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Journal: Child psychiatry and human development

Year: 2016 Oct

Issue: 47

Volume: 5

Pages: 780-91

DOI: 10.1007/s10578-015-0611-6

Improving maternal mental health following preterm birth using an expressive writing intervention: A randomized controlled trial.

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Suggested running head: Expressive writing for mothers of premature infants

Abstract

Evaluations of evidence-based, easily accessible, psychological interventions to improve maternal mental health following very preterm birth are scarce. This study investigated the efficacy and acceptability of the expressive writing paradigm for mothers of very preterm infants. The level of maternal posttraumatic stress and depressive symptoms was the primary outcome. Participants were 67 mothers of very preterm babies who were randomly allocated into the intervention (expressive writing; n = 33) or control group (treatment-as-usual; n = 32) when their infant was aged 3 months (corrected age, CA). Measurements were taken 3 months (pre-intervention), 4 months (post-intervention), and 6 months CA (follow-up). Results showed reduced maternal posttraumatic stress (d=0.42), depressive symptoms (d=0.67), and an improved mental health status (d=1.20) in the intervention group, which were maintained at follow-up. Expressive writing is a brief, cost-effective, and acceptable therapeutic approach that could be offered as part of the NICU care.

Keywords: premature, NICU, expressive writing, intervention, mother

Introduction

Worldwide, 1 infant in10 is born preterm (1). In Switzerland, approximately 6000 infants are born preterm every year, and 800 very preterm. Preterm birth accounts for 70% of neonatal mortality and morbidity and although advances in technology have increased the survival rate of preterm infants, morbidity remains high (2). Indeed, studies on the long-term outcome of preterm children show increased rates of cognitive, motor, behavioral and functional impairments (3). The birth and subsequent hospitalisation of a preterm infant in the neonatal intensive care unit (NICU) is often a distressing experience for parents. Important stressors include concern for the survival and the development of the infant, doubts in their ability to care for the child, separation from the baby with limited opportunities to foster attachment, and the physical environment of the NICU (4-6). Parents of preterm babies report more perceived stress and experience more adjustment difficulties and need for support during the first year after delivery compared to parents of infants born at term (7, 8). It has been documented that parents may experience severe psychological distress, such as posttraumatic stress reactions and depression following the preterm birth of their baby, which subsequently may impact on the mother-infant-interactions and their attachment relationship (9-14). In turn, poorer parenting competencies, such as lack of sensitivity during interactions may affect the infant's development (15).

So far, few studies have been published evaluating the effectiveness of an intervention to help alleviate distress in the parents of preterm infants. Given that some parents may have lower perceptions of parental competence (6), interventions often focused on supporting mothers with their parenting through a 'buddy system' or individual peer support system (e.g. (5)). A systematic review (4) found seven studies that evaluated interventions aimed at alleviating the adverse psychosocial consequences of having a preterm infant, of which four were RCTs where

the intervention was an individualised developmental behavioral program. Although these programs provided parents with individual psychological support, their main focus was on improving the development of the infant by giving parents practical guidance on how to interact with and care for their baby whilst the baby was still in the NICU (16-19). A more recent systematic review and meta-analysis (20) described the intervention components with the following three categories: (a) parent support (i.e., psychological counselling and social support), (b) parent education (i.e., information, demonstration and discussion, and active engagement with feedback from a professional), and (c) therapeutic child development support. They reported that eight out of eighteen studies had focused on parent support and 11 studies had reported some maternal outcomes, such as stress, anxiety, depression, self-efficacy, and sensitivity/responsiveness in interaction.

So far, only a few studies have focused specifically on maternal posttraumatic stress symptoms (see (21) for a review). One early intervention program aimed to provide parent support, parent-infant relationship support, and infant development support when the infant was aged 33 weeks, 42 weeks, and 4 months CA and reported improved maternal posttraumatic stress symptoms (22). A crisis intervention program during the hospitalization of the infant resulted in reduced maternal posttraumatic stress symptoms (23). An intervention based on the principles of cognitive-behavioral therapy (CBT) showed a reduction of acute stress disorder and depressive symptoms during the first four weeks following preterm birth (24). Two other brief CBT interventions delivered whilst the infant was still in hospital reduced depressive (25) and trauma symptoms (23). To our knowledge, some of these interventions included self-reflection components but none included writing components. Taken together, brief evidence-based early interventions to provide support to parents following hospital discharge are so far scarce.

Parents need an effective, theoretically based, easily accessible, psychological intervention that could be offered on a routine basis as part of the NICU program. It is important that this would be brief and could be carried out at home, given that parents are often preoccupied with their baby's health and the attendance of medical appointments. Furthermore, in order to be acceptable for non-native language speakers, an intervention needs to be found that will not depend on native language skills.

A promising intervention that has been offered to a range of populations (e.g. college students, individuals with cancer rheumatoid arthritis, asthma or other medical illnesses, patients with psychological problems or psychiatric diagnoses) experiencing stressful or traumatic events is the 'expressive writing paradigm' (26). This is based on the theory of inhibition that links confiding traumatic events to positive health outcomes. It is hypothesised that failing to share personal traumatic experiences is a type of inhibition. The effort of restricting communication requires physiological work, which may be linked to negative short- and long-term health outcomes (27). Indeed, evidence shows that posttraumatic stress symptoms lead to increased activity in endocrine and inflammatory pathways, thus negatively impacting on physical health (28). The central premise of the intervention therefore is that when people transform their feelings and thoughts about personally distressing experiences into language, their mental and physical health often improve (29). The process of writing about those experiences is assumed to foster temporal organisation, increased understanding, and the development of a coherent narrative of thoughts and feelings (30).

The standard expressive writing paradigm involves asking individuals to write about their deepest thoughts and feelings in relation to a distressing or traumatic event they encountered. Individuals usually write in a private space for approximately 15 minutes over three consecutive

days and no feedback on their writing is given. However, some studies have used variations of this standard paradigm, with changing of the instructions, the timing or the format (see (29) for more details). A range of outcomes has been evaluated in different studies, such as psychological health, physiological functioning, self-reported health, health behaviours, or general functioning outcomes (see (31) for more details).

Emotional support from personal networks has been identified as the most frequently used parental coping strategy in the NICU, which may help alleviate parental stress and depression as well as increase parental adjustment and mastery (32, 33). However, mothers have also reported social isolation because their family and friends were unable to understand what it was like to have a premature baby (34), which makes it less likely that they have the opportunity to disclose their experience. Given this, it might make sense to invite them to write about their deepest thoughts and feelings in relation to this experience as a means of alleviating their distress.

Several meta-analyses have demonstrated the effectiveness of this intervention in healthy, as well as in clinical populations (31, 35-37). A systematic review concluded that in healthy participants the expressive writing paradigm leads to positive outcomes with a weighted mean effect size of d = .47, which is similar to or larger than that produced by other psychological interventions (37). The highest effect sizes were for psychological and physiological outcomes, which were greater than those for health and general functioning outcomes. A meta-analysis of clinical populations also reported significantly improved health outcomes, but the effect was stronger for physical than for psychological health outcomes (36). However, studies on psychiatric populations usually did not exclude participants receiving psychotherapy or medication, thus introducing a potential bias (36). The overall consensus currently seems to be

that the expressive writing intervention is more effective for healthy but distressed individuals and physical illness populations than for psychiatric populations (29).

Given that most mothers following the birth of their premature baby report experiencing distress or some psychiatric symptoms but do not necessarily meet full diagnostic criteria for psychiatric illnesses (e.g. (38), it is reasonable to argue that the expressive writing intervention may well be of benefit to them. One study illustrated a stress-reducing effect of journal writing for mothers who documented feelings, thoughts, milestones and involvement in the care of their preterm baby (39). In another study (40), 38 mothers who had an infant hospitalized in an NICU in the previous 2 to 14 months were randomly allocated to either an intervention or control group. Mothers in the intervention group wrote a journal about their NICU experience for at least 30 minutes during four subsequent days; mothers in the control group did not write such a journal. Participants were given a series of nine questions to help them write about their most emotional and upsetting experiences in the NICU. Significant differences between the treatment and control groups at post test (one month after journal writing) with regards to general psychological distress and posttraumatic stress symptoms were found but no follow-up of these outcomes took place. However, so far, no study utilising the standard expressive writing paradigm in mothers of very preterm infants to decrease their depression as well as posttraumatic stress symptoms has been published.

This study aimed to evaluate the efficacy of, and satisfaction with an expressive writing intervention for mothers who recently had a preterm baby. For mothers in the intervention group it was hypothesised that (1) mental health symptoms (posttraumatic stress and depression) would decrease, that (2) health and mental health status would improve and use of healthcare services

decrease, and (3) that the intervention would be perceived as acceptable and helpful by participants.

Method

Participant consent and recruitment

The study took place in the NICU at the University Hospital Lausanne (Switzerland) where approximately 120 very preterm infants are born per year. Mothers who gave birth to a very preterm baby between January 2012 and September 2014 were given an invitation letter, a participant information sheet explaining the content of the study, and a consent form with an opt-in slip by a member of staff in the Unit. They then had the opportunity to ask questions about the study and to discuss any potential concerns they may have. Mothers interested in participating who sent back their opt-in slip and the signed consent form were then contacted by the first author to answer any remaining questions. They were told that they would be contacted again just before their baby reached the age of 3 months corrected age (CA, age since term). Mothers were eligible to participate if they had given birth to a very preterm infant (< 32 weeks of gestation or < 1500g birth weight), if their baby was still alive at the time of recruitment and the time of group allocation (3 months CA), and if they were able to complete questionnaires in French. Mothers were excluded if they did not speak French sufficiently to complete the questionnaires or if they were attending regular counselling or psychotherapy sessions at the time of recruitment or group allocation (3 months CA). The study was approved by the ethics committee of the Canton Vaud (study number: 14/12) and CONSORT guidelines were followed in the implementation and reporting of the trial (41).

Sample size was powered to detect a clinically meaningful reduction in posttraumatic stress symptoms (G*Power (42)). Based on a previous study (40) reporting an effect size of 0.766 in a similar population using journal writing, we calculated a recruitment target of 56 (28 per arm) with a power of 80% and an alpha of 0.05 using two-sided hypothesis testing. Given that we anticipated a drop-out of 15% between the recruitment (shortly after childbirth) and group allocation (3 months CA), we aimed to recruit a minimum of 66 mothers.

Procedure

Following recruitment whilst their baby was hospitalized in the NICU, mothers were contacted again once their baby was 3 months (CA) old and were randomly allocated (1:1, using computer-generated numbers) to either the intervention or a control group. The allocation was performed by using sealed envelopes that were prepared before the study started and opened by a staff member not involved in testing. Participants were asked to complete a series of questionnaires when their baby was aged 3 months CA (baseline, before group allocation and intervention), when their baby was aged 4 months CA (one month after group allocation and intervention), and when their baby was aged 6 months CA (2 months after the group allocation). The timing of the post-measure was chosen based on the conclusions of a meta-analysis to wait for at least one month before the post-measures are administered because of the potential short-term negative effects of disclosure of traumatic material (31). The intervention took place when the infant was aged 3 months (CA).

Mothers in the intervention group received a workbook with written instructions for the expressive writing intervention and were asked to post it once they had completed their third narrative (see below). A telephone call or a text message (according to participants' preference)

was sent to remind participants of the start date of the intervention and to remind them to complete the pre-measures before the start of the intervention.

Mothers in the control group received treatment as usual and were sent the same questionnaire pack to be completed at 3 months, 4 months and 6 months CA and received the same number of reminder phone calls or text messages as the intervention group.

Expressive writing intervention

Mothers were given written instructions for the expressive writing intervention based on the standard instructions by Pennebaker but specific reference to the experience of prematurity was made (29). The instructions were as follows: *'For the next three days, we would like you to write about your very deepest thoughts and feelings about the most traumatic experience relating to the birth and hospitalisation of your premature baby. In your writing, we would really like you to let go and explore your very deepest emotions and thoughts in relation to this experience. You might link this trauma to your childhood, your relationship with others, including parents, lovers, friends, or relatives. You may also link this event to your past, your present, your future, or to who you have been, who you would like to be, or who you are now. You may write about the same general issues or aspects of your experience on all days of writing or on different aspects of your experience each day. All of your writing will be completely confidential. Don't worry about your spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your time is up.'*

Participants were asked to write for 15 minutes during 3 consecutive days and to send their written narratives (in a workbook provided) immediately after they had completed their third narrative account in a pre-paid envelope to the first author. They were assured that their

written narratives would only be used as a check that they had adhered to the protocol but would not be read in detail by the research team. Participants were also encouraged to write in a private space, as this has been shown to be a critical component of the expressive writing intervention (43). Finally, they were told that they could write in their own maternal language if they wished.

Measures

Primary outcomes: Maternal mental health symptoms

Perinatal PTSD Questionnaire (PPQ (44)*).* This is a 14-item self-report questionnaire that examines maternal perinatal posttraumatic stress symptoms specific to childbirth. The mothers answers 'yes' or 'no' to each of the items that relate to the three symptom clusters of PTSD: intrusive memories, avoidance, and arousal symptoms. The items are based on the DSM-IV-R diagnostic criteria for PTSD (45). Scores range from 0 to 14; but a score of greater than 6 would qualify for a diagnosis of PTSD if questions were posed in a diagnostic interview (46)). Good psychometric properties of the PPQ in a French sample have been reported, with sensitivity coefficient of 89% and a specificity coefficient of 87%. (47). The Cronbach alpha in this study was 0.765.

Edinburgh Postnatal Depression Scale (EPDS (48)). This is a 10-item self-report scale was specifically designed to screen for postnatal depression and has been extensively used as a screening instrument in research and in clinical practice. Each item is scored on a 4-point scale, the minimum and maximum total scores being 0 and 30, respectively. The scale rates the intensity of depressive symptoms present within the previous 7 days. The EPDS has been validated in a French sample and good psychometric properties have been reported (sensitivity: 0.80; specificity: 0.92) (49). The Cronbach alpha in this study was 0.765. The original authors

suggested a cut-off score of 12.5 as an indication of clinically significant depression but others reported that a score of 10 was the most useful cut-off in a French sample of postnatal women (49).

Secondary outcome measures: Mental and physical health status and healthcare utilisation

SF-36 Health Survey (50). This 36-item self-report questionnaire is a generic measure of health status independent of which diseases or illnesses affect the population under study. A summary score of mental health and physical health was obtained, with higher values indicating better mental or physical health. The French translation has been validated and reported (51). The Cronbach alpha in this study was 0.652.

Use of healthcare services. Two questions assessed the number of medical and non-medical specialists seen by the mother in the last month.

Satisfaction with the intervention

Satisfaction with the intervention. At the 6-month follow-up point, participants in the intervention group were asked to rate how acceptable and helpful they found the intervention on a 5-point Likert Scale. They were also asked whether they would recommend the intervention to a friend or relative. Finally, participants were asked to indicate whether the intervention had been offered at a time that was adequate for them (3 months CA). They were given three options of which they were asked to choose one ("*too early*", "*timing adequate*", or "*too late*"). They were also given the opportunity to write a comment.

Demographic and perinatal characteristics

Two scores of disease severity were used, the *CRIB II score*, which assesses risk of death at birth using gestational age, birth weight, temperature and blood acid values (52), and the *Perinatal Risk Inventory* (PERI (53), which is an older 18-item inventory used to describe the severity of perinatal problems on the basis of perinatal parameters, such as the APGAR index, gestational age, weight, head growth, EEG, brain ultrasonography, and ventilation, reflecting the whole of the neonatal period. Its use was validated in a French-speaking population (13).

Parental socioeconomic status was determined using the *Largo score*, which entails a 6 point scale for each parent, with recorded mother's education (1 = university and 6= special or no schooling) and father's occupation (1=leading position and 6= unskilled labor) (54). The d*emographic questionnaire* contained brief questions about the mother (e.g. age, migrant status) and about the baby (e.g. gestational age, birth weight).

Analysis

Intention-to-treat analyses were carried out using SPSS Version 20 (SPSS, Inc., Chicago, IL, USA). Analysis of variance (ANOVA) and Mann-Whitney tests were carried out to establish equivalence of the two groups on demographic, medical variables, and outcome measures at baseline. For the main analysis, a Mixed Model Analysis (MMA) for each outcome measure over the three time points (3, 4 and 6 months CA) was carried out, whilst checking for standardised residuals. Following this, post-hoc explorative between- and within-group differences for each separate time point were calculated using independent and paired t-tests for each continuous outcome measure and Mann-Whitney and Wilcoxon tests for between- and within group

comparisons regarding the number of medical and non-medical specialists seen by the mother. A correction for multiple testing using Bonferroni correction was carried out. Effect sizes (Cohen's *d*) were calculated as an index of the standardised difference of means between groups at post-test (4 months CA) and follow-up (6 months CA). In order to demonstrate the *clinical significance* of the treatment effect, both groups were compared regarding the proportions of those who experienced clinically significant depressive (EPDS > 10) or PTSD (PPQ > 6) symptoms at 4 or 6 months CA using Chi-Square tests. All data are shown as *p*-values (two-tailed), with significance assumed at $p < 0.05$, but trends ($p < 0.10$) are also reported.

Results

Participant flow

Of the 105 mothers who were screened, 94 (89.5%) were eligible and consented to participate in the study whilst their baby was still hospitalised. Of those, 67 (71.2%) completed the first measures at 3 months CA, of which 54 (80.6%) completed all three time points (see Figure 1). Reasons for early termination are described in Figure 1. No significant differences between completers and non-completers on baseline demographic and clinical characteristics were found (p = ns). Missing data was not replaced.

Baseline characteristics

Demographic information is summarised in Table 1. No statistically significant differences between the intervention and control group with regards to demographic variables of the mother or baby or medical variables of the baby were found (all p = ns). No baseline

differences between the two groups with regards to maternal mental or physical health or healthcare utilization were found (all p = ns; Table 2), thus indicating that intervention and control group were equivalent at pre-test.

Adherence indicators

Adherence to the expressive writing paradigm was assessed by checking that each returned journal contained three separate entries. During a subsequent phone call at 6 months CA it was established whether participants in the intervention group had understood and followed the instructions. Furthermore, they were asked if the content of the journal related to their NICU experience. All participants indicated that they had complied with the instructions.

Mental health symptoms: Posttraumatic stress and depression

Table 2 represents the results of the between-group differences at 4 and 6 months CA, including effect sizes (Cohen's *d*). Table 3 shows the within-group differences between 3 and 4 months CA (pre-test and post-test) and 3 and 6 months CA (pre-test and follow-up). For each outcome variable, we first report the results of the MMA before presenting the between-group and then the within-group differences. Furthermore, results are depicted in Figure 2.

Posttraumatic stress: For the PPQ total, a significant time effect ($F(1) = 6.508$; $p = 0.012$) but no group ($F(1) = 0.488$; $p = 0.486$) or group x time ($F(1) = 2.360$; $p = 0.128$) effects were computed. Using explorative post-hoc analyses, we found no significant group differences at 4 or 6 months. There was a significant decrease in PTSD symptoms between 3 and 4 months in the intervention but not control group (intervention: $p = 0.013$ vs. control: p = ns). Between 3

and 6 months, we found a significant decrease in the intervention group ($p = 0.029$) and a trend towards a decrease of PTSD in the control group ($p = 0.094$).

Depression: For the EPDS total, a significant time effect (F(1) = 7.856, p = 0.006) and a borderline group x time effect ($F(1) = 3.749$, $p = 0.056$) but no group effect ($F(1) = 2.032$; $p = 0.156$) were found. Explorative post-hoc between-group analyses of the EPDS total score showed a significant difference at 6 ($p = 0.044$; $d = 0.67$) but not 4 months (p = ns). There was no significant change between 3 and 4 months in either group (p = ns) with regards to the total score of the EPDS. However, a significant decrease of depressive symptoms between 3 and 6 months in the intervention but not in the control group (intervention: $p = 0.001$ vs. control: p = ns) was found.

Clinical significance

Between-group comparisons of participants who reported clinically significant depression (EPDS > 10) found no significant difference at 3 months (intervention group: 6 (17.6%) vs. control group: 6 (17.1%), 4 months (intervention group: 4 (11.8%) vs control group: 7 (17.9%)) or 6 months (intervention group: 1 (2.9%) vs. control group: 2 (5.1%)) CA (all p = ns). Comparing proportions of participants of both groups who were above the clinical cut-off of posttraumatic stress (PPQ > 6) resulted in no significant difference at 3 months (intervention group: 8 (23.5%) vs. control group: 9 (25.7%) or 4 months (intervention group: 2 (5.9%) vs. control group : 6 (15.4) ; both p = ns). However, a trend towards a difference at 6 months CA was found (F (1) = 3.25 ; $p = 0.071$, with intervention group : 3 (8.8%) vs. control group : 7 (17.9%)).

Mental and physical health status and healthcare utilization

Mental health status: For the SF-36 mental health composite score, a significant time effect ($F(1) = 2.797$; $p < 0.001$) and trends towards a group effect ($F(1) = 2.793$; $p = 0.097$) and group x time effect ($F(1) = 2.797$; $p = 0.098$) were found. We found a significant difference between the two groups at 6 ($p = 0.002$) but not 4 months (p = ns), with the intervention group reporting a higher mental health score than the control group. There was no significant change in mental health symptoms in either group between 3 and 4 months (p = ns). However, between 3 and 6 months, a significant decrease was observed for both groups: intervention ($p < 0.001$); control ($p = 0.005$).

Physical health status: For the SF-36 physical health composite score, a significant time effect ($F(1) = 12.988$; $p < 0.001$) but no group ($F(1) = 1.191$; $p = 0.277$) or group x time effects ($F(1) = 1.391$; $p = 0.241$) were computed. Explorative post-hoc analyses found no significant group differences at either 4 or 6 months (p = ns). Regarding within-group changes, no significant results were found for either group (p = ns) between 3 and 4 months. However, between 3 and 6 months, there was a significant improvement in physical health status in the intervention group ($p = 0.049$) and in the control group ($p = 0.002$).

Healthcare utilization: No significant time x group effect was found using the MMA for the number of medical or non-medical specialists seen by the mother (p = ns). Significant group differences were computed for number of medical specialists seen by the mother at 6 months ($p = 0.026$), which was lower in the intervention group. Regarding within-group changes, the number of medical specialists ($p = 0.003$) as well as non-medical specialists ($p = 0.007$) seen by the mother between 3 and 4 months in the intervention group decreased significantly. In the control group, we found a trend towards a decrease of the number of medical ($p = 0.058$) and a

significant decrease of the number of non-medical specialists ($p = 0.005$) seen by the mother. Between 3 and 6 months, the number of medical ($p = 0.005$) and non-medical ($p = 0.033$) specialists seen by the mother significantly decreased in the intervention group but not in the control group (p = ns).

Satisfaction with the intervention

Nineteen (55.8%) mothers found the intervention «rather» to «very useful» (Likert Scale 3-5), 24 (70.5%) were «rather» to «very satisfied» with it (Likert Scale 3-5), and 24 (70.5%) would recommend the intervention to a friend or relative. Regarding the timing of the intervention, the majority (16, 76.2%) thought that the time of intervention was «adequate», whereas 2 (9.5%) found it «too early» and 3 (14.3%) «too late». No participant made additional comments regarding the timing of the intervention.

Discussion

This randomized controlled trial aimed to evaluate the efficacy of, and satisfaction with an expressive writing intervention for mothers who recently had a very preterm baby. Despite the lack of between-group differences, a significant reduction in PTSD symptoms that was maintained 3 months after the intervention was shown. Furthermore, the intervention group showed a significant reduction in depressive symptoms between baseline and the 3-month follow-up, as well as a significant group difference at 3-month follow-up, with the intervention group reporting less depressive symptoms than the control group. Comparing proportions of participants of both groups who were above the clinical cut-off of PTSD revealed no significant differences, although there were more than twice as many PTSD cases in the control group at the

3-month follow-up. The majority of participants reported finding the intervention useful and felt satisfied with it. Taken together, the results of this study give some indication that expressive writing may be of benefit for mothers who gave birth to a very preterm infant and adds to the existing literature on the possible benefits of disclosure (26).

This reduction of maternal posttraumatic stress is in line with a previous study asking mothers to write a journal about their NICU experience (40), although that study had no follow-up. It has important clinical implications, as maternal PTSD is not only severely distressing for the mother but has also been shown to negatively impact on the mother-infant interactions and the attachment relationship (11-13). To our knowledge, no previous study has investigated the efficacy of an expressive writing paradigm to reduce maternal depressive symptoms following preterm birth. Our results therefore need to be replicated but are encouraging, as the detrimental effects of postnatal depression not only for the mother and her partner but also for the infant development are well established (55). Between baseline and follow-up, a significant decrease of the mental health score was observed in both groups. This might be linked to the fact that after the discharge from the hospital, caring for their baby at home might have put a significant burden on mothers. However, at 6 months, the intervention group had a significantly higher mental health score than the control group. Comparing our results with studies of other populations, in a recent cancer sample, no significant improvement in depressive symptoms or mental health status was reported (56).

The intervention had no specific impact on physical health status, as this improved in both groups. Our results are in contrast to other studies that reported a decrease of physical health problems, such as in cancer patients (56). However, given that our participants were not selected because of specific health problems, there might have been a ceiling effect.

Nevertheless, compared with the control group, mothers in the intervention group reported a decrease in the number of medical and non medical specialists they had seen at follow-up. This is an encouraging finding, as it implies decreased healthcare costs.

Our results showed that more than half of the mothers who had carried out the writing intervention had found it useful, were satisfied with it, and found the timing adequate. This shows that mothers thought it was worth spending the time to do the expressive writing intervention despite the fact that they tend to be preoccupied with their baby's health and the attendance of medical appointments.

Our study has several limitations. Firstly, all outcomes were assessed with the help of questionnaires, which represents a subjective assessment linked to self-reflective capacities. The Cronbach alpha of the SF-36 was marginal, and results related to this questionnaire therefore need to be treated with caution. Secondly, the diagnosis of PTSD was made based on a questionnaire rather than a clinical interview. However, previous research established that a score of greater than 6 would qualify for a diagnosis of PTSD if questions were posed in a diagnostic interview (46). Furthermore, we gave participants the option to write in their own native language, which means that in those cases we were not able to check if the participant had indeed written about her experience of the birth and hospitalization of her preterm infant. Finally, the control group had treatment as usual and time was not controlled for. Therefore, any perceived effectiveness of this intervention could be attributed to the time spent engaging in a specific activity and it is not necessarily related to this particular writing intervention. The use of another writing condition as active control and a longer follow-up period would be recommended for future studies.

Summary

This RCT found that expressive writing is a brief, easily accessible, and cost-effective therapeutic approach that reduces maternal posttraumatic and depressive symptoms and improves mental health status following the birth of a very preterm baby, which is maintained at follow-up. Mothers were satisfied with this intervention and found the timing appropriate. Future research should identify individual predictors of treatment outcome in order to individually tailor the expressive writing intervention.

Acknowledgements

Antje Horsch was supported by the Faculty of Biology and Medicine, University of Lausanne. We would like to thank all mothers who participated and Mehdi Mohammad Gholamrezaee for his statistical advice. Thank you to Karine Perretten, Laetizia von Laer Tschudin, Manon Macherel, Maria Campos, and Anaïs Torregrossa for their assistance.

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Table 1: Demographic medical data for the mothers and their preterm infants

Baseline (3 mois CA)	Intervention group *N* = 33	Control group *N* = 32	*p*
Mother			
Age (M, SD)	31.5 (5.8)	31.9 (6.4)	ns
Migrant (%)	11 (33.3)	6 (18.8)	ns
Marital status (%)			ns
Married/together	21 (63.3)	19 (48.7)	
Single	9 (27.3)	11 (28.2)	
Separated/Divorced	1 (3.0)	1 (3.0)	
Other	2 (6.0)	2 (6.0)	
Psychiatric history (%)	11 (34.4)	10 (31.3)	ns
Largo score (M, SD)	2.6 (1.2)	2.8 (1.0)	ns
Infant			
Gender (female, %)	18 (54.5)	16 (50.0)	ns
Gestational age (weeks, days) (M,	29.6 (2.4)	29.3 (2.7)	ns
SD)	1159.2 (321.9)	1059.3 (250.2)	ns
Birth weight, g (M, SD)	62.0 (34.9)	67.3 (44.3)	ns
Hospitalisation, days (M, SD)	6.7 (6.0)	8.4 (7.7)	ns
Crib II score (M, SD)	7.2 (4.6)	6.6 (4.6)	ns
PERI score (M, SD)			

Table 2: Between-group differences at 3 (baseline), 4 (post-test), and 6 months (follow-up) corrected age (CA)

Measures	Group	3 months CA		4 months CA			6 months CA		
		M (SD) or *n (%)*	*t or U*	*M (SD)* or *n (%)*	*t or U*	*d*	*M (SD)* or *n (%)*	*t or U*	*d*
Posttraumatic stress									
PPQ	EWG	4.09 (2.9)	-0.074	2.60 (2.5)	-1.373	0.37	2.78 (2.7)	1.379	0.42
	CG	4.14 (3.2)		3.64 (3.1)			4.05 (3.3)		
Depression									
EPDS	EWG	7.20 (3.8)	0.401	6.24 (3.5)	-0.824	0.22	4.46 (3.8)	2.079	0.67
	CG	6.60 (5.1)		7.09 (4.2)			6.88 (3.4)	*	
Mental health									
SF-36 mental health	EWG	41.50 (8.6)	-0.725	41.49 (6.4)	0.222	0.06	36.81 (2.9)	3.261 **	1.20
	CG	43.3 (10.8)					31.07 (6.1)		

				41.09					
				(6.2)					
Physical health									
SF-36 physical	EWG	51.57	0.711	51.73	-0.427	0.12	54.13 (6.8)	-0.668	0.21
health		(5.7)		(6.4)					
	CG	50.47		52.57			55.7 (8.3)		
		(6.3)		(7.4)					
Healthcare									
utilization									
Number of									
medical									
specialists seen									
0	EWG	18 (52.9)	479.0	25 (73.5)	299.5	n/a	25 (73.5)	184.5	n/a
1		11 (32.4)		2 (5.9)			2 (5.9)	*	
2		2 (5.9)		1 (2.9)			-		
3		-		-			1 (2.9)		

4		1 (2.9)		-			-		
0	CG	24 (61.5)		19 (48.7)			11 (28.2)		
1		6 (15.4)		2 (5.1)			6 (15.4)		
2		2 (5.1)		2 (5.1)			2 (5.1)		
3		2 (5.1)		-			-		
Number of non-medical specialists seen									
0	EWG	11 (32.4)	497.0	20 (58.8)	397.0*	n/a	18 (52.9)	253.5	n/a
1		16 (47.1)		7 (20.6)			8 (23.5)		
2		4 (11.8)		2 (5.9)			-		
3		2 (5.9)		-			1 (2.9)		
0	CG	18 (46.2)		24 (61.5)			13 (33.3)		n/a
1		14 (35.9)		6 (15.4)			5 (12.8)		
2		-		1 (2.6)			-		
3		1 (2.6)		-			1 (2.6)		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $^{+}p < 0.090$, EWG = expressive writing group; CG = control group

Table 3: Within-group differences between 3 and 4 months and 3 and 6 months corrected age (CA) in the intervention and control group

Outcome variables	Group	3-4 months CA		3-6 months CA	
		t or Z	*p*	*t or Z*	*p*
Posttraumatic stress					
PPQ	EWG	2.671	0.013	2.3	0.029
	CG	1.021	0.316	1.775	0.094
Depression					
EPDS	EWG	0.524	0.605	3.904	0.001
	CG	0.055	0.957	0.773	0.452
Mental health					
SF-36 mental health	EWG	0.81	0.428	5.158	< 0.001
	CG	1.050	0.306	6.279	< 0.001
Physical health					
SF-36 physical health	EWG	-0.15	0.882	-0.150	0.049
	CG	-1.399	0.175	-3.733	0.002
Healthcare utilization					
Number of medical	EWG	-2.967	0.003	-2.814	0.005
specialists seen	CG	-1.897	0.058	-0.289	0.773
Number of non-medical	EWG	-2.693	0.007	-2.134	0.033
specialists seen	CG	-2.814	0.005	-0.749	0.454

EWG = expressive writing group; CG = control group

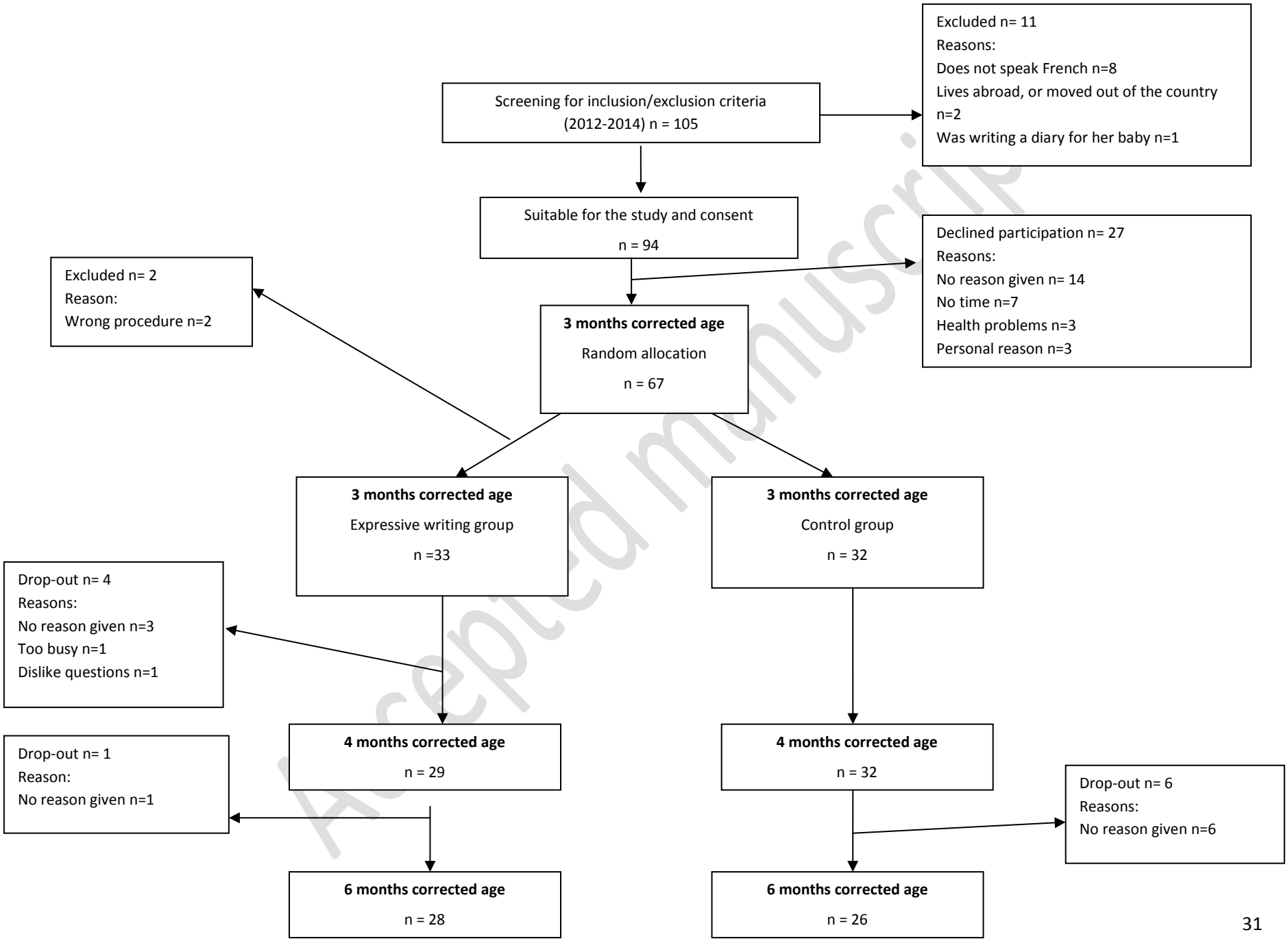

Figure 1 : Flow chart of participant recruitment

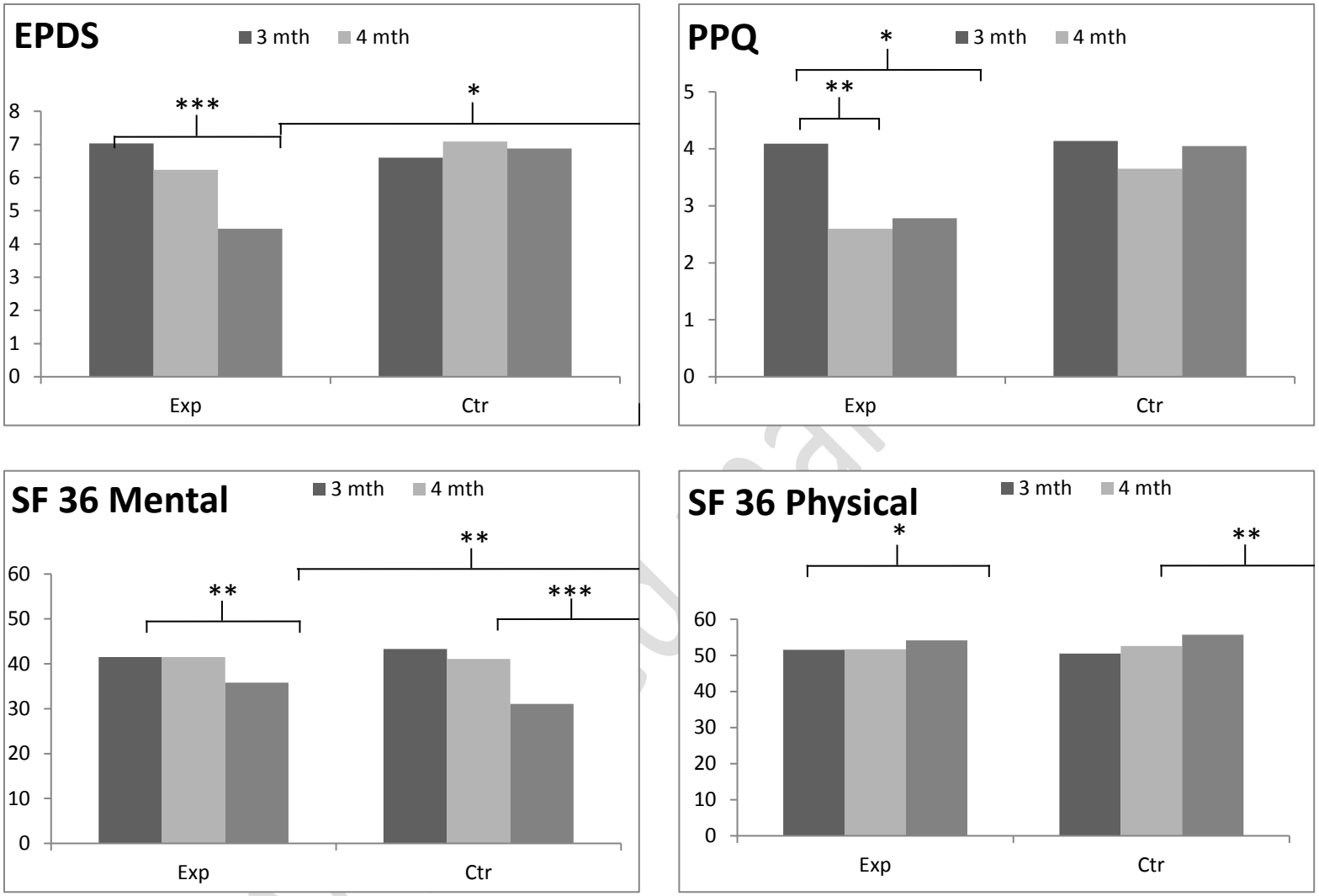

Figure 2: Group comparisons

Exp = Experimental group; Ctr = Control group; PPQ = Perinatal Posttraumatic Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; SF36 mental/physical = SF36 mental/physical health score