrounds, we developed the "positive diary"—a tool that family caregivers of people with dementia can use to promote recognition of the positive aspects of caregiving (Fuju et al., 2018).

The "positive diary" is a diary in which one writes down three positive things that happened during the day, with the reasons why they chose them. They then reflect on this and compliment themselves at the end of each day. The diary was developed through discussion with a physician who specializes in dementia, a physical therapist, a care manager, and a family caregiver. We conducted a quasi-experimental pilot study targeting 10 family caregivers that set 4 weeks for the control period and another 4 weeks for the

intervention. The results showed improvements in the degree of caregiver burden and behavioral and psychological symptoms of dementia (BPSD), suggesting the efficacy of the positive diary (Fuju et al., 2018). Therefore, the current study examined the effects of the "positive diary" using a randomized controlled trial for family caregivers.

2 | METHODS

2.1 | Participants

Family caregivers of people with dementia were recruited through care managers and close supporters (volunteers) from January 2019 to April 2020 from 14 locations: 1 in Saitama prefecture, 11 in Gunma prefecture, 1 in Fukuoka prefecture, and 1 in Tokyo. The inclusion criteria specified that participants had to be family caregivers (primary caregivers) of people with dementia at home, could write a diary, and consented to participate. Those who could not maintain a diary or whose care recipients were in an unstable health condition were excluded from participating. The discontinuance criteria specified that participants who could no longer continue writing a diary, or whose care recipients experienced changes in dementia or psychotropic medications or types of case services had to withdraw from the research. In addition to the diagnoses presented by attending physicians, we used the Short Memory Questionnaire (SMQ) (Koss et al., 1993). The SMQ evaluates the severity of dementia based on information provided by primary caregivers. Participants rated each item, such as "Can you remember what you wore yesterday?" and "Can you manage your money by yourself?" on a 4-point scale ranging from 1 (*No, I cannot*) to 4 (*Yes, I can do it all the time*). The total score ranges from 4 to 46 points and if the score is less than 40, the care recipient is identified as having dementia.

2.2 | "Positive diary"

The "positive diary" is a diary in which one writes down three positive things that happened during the day, with the reasons why they chose them, and compliment themselves at the end of each day. Considering participants' burden and persistency rate, we decided not to limit the "positive diary" to only caregiving (Fuju et al., 2018).

2.3 | Outcome measurements

As the primary outcome measure, we used the Neuropsychiatric Inventory Caregiver Distress Scale (NPI-D) and the NPI Questionnaire (NPI-Q) to evaluate BPSD among people with dementia (Kaufer et al., 2000). We also included the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) as the primary outcome measure for depression because depression among family caregivers of people with dementia is an important outcome (Cheng, 2017; Zhu

et al., 2015). The other evaluation instruments were used as secondary outcome measures.

2.4 | NPI-Q and NPI-D

The NPI-Q consists of 12 BPSD-related items (delusions, hallucinations, agitation/aggression, dysphoria/depression, anxiety, euphoria/elation, apathy/indifference, disinhibition, irritability/lability, aberrant motor behavior, night-time behavioral disturbances, appetite/eating disturbances). The severity of each item is assessed (range = 0–3). Total scores are calculated based on 10 items, excluding night-time disturbances and appetite/eating disturbances (i.e., range = 0–30). Higher scores indicate a greater severity of BPSD. The NPI-D evaluates the degree of caregiver burden for each NPI-Q item, rated on a scale ranging from 0 to 5, with total scores ranging from 0 to 50. Higher scores indicate higher levels of caregiver burden.

2.5 | CES-D

The CES-D consists of 20 items, rated on a 4-point Likert scale, with total scores ranging from 0 to 60. Higher scores indicate greater depressive symptoms. The cut-off score for depression was 16 points or higher.

2.6 | World Health Organization-Five Well-Being Index (WHO-5)

The WHO-5 (Awata et al., 2007) consists of five items, rated on a 6-point Likert scale, with total scores ranging from 0 to 25. Higher scores indicate a higher quality of life.

2.7 | Short version of the Zarit Burden Interview (ZBI_8)

The ZBI_8 (Arai et al., 2003; Arai, 2018) evaluates family caregivers' burden. The ZBI_8 consists of eight items, rated on a 5-point Likert scale, with total scores ranging from 0 to 32. Higher scores indicate a higher degree of caregiver burden.

2.8 | Caregiving Gratification Scale (CGS)

The CGS (Nishimura et al., 2005) evaluates family caregivers' positive cognitive appraisal of their caregiving. The CGS consists of eight items, rated on a 4-point Likert scale, with total scores ranging from 0 to 24. Higher scores indicate a higher degree of positive cognitive appraisal.

2.9 | Dementia Caregiver Positive Feelings Scale 21-item version (DCPFS-21)

The DCPFS-21 (Fuju et al., 2021) evaluates the degree of positive feelings that family caregivers of people with dementia have regarding their caregiving. The DCPFS-21 consists of 21 items, rated on a 4-point Likert scale, with total scores ranging from 21 to 84. Higher scores indicate more positive feelings.

2.10 | Participants' impressions of the “positive diary”

Postintervention, we asked participants in the intervention group to complete a questionnaire about the usefulness of the “positive diary.” The questions asked were as follows: “Do you want to keep writing in the positive diary? (*strongly agree, agree, disagree, or strongly disagree*),” “Do you think writing in the positive diary had an effect on caregiving? (*it had a good effect, it had neither good nor bad effect, or it had a bad effect*),” and “What are your impressions of writing in the positive diary? (*good, neither good nor bad, or bad*).”

2.11 | Sample size

As there was no similar previous research, we calculated an effect size of 1.38 based on the NPI-D scores from the pilot study (Fuju et al., 2018). However, as the number of participants in the pilot study was small and unequal, we carefully calculated the sample size based on the assumption of a large effect size (Cohen's $d = 0.80$), a power of .80, and an alpha level of 0.05. As a result of the calculation using G*Power 3.1, the required sample size for the t -test was 52 participants, with 26 per group. However, our annual monitoring suggested that the effect size could be higher than 0.80. Therefore, we recalculated the sample size based on an effect size of 0.95, which was calculated from the NPI-D scores using G*Power 3.1. The result showed that the required sample size for the t -test was 38 participants, with 19 per group. The mean change of the NPI-Q and NPI-D exceeded the minimal clinically important difference (MCID) (Mao et al., 2015). In addition, the effect size based on the NPI-Q was 1.35. Moreover, considering the novel coronavirus disease 2019 (COVID-19) pandemic, we ended our recruitment with 36 participants.

2.12 | Procedure

The protocol of this study was reviewed and approved by the appropriate ethics committee Tokyo Center for Dementia Care Research and Practices (Approval number: 17) and the study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all participants.

Participants were randomly assigned, with a permuted block method using a random number generator in Excel 2016, to either an intervention group or a control group. The intervention group received instructions about the “positive diary” by a main researcher and used the “positive diary” for 4 weeks. The instruments were completed by family caregivers pre- and postintervention.

The control group was asked to keep a record of each meal (breakfast, lunch, and dinner) at the end of each day for 4 weeks. The notebooks for recording food intake were created based on the “positive diary” format. The instructions for the intervention method and instruments were conducted under the same conditions as the intervention group. Moreover, we implemented the “positive diary” intervention for individuals from the control group who wished to use the “positive diary” after completing the 4-week record of food intake.

Participants were not informed if they were assigned to the intervention or control group and only notified that we were evaluating the effects of the diary. Two weeks after the first day of the intervention, participants were phoned to check on their progress.

2.13 | Data analysis

Statistical analyses were performed using SPSS Statistics (IBM). Unpaired *t*-tests, χ^2 -tests, and Fisher's exact tests were conducted to compare the groups at baseline. Unpaired *t*-tests were performed to analyze the mean difference from the baseline of each outcome. Repeated-measures analyses of covariance (ANCOVAs) with the covariates of ZBI_8 (baseline) and the time allocated for care in the day were used to analyze participants at the end of the study. The effect sizes of each group were compared with Cohen's *d* (adjusted mean treatment difference/pooled standard deviation): *d* = 0.2 was considered small, 0.5 was considered medium, and 0.8 was considered large. The ANCOVA interaction (Group × Time) of the effect sizes was calculated as follows: *r* = 0.1 was considered small, 3 was considered medium, and 0.5 was considered large.

The quantitative text analysis for descriptions in the “positive diary” was conducted using KH Coder (ver. 3.00) (Higuchi, 2016). The terms equivalent to a care recipient in the descriptions were replaced with “a care recipient (a person with dementia).” We extracted the terms to express positive emotions (“positive words”) based on the 10 positive emotions identified by Fredrickson (2013) (i.e., joy, forgiveness, serenity, interest, hope, pride, amusement, inspiration, awe, love). The total number of words, the total number of sentences, and the number of sentences including positive words were calculated. Furthermore, achievement rates were calculated by dividing the number of items by 84, which is the maximum number of items when the participant continued describing 3 items for 28 days (4 weeks), and multiplying by 100.

Each description was categorized into “daily lives,” “interaction with people other than people with dementia,” “situations

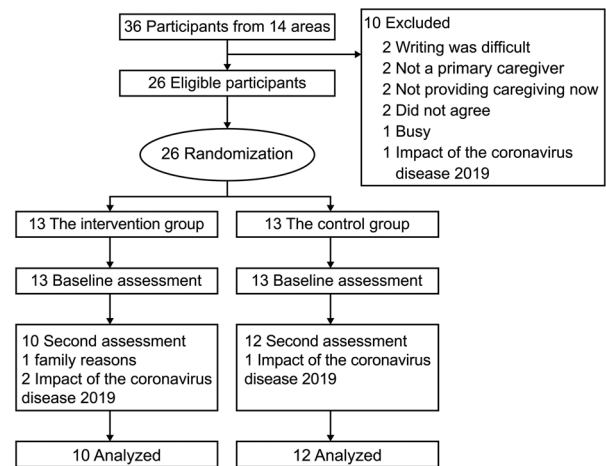


FIGURE 1 Participant flow

related to caregiving,” “hobbies and leisure activities,” “appreciation for daily effort,” and “contact with nature and animals” based on the pilot study (Fuju et al., 2019). The categorization was conducted by a main researcher and an evaluator unrelated to this study, and its validity was checked. Spearman's correlation coefficients between the total number of words, the number of the terms equivalent to a care recipient, the total number of sentences, the number of sentences including positive words, the achievement rate, and the number of entries in each category were calculated, using the differences pre- and postintervention as the amount of change. The results of the questionnaire about the positive diary conducted postintervention were compiled descriptively.

3 | RESULTS

Figure 1 shows the flow of participants from recruitment to the end of the 4-week intervention. Participants' characteristics and the characteristics of people with dementia are shown in Tables 1 and 2, respectively. There were significant differences in baseline ZBI_8 and the time allocated for caregiving in a day between the intervention and control groups. Other baseline characteristics did not differ significantly. The characteristics of the excluded participants are shown in Tables S1 and S2.

3.1 | Change in the outcome measures

Table 3 The unpaired *t*-tests revealed significant improvements in the scores of the NPI-Q, CES-D, WHO-5, ZBI_8, and CGS in the intervention group. A repeated-measures ANCOVA produced a significant interaction (Group × Time) for the total score of the CES-D. In contrast, the scores of the NPI-D, NPI-Q, WHO-5, and ZBI_8 did not show any significance. All outcomes pre- and post-intervention are shown in Table S3.

TABLE 1 Basic characteristics of the family caregivers

	Intervention (n = 10)	Control (n = 12)	p
Age, mean (SD), years	61.1 (13.4)	63.8 (9.1)	0.59 ^a
Sex, n (%)			
Female	8 (80.0)	9 (75.0)	1.00 ^b
Male	2 (20.0)	3 (25.0)	
Experience of care, mean (SD), years	4.4 (1.7)	5.7 (5.2)	0.47 ^a
The number of people living in home, n (%)			
2 (person with dementia and caregiver)	2 (20.0)	4 (33.3)	0.42 ^c
3	5 (50.0)	4 (33.3)	
≥ 4	3 (30.0)	2 (16.7)	
Unknown	0 (0.0)	2 (16.7)	
Employment, n (%)			
Yes	5 (50.0)	6 (50.0)	1.00 ^b
No	5 (50.0)	6 (50.0)	
Care recipient, n (%)			
Husband	0 (0.0)	2 (16.7)	0.57 ^c
Wife	2 (20.0)	2 (16.7)	
Birth father	0 (0.0)	1 (8.3)	
Birth mother	6 (60.0)	6 (50.0)	
Father-in-law	1 (10.0)	0 (0.0)	
Mother-in-law	1 (10.0)	1 (8.3)	
Time allocated for care in the day, n (%)			
Almost all the time	3 (30.0)	0 (0.0)	0.01 ^c
Half a day	3 (30.0)	6 (50.0)	
2–3 h	4 (40.0)	0 (0.0)	
At the time of need	0 (0.0)	4 (33.3)	
Other	0 (0.0)	2 (16.7)	
Health condition, n (%)			
Healthy	8 (80.0)	11 (91.7)	0.57 ^b
Not healthy	2 (20.0)	1 (8.3)	
Service used (multiple answers allowed), n (%)			
Home-visit	3 (30.0)	3 (25.0)	0.79 ^b
Commuting	8 (80.0)	8 (66.7)	0.48 ^b
Short-term institutionalization	4 (40.0)	3 (25.0)	0.65 ^b
Small-sized multifunctional in-home care	0 (0.0)	2 (16.7)	0.18 ^b

(Continues)

TABLE 1 (Continued)

	Intervention (n = 10)	Control (n = 12)	p
Informal support	2 (20.0)	0 (0.0)	0.20 ^b
Habit of writing, n (%)			
Yes (now)	5 (50.0)	6 (50.0)	0.95 ^c
Yes (past)	3 (30.0)	3 (25.0)	
No	2 (20.0)	3 (25.0)	
NPI-D, mean (SD)	6.5 (5.4)	6.4 (4.5)	0.97 ^a
CES-D, mean (SD)	14.8 (6.8)	10.9 (6.4)	0.18 ^a
WHO-5, mean (SD)	12.3 (5.1)	13.4 (4.1)	0.58 ^a
ZBI_8, mean (SD)	16.5 (6.8)	9.5 (4.7)	0.01 ^a
DCPFS-21, mean (SD)	67.7 (5.6)	68.0 (5.6)	0.90 ^a
CGS, mean (SD)	14.8 (4.8)	14.2 (3.5)	0.73 ^a

Abbreviations: CES-D, Center for Epidemiologic Studies Depression Scale; CGS, Caregiving Gratification Scale; DCPFS-21, Dementia Caregiver Positive Feelings Scale 21-item version; NPI-D, Neuropsychiatric Inventory Caregiver Distress Scale; WHO-5, World Health Organization-Five Well-Being Index; ZBI_8, Short version of the Zarit Burden Interview.

^aunpaired t-test.

^bFisher's exact test.

^c χ^2 -test.

3.2 | Relationship between changes in the outcome measures and contents of the diary

Table 4 Among the text data of the descriptions from the 10 participants in the intervention group, 7993 words (mean = 799.3 words) were subject to analysis, which included 109 words equivalent to "a care recipient" (mean = 10.9 words). A total of 2311 sentences (mean = 231.1 sentences) were subject to analysis, which included 1293 sentences with positive words (mean = 129.3 sentences). There were 776 contents described in the "positive diary" (mean = 77.6 contents; achievement rate mean = 92.4%). The number of contents in each category was as follows: 234 in "daily lives" (30.2%), 205 in "interaction with people other than people with dementia" (26.4%), 112 in "situations related to caregiving" (14.4%), 98 in "hobbies and leisure activities" (12.6%), 78 in "appreciation for daily effort" (10.1%), and 49 in "contact with nature and animals" (6.3%). A total of 12 negative contents were excluded from the analysis (1.5%).

Table 4 shows the Spearman's correlation coefficients between contents and differences in each outcome pre- and post-intervention as the amount of change. The total WHO-5 score showed a significant and positive correlation with the number of instances of "appreciation for daily effort." ZBI_8 total score was significantly negatively correlated with the number of instances of "appreciation for daily effort." Family caregivers' age was significantly negatively correlated with the number of positive words.

TABLE 2 Basic characteristics of people with dementia (care recipients)

	Intervention (n = 10)	Control (n = 12)	p
Age, mean (SD), years	82.6 (9.7)	82.7 (10.2)	0.99 ^a
Sex, n (%)			
Female	9 (90.0)	9 (75.0)	0.59 ^b
Male	1 (10.0)	3 (25.0)	
Diagnosis, n (%)			
Dementia secondary to Alzheimer's disease	5 (50.0)	5 (41.7)	0.43 ^c
Dementia secondary to cerebrovascular disease	1 (10.0)	1 (8.3)	
Dementia secondary to Lewy body disease	0 (0.0)	3 (25.0)	
Unknown	3 (30.0)	3 (25.0)	
Other	1 (10.0)	0 (0.0)	
Care level, n (%) ^d			
Pending approval	0 (0.0)	1 (8.3)	0.45 ^b
Care level 1	4 (40.0)	2 (16.7)	
Care level 2	4 (40.0)	4 (33.3)	
Care level 3	2 (20.0)	3 (25.0)	
Care level 5	0 (0.0)	2 (16.7)	
NPI-Q, Mean (SD)	6.9 (4.2)	5.9 (3.6)	0.57 ^a
SMQ, Mean (SD)	13.8 (7.5)	14.0 (5.4)	0.95 ^a
≤39.0 on SMQ	10 (100.0)	12 (100.0)	–

Abbreviation: NPI-Q, Neuropsychiatric Inventory Questionnaire; SMQ, Short Memory Questionnaire.

^aUnpaired t-test.

^bFisher's exact test.

^c χ^2 -test.

^dThe classification to separate the conditions of people who require long-term care services into seven levels: support required (1–2) and care level (1–5).

3.3 | Participants' impressions of the “Positive diary”

To the question, “Do you want to keep writing in the positive diary?” two respondents answered “*strongly agree*,” six answered “*agree*,” one answered “*disagree*,” and one answered “*strongly disagree*.” To the question, “Do you think writing in the positive diary had an effect on caregiving?” six respondents answered that “*it had a good effect*” and four answered “*it had neither good nor bad effect*.”

To the question, “What are your impressions of writing in the “positive diary?” nine respondents answered it was “*good*” and one answered it was “*neither good nor bad*.”

4 | DISCUSSION

Through a randomized controlled trial, the use of the “positive diary” revealed significant improvements in depression. The effect of reducing depression owing to positive psychology interventions (PPIs) including TGT (Seligman et al., 2005) has been suggested (Lam et al., 2020), and we expected a similar effect on family caregivers of people with dementia. Although some intervention research has been reported to be effective on depression (Cheng, Mak, et al., 2017; Liu et al., 2018; Livingston et al., 2020), it is meaningful that the “positive diary” was effective because, compared to other methods, it does not require professional personnel and specialized techniques and each person can use it easily in daily life without incurring expenses. The WHO-5 score also showed a significant change, although it was not shown through an ANCOVA. However, the effect size was, along with the CES-D, higher than that of other caregiving-related scales other than the CGS. Therefore, there is a possibility that the “positive diary” has an influence on general psychological aspects at first and secondarily on caregiving-related psychological aspects. Although the NPI-D and the NPI-Q did not show any significant interaction through the ANCOVA, mean changes exceeded the MCID (Mao et al., 2015). Moreover, other caregiving-related scales, including the ZBI_8, the DCPFS-21, and the CGS, did not show any significant interactions.

The intervention group showed improvements in caregiver burden. Although the “positive diary” was not a direct intervention toward caregiving, there is a possibility that the act of writing in the “positive diary” became an opportunity to objectively think about one's own caregiving. The effectiveness of positively re-evaluating caregiving has been suggested (Cheng, Mak, et al., 2017), and six respondents in this study found a “good effect” on caregiving, while nine respondents felt that using the positive diary was “good.” Therefore, the “positive diary” may have prompted a change in behavior among family caregivers and consequently affected the NPI-Q scores.

We categorized the descriptions in the “positive diary” in a similar way as previous research, and the percentages were consistent (Fuju et al., 2019). Evaluation of relationships between the descriptions and the amount of change in each outcome showed that “appreciation for daily effort” was significantly positively correlated with the WHO-5 scores and significantly negatively correlated with the ZBI_8 scores. In contrast, there was no correlation between the number of words and sentences. Sheldon and Lyubomirsky (2019) suggested that, as similar things kept repeating, they became less fresh and at the end lost almost all the effects they had. Therefore, the effects of the “positive diary” may be attributed not to the number of descriptions but to the contents of the descriptions.

In this study, considering the burden on family caregivers of people with dementia, participants were recruited through research collaborators. Therefore, the risk of selection bias is large, and its actual influence on efficacy has been noted. In addition, it has been suggested that there are differences in the effects of PPIs and possible side effects depending on individual characteristics (Layous et al., 2017). When the “positive diary” is used, it should be

TABLE 3 Change in outcome measures for intervention ($n = 10$) and Control ($n = 12$) groups

Outcome	Group	Mean difference from baseline			ES Cohen's d	Repeated-measures ANCOVA		
		Each group mean (SD)	Mean difference (95% CI)	p of unpaired t -test		Group \times Time interaction		ES r
					F	p		
Primary								
NPI-D	Intervention	-3.1 (4.1)	-3.1 (-6.3, 0.1)	0.054	0.93	0.25	0.25	0.12
	Control	0 (2.5)						
NPI-Q	Intervention	-3.0 (2.8)	-3.3 (-5.7, -1.0)	0.008	1.25	0.38	0.54	0.14
	Control	0.3 (2.5)						
CES-D	Intervention	-6.3 (5.0)	-9.1 (-13.1, -5.0)	<0.001	2.08	7.28	0.015	0.54
	Control	2.8 (3.8)						
Secondary								
WHO-5	Intervention	5.3 (4.4)	5.0 (1.0, 8.9)	0.02	1.14	2.56	0.13	0.35
	Control	0.3 (4.4)						
ZBI_8	Intervention	-5.9 (7.4)	-6.2 (-11.7, -0.6)	0.03	1.08	0.46	0.51	0.16
	Control	0.3 (3.8)						
DCPFS-21	Intervention	2.9 (4.3)	4.3 (-0.4, -9.1)	0.07	0.79	1.81	0.20	0.30
	Control	-1.4 (6.2)						
CGS	Intervention	2.1 (4.7)	4.0 (0.3, 7.7)	0.04	1.00	3.80	0.07	0.42
	Control	-1.9 (3.3)						

Note: Repeated-measures analysis of covariance (ANCOVA) with the covariates of ZBI_8 (Baseline) and the time allocated for care in the day.

Abbreviations: CES-D, Center for Epidemiologic Studies Depression Scale; CGS, Caregiving Gratification Scale; CI, confidence interval; DCPFS-21, Dementia Caregiver Positive Feelings Scale 21-item version; ES, effect size; NPI-D, Neuropsychiatric Inventory Caregiver Distress Scale; NPI-Q, Neuropsychiatric Inventory Questionnaire; WHO-5, World Health Organization-Five Well-Being Index; ZBI_8, Short version of the Zarit Burden Interview.

introduced only through a trusted supporter of the family caregiver, and only when the caregiver shows willingness to implement it. In addition, considering the side effects, it is necessary to ensure caregivers do not feel forced to perform the task.

This study had several limitations. First, our results cannot be generalized because we conducted this research in limited regions of Japan, and purposive sampling was used to select participants. Moreover, the number of participants was small and unequal because we had to stop recruitment owing to COVID-19. Second, as we could not achieve our ideal sample size and the number of participants was almost identical to that in the pilot study, there is a possibility that the effects were overestimated. Third, carryover effects should be studied. Because the 95% confidence interval was wide for the change in each outcome, it was not possible to claim the usefulness for outcomes other than the CES-D. In addition, although the difference in CES-D scores at baseline was nonsignificant between groups, the score of the intervention group was higher than that of the control group. Furthermore, although we compared the effects of a positive

writing task, the effects of writing down bad things and keeping general diaries which are not intended specifically for writing down either good or bad things should also be examined.

5 | IMPLICATIONS FOR NURSING PRACTICE

Despite these limitations, the effects of the “positive diary” on depression and BPSD were promising. Most respondents had good impressions of the intervention, and its influence on caregiving was suggested. Therefore, we propose that the “positive diary” is a useful and easy-to-use self-care tool for family caregivers of people with dementia. Psychological interventions for family caregivers of people with dementia are essential, and depression is an important outcome that leads to increased medical expenses (Cheng, 2017; Zhu et al., 2015). We hope that our research results will be widely recognized by professionals and the general public.

TABLE 4 Correlation between outcome and diary content ($n = 10$; Spearman's ρ)

Outcome of difference from baseline	Number of words		Number of sentences		Number of contents		Number of entries in each category							
	Total	People with dementia words	Total	Positive words	Total	Achievement rate	Daily lives	Interaction with people other than people with dementia			Situations related to caregiving	Hobbies and leisure activities	Appreciation for daily effort	Contact with nature and animals
								Daily lives	Daily lives	Daily lives				
NPI-D	-0.10	0.31	0.01	-0.24	0.23	0.23	-0.26	-0.15	0.46	0.62	-0.15	0.21	-0.06	0.57
NPI-Q	-0.09	0.17	-0.38	-0.41	-0.32	-0.32	-0.19	-0.12	0.12	0.30	-0.29	-0.06	0.57	0.10
CES-D	0.12	-0.09	-0.10	-0.12	0.11	0.11	0.42	-0.44	-0.18	0.59	-0.43	0.10	0.16	-0.12
WHO-5	0.29	0.20	0.35	0.61	-0.19	-0.19	-0.04	0.49	-0.21	0.00	0.72*	-0.04	0.16	-0.35
ZBI_8	-0.31	-0.09	-0.62	-0.62	-0.20	-0.20	-0.15	0.10	0.05	0.16	-0.76*	0.10	0.34	0.10
DCPFS-21	-0.27	-0.07	-0.06	0.23	-0.31	-0.31	0.26	0.03	-0.34	-0.11	0.03	-0.35	0.10	0.16
CGS	0.04	0.23	0.16	0.32	0.06	0.06	0.01	-0.03	0.07	0.34	0.11	0.10	0.10	0.16
Age (caregiver)	-0.23	0.06	-0.47	-0.74*	-0.23	-0.23	-0.40	-0.10	0.36	0.47	-0.53	0.16	0.10	0.16

Abbreviations: CES-D, Center for Epidemiologic Studies Depression Scale; CGS, Caregiving Gratification Scale; CI, confidence interval; DCPFS-21, Dementia Caregiver Positive Feelings Scale 21-item version; ES, effect size; NPI-D, Neuropsychiatric Inventory Caregiver Distress Scale; NPI-Q, Neuropsychiatric Inventory Questionnaire; WHO-5, World Health Organization-Five Well-Being Index; ZBI_8, Short version of the Zarit Burden Interview.

* $p < 0.05$.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

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