

1 Effective support following recurrent pregnancy loss: a randomised
2 controlled feasibility and acceptability study

3 Authors

4 **Sarah Bailey**^{a,b} – sarahl.bailey@soton.ac.uk

5 **Jacky Boivin**^c – boivin@cardiff.ac.uk

6 **Ying Cheong**^{d,e} – y.cheong@soton.ac.uk

7 **Christopher Bailey**^{b,1} drcbailey@btinternet.com

8 **Ellen Kitson-Reynolds**^b – e.l.kitson-reynolds@soton.ac.uk

9 **Nick Macklon**^{d,e,2} – nick.macklon@londonwomensclinic.com

10

11 ^a University Hospitals Southampton NHS Foundation Trust, Princess Anne Hospital, Coxford Road,
12 Southampton, SO16 5YA, UK

13 ^b Faculty of Health Sciences, University of Southampton, University Road, Southampton, SO17 1BJ,
14 UK,

15 ^c School of Psychology, Cardiff University, 70 Park Place, Cardiff, CF10 3AT, Wales, UK

16 ^d Faculty of Medicine, University of Southampton, University Road, Southampton, SO17 1BJ, UK

17 ^e Complete Fertility Centre, Princess Anne Hospital, Coxford Road, Southampton, SO16 5YA, UK

18 ¹Present address – Faculty of Health Sciences, University of Nottingham, Nottingham, NG7 2UK,
19 UK

20 ²Present address – London Women’s Clinic, 113-115 Harley Street, London W1G 6AP, UK /
21 Zealand University Hospital Copenhagen, Lykkebaekvej 1, 4600 Køge, Denmark

22

23 Corresponding author

24 Sarah Bailey – sarahl.bailey@soton.ac.uk

25

26

27 Abstract

28 Research Question

29 Is it feasible to perform a future definitive trial to determine the effectiveness of the Positive
30 Reappraisal Coping Intervention (PRCI) in improving the psychological well-being of women with
31 recurrent pregnancy loss (RPL) during the early stages of a new pregnancy?
32

33 Design

34 This mixed method study aimed to establish the feasibility of conducting a multicentre
35 randomised controlled trial (RCT) to definitively test the effects of the PRCI on the psychological
36 well-being of women with RPL. Participants (n=75) were recruited to the study and at the point of
37 a positive pregnancy test, 47 were randomised into two study groups. The intervention group
38 received the PRCI and weekly questionnaire assessment (Hospital Anxiety Depression Scale and
39 Weekly Record Keeping Form (WRK)) to monitor psychological well-being, the control group
40 received the same questionnaires. Nested within the RCT was a qualitative process evaluation

1 (QPE) exploring participants' subjective experience of study methods and the intervention. The
2 study was conducted over a two-year period between 2014 and 2016

3

4 Results

5 This study successfully gathered knowledge about the feasibility aspects of conducting a future
6 multi-centre definitive study to determine the effects of the PRCI on the psychological well-being
7 of women with RPL. Participants were receptive to its use and the intervention appeared to
8 convey benefits with no apparent downside.

9 Conclusions

10 The study concluded that a definitive RCT of the PRCI is possible and that the model of care
11 already has the potential to be made more widely available as a safe, low cost, convenient and
12 easily deliverable intervention to provide much needed support to a vulnerable patient
13 population.

14 Keywords

15 Recurrent pregnancy loss, Anxiety, Randomised controlled trial, Feasibility

16

17

18

19

20 Introduction

21

22 Recurrent pregnancy loss (RPL) is currently defined as the loss of three or more pregnancies
23 within the UK (RCOG 2011). However, other countries have adopted different definitions and the
24 recently published European Society for Human Reproduction and Embryology (ESHRE) guideline
25 suggests that RPL should be considered after the loss of two or more pregnancies (ESHRE 2017).
26 The early stages of a new pregnancy, when confirmation by ultrasound scan of an ongoing and
27 viable pregnancy is awaited, represent a particularly challenging period for women affected by
28 this condition. Previous studies have indicated that this waiting period is associated with high
29 levels of distress due to the anxiety of possibly experiencing a further miscarriage (Ockhuijsen et
30 al. 2013a; Ockhuijsen et al. 2014c; Ockhuijsen et al. 2015). However, limited support and
31 counselling is available during this difficult period and many are left to manage these distressing
32 emotions without coping support. While some women seek frequent confirmation of viability by
33 ultrasound scans, this approach is not feasible in most clinical settings, and appears to be of
34 limited efficacy in reducing anxiety (Bailey et al. 2019). An alternative approach may be to provide
35 the woman with tools that can help her cope with this period.

36 The Positive Reappraisal Coping Intervention (PRCI) is a novel self-administered supportive
37 technique, based on the principles of positive reappraisal. It has been shown to be effective at
38 promoting positive feelings and sustaining the ability to cope in a group of patients who
39 experience a similar waiting period, namely fertility patients, awaiting the outcome of in vitro

1 fertilisation (IVF) treatment (Lancastle and Boivin 2008; Ockhuijsen et al. 2014a, b). It comprises
2 an explanatory leaflet describing positive reappraisal coping and its potential benefits and 10
3 positive reappraisal statements that users read at least twice a day to stimulate this form of
4 coping (Figure 1). For women who have experienced RPL the waiting period in the early stages of
5 a new pregnancy shares many characteristics (unpredictable, uncontrollable, immense personal
6 significance) with the waiting period fertility patients experience after IVF, suggesting that the
7 PRCI may also provide a potentially valuable supportive intervention for this patient group.

8 The essence of positive reappraisal coping is that it 'sustains the coping process through
9 increasing positive mood, via cognitive processing' (Lancastle and Boivin 2008). In view of the
10 overwhelming anxiety and despair women with RPL can experience during the early stages of a
11 new pregnancy, they might find this concept difficult to understand and be sceptical about
12 whether the PRCI, a self-managed intervention, is able to make them feel more positive.
13 Therefore, to assess the potential value of the PRCI as a means of improving psychological well-
14 being, a study was designed to assess the acceptability of the intervention and the feasibility of
15 conducting a future large scale randomised controlled trial (RCT).

16 Effective feasibility or piloting work can anticipate difficulties with acceptability, compliance,
17 delivery of the intervention and recruitment and retention (Craig et al. 2013). Correspondingly, a
18 recent review concluded that the feasibility phase prior to an RCT helps to maximise the
19 likelihood of researchers evaluating the optimum intervention utilising the most appropriate and
20 proficient recruitment processes and trial design (O'Cathain et al. 2015). Much of the literature
21 that examines the theory around such studies, uses the terms feasibility and pilot studies
22 interchangeably and the language used to describe the preliminary stages of a large-scale
23 definitive study remains inconsistent. However, the significant factor that connects the
24 synonymous use of the terms 'feasibility' and 'pilot' study appears to be that both types of study
25 address the uncertainties of study design and lay the foundation for a future definitive RCT. A
26 fundamental aim of a feasibility study is to determine whether it is possible to successfully deliver
27 a study in the proposed context (Bowen et al. 2009). Feasibility studies, therefore, play an
28 important role in establishing appropriate study design to support successful study completion
29 and may provide an indication of likely efficacy of the intervention.

30 The primary objective of this study was to establish the feasibility and acceptability of performing
31 future exploratory and definitive trials to determine the effectiveness of the PRCI in improving the
32 psychological well-being of women who have experienced RPL during the initial waiting period (1-
33 12 weeks) of a subsequent pregnancy.

1 **Materials and Methods**

2 Study Design

3 Between February 2014 and March 2016, women with a history of RPL were recruited to
4 participate in this two-centred mixed method study incorporating an RCT and qualitative analysis
5 in a triangulation design. This approach was selected as it was considered to provide a broader
6 understanding (Cresswell 2015) of both the acceptability and the possible effect of the PRCI in this
7 clinical context.

8 In order to support the study design and increase the validity of findings (Lancaster et al. 2004),
9 the research questions to be addressed were articulated as follows:

- 10 • How feasible and acceptable were the proposed methods of recruitment, randomisation,
11 intervention and follow up?
- 12 • Was it possible to achieve acceptable recruitment and retention rates within each centre,
13 taking into account defined inclusion/exclusion criteria?
- 14 • Were the proposed study questionnaires and data collection methods appropriate?
- 15 • Were the study time points for questionnaires and use of PRCI appropriate?
- 16 • Was there any preliminary indication of an effect of the PRCI?

17 A second component of the study was a qualitative process evaluation (QPE) that aimed to
18 explore in depth women's subjective experience of the study intervention and research methods
19 to provide information to refine any aspects of the research design (if appropriate). The study
20 protocol and methodology employed in this qualitative element has been previously published
21 elsewhere (Bailey et al. 2015)

22 Prior to commencing recruitment to this study, full ethical approval was given from the NHS
23 Health Research Authority on 21st October 2013 (IRAS project ID 129379). This study was
24 registered with the ISRCTN (trial registration number ISRCTN43571276).

25 The Intervention

26

27 The PRCI (Figure 1) is a theoretically derived and short coping intervention with proven reliability
28 and validity, based on the concept of positive reappraisal (Lancaster and Boivin 2008; Ockhuijsen
29 et al. 2013b; Ockhuijsen 2014; Domar et al. 2015). It aims to promote positive re-evaluation of a
30 challenging situation and consists of a small card containing 10 positive reappraisal statements
31 that encourage users to redefine the waiting period more positively. An accompanying leaflet
32 provides concise guidance on the use of the PRCI. Specifically, participants are encouraged to read
33 the card at least twice a day, in the morning and the evening and any other time they feel the
34 need. The guidance also advises that thinking about the positive aspects of a difficult situation
35 does not mean pretending that 'everything is wonderful' when this is not the case, or ignoring the
36 negative aspects of the situation, but taking account of positive aspects alongside the negative.

1 Study Population

2

3 The study population consisted of patients attending the Recurrent Miscarriage Clinic (RMC) and
4 the Early Pregnancy Unit (EPU) at two tertiary referral hospitals in the United Kingdom. Site A
5 operated a weekly RMC through which potential participants were identified and In Site B, access
6 to potential participants was achieved through the site's EPU. Review of referral rates prior to
7 recruitment suggested that approximately five eligible women would be seen in each centre per
8 month.

9 Inclusion / Exclusion Criteria

10

11 All women who attended the RMC in Site A and the EPU in Site B who had experienced three or
12 more miscarriages were eligible to participate. Exclusion criteria included if the woman was
13 unable to speak English well enough to understand the study materials, required fertility
14 treatment to achieve a pregnancy, was less than 18 years of age or unable to provide written
15 consent to take part in the study.

16 Study Sample

17

18 The PRCI has only been previously applied in the context of recurrent miscarriage in one study
19 (Ockhuijsen et al. 2015). This did not yield effect size, therefore, no clinical data was available on
20 which to base a power calculation for the current study. Indeed one of the aims of the present
21 feasibility study was to generate data that could inform a power calculation. Therefore, more
22 pragmatic considerations were used to determine a sample capable, for example, of showing
23 likely rate of referral of participants and feasibility of recruiting adequate numbers in a future
24 definitive trial. It was estimated that the two study sites would yield a total of six patients a
25 month (three from each centre) over a recruitment period of one year. The aim was to randomise
26 50 participants within this time.

27 For entry in to the QPE, participants were selected purposively from those who had previously
28 taken part in the RCT component of the study. Characteristics considered in the purposive
29 sampling method were intended to produce a heterogeneous sample, and therefore included
30 previous study group (intervention or control), ongoing pregnancy or miscarriage, ethnicity of
31 participant, age and number of previous live births. Fourteen participants were recruited to the
32 QPE at which point data saturation was achieved.

33 Recruitment and Randomisation

34

35 Eligible participants were given a Patient Information Sheet (PIS) containing study information, by
36 their clinical care team, when they attended the RMC or the EPU. The information was given once

1 they had completed their consultation. If patients were interested in finding out more about the
2 study, a meeting was arranged for detailed discussion with the researcher. Although potential
3 participants were free to take as much time as they wished to consider their participation in the
4 study, they were asked to consent to participation prior to becoming pregnant.

5 After providing consent the research participants were asked to notify the researcher of a positive
6 pregnancy test in order to enable randomisation, the aim being to achieve randomisation on the
7 same day as the positive pregnancy test or as soon as possible after this.

8 Randomisation into the two study groups (intervention and control) was carried out using an
9 independent computerised randomisation system with a randomly sized block design with block
10 sizes of 2, 4 and 6. The study population was stratified for those women receiving concurrent
11 medical treatment for RPL, those with underlying medical conditions that were causative of RPL
12 and number of previous miscarriages. The PRCI group were asked to use the intervention and
13 received a weekly questionnaire assessment from the date of a positive pregnancy test until
14 twelve weeks of pregnancy. The control group received the same weekly questionnaire
15 assessment from the date of a positive pregnancy test until 12 weeks of pregnancy, but not the
16 PRCI. All study materials including the study questionnaires and the PRCI were posted to the
17 participant at randomisation. If a participant experienced a further miscarriage during the study
18 period, they were asked to notify the researcher and were advised to discontinue completing
19 study questionnaires after their miscarriage. Prior questionnaire data from women who
20 experienced miscarriage before twelve weeks of pregnancy was included in the data analysis as
21 for those whose pregnancies continued.

22 Participants became eligible to take part in the QPE if they reached twelve weeks of pregnancy,
23 had used the PRCI and completed the weekly questionnaire assessment, or in the case of the
24 control group, if they had completed weekly questionnaire assessments. If a participant
25 experienced a further miscarriage, they were still approached and invited to take part in an
26 interview. In all cases, the participant contacted the researcher directly to inform them of their
27 miscarriage and it was at this point they were invited to participate in the QPE.

28 Participants indicated on the consent form of the RCT feasibility component of this study whether
29 they would be willing to be invited to take part in the qualitative interviews. Potential participants
30 for the qualitative interview were then selected purposively from the cohort of patients who
31 indicated a willingness to participate. The aim of the purposive sampling was to ensure that
32 perspectives were collected from as diverse a group as possible.

33 Data Collection

34

35 Pre intervention demographic questionnaire

36

1 This questionnaire was specifically designed for use in this study to capture relevant baseline
2 demographic information including age, level of education, medical and psychological history (to
3 identify any co-morbidities associated with RPL), gynaecological and reproductive history (fertility
4 history, dates and number of live births and miscarriages) and the time period the woman had
5 been trying to achieve a successful pregnancy.

6 Outcome Measures

7

8 To assess psychological well-being in women in each study group, two validated outcome
9 measure questionnaires, the Hospital Anxiety Depression Scale (HADS) (Zigmond and Snaith 1983)
10 and the Daily Record Keeping Form (Boivin and Takefman 1995) were used at specific time points.
11 Time points commenced on the day of a positive pregnancy test (or as soon as possible
12 thereafter) and then at weekly intervals until the woman either reported a further miscarriage or
13 reached 12 weeks gestation when ongoing viability is associated with a greater than 95% chance
14 (Tong et al. 2008) of reaching live birth.

15 Hospital Anxiety Depression Scale

16

17 The HADS and associated questionnaire has been shown to be a valid measure of the severity of
18 anxiety and depression and of changes in a patient's emotional state (Zigmond and Snaith 1983).
19 The questionnaire consists of 14 items (seven questions for anxiety and seven for depression)
20 which are rated on a four-point Likert scale. The anxiety and depression scores are interspersed
21 within the questionnaire, but are scored separately and are interpreted in ranges 0-7 (normal), 8-
22 10 (mild), 11-14 (moderate) and 15-21 (severe).

23 Daily Record Keeping Form

24

25 The Daily Record Keeping Form (DRK) was used to assess the emotions, appraisals, coping and
26 physical symptoms experienced during the waiting period. The original measure was developed to
27 assess these elements during the waiting period prior to a pregnancy test after fertility treatment
28 (Boivin and Takefman 1995; Boivin and Lancaster 2010).

29 To adapt the DRK for use in this study, a number of relevant words and phrases were changed to
30 better reflect the waiting period experienced by RPL patients. However, the overall format of the
31 questionnaire was not amended. Furthermore, to reduce the burden of daily monitoring and
32 potential reactivity identified in previous studies (Ockhuijsen 2014), the DRK was completed only
33 at weekly intervals. To avoid confusion for research participants, it was called the 'Weekly Record
34 Keeping Form' for the duration of the study.

35 Process evaluations play a vital role in determining the feasibility of an intervention and
36 optimising its design and evaluation (Moore et al. 2015). In the QPE, data were collected using

1 face-to-face, semi-structured interviews that took place at a convenient place and time for the
2 participant. The interviews followed a guide to steer the general direction of data collection and
3 this was developed and based upon the feasibility aims of the study, a review of current literature
4 and discussion with Patient Public Involvement (PPI) representatives and the study supervisory
5 team. The interviews were scheduled to last for between thirty and sixty minutes.

6 Data Analysis

7

8 Descriptive statistics were used to explore the feasibility of the study processes (numbers of
9 eligible women, recruitment and retention rates, missing data) for each centre. Scores from
10 psychological well-being measures and data from the DRK were summarised and changes over
11 the course of the study examined informally by study statistics and via graphical displays. The
12 relationships between physical symptoms, psychological well-being and coping were explored,
13 again through informal methods, such as graphical displays. An informal assessment of any
14 indication of intervention effect was considered, however the purpose of this study was not
15 hypothesis testing but feasibility and acceptability.

16 QPE interviews were audio recorded and then transcribed verbatim, aiming to achieve
17 transparency by maintaining memos, field notes and a reflective diary during the process. Two
18 members of the research team completed the initial coding of the raw data and developed the
19 initial themes and this was discussed with other members of the research team who examined
20 the transcripts and were asked to compare their perceptions of the interview data. The data was
21 analysed utilising the general inductive approach (Thomas 2006). The main analytic strategy of
22 this approach was to establish the core meanings evident in the text, which were relevant to the
23 evaluation (or research) objectives.

24 Although findings from the quantitative and qualitative analyses are presented concurrently in
25 this paper, fuller details of the qualitative methodology and findings are reported elsewhere
26 (Bailey et al. 2015; Bailey et al. 2019)

27 Patient and Public Involvement

28

29 A Patient and Public Involvement (PPI) advisory group supported this research and met on a
30 regular basis for the duration of this study. The group were involved with the design of the study
31 and commented on any potential burden of participation in the study from a patient's
32 perspective. The group were involved with data interpretation, and, at the end of the study,
33 commented on the findings and contributed to the dissemination plan.

1 Results

2

3 The specific structure previously proposed for reporting findings of feasibility studies (Lancaster et
4 al. 2004; Eldridge et al. 2016) was applied.

5 Recruitment-Related Feasibility Outcomes

6

7 In total, 118 women were assessed for eligibility to participate in the study in Site A of whom 19
8 did not meet eligibility criteria. Of the 99 women approached to participate in Site A, 6 (6.0%)
9 declined to participate; contact was lost with 26 (26.3%) women who either failed to notify the
10 researcher whether they had decided to take part in the study or the researcher was unable to
11 contact them. A total of 75 participants were recruited to the study, 67 (89.3%) of these were
12 from Site A where recruitment targets were exceeded. In contrast, in Site B, the number of
13 women identified as potential participants fell well below the expected number, with a marked
14 discrepancy between the estimated and actual recruitment rate. Despite an extended recruitment
15 period and the provision of research infrastructure support systems, recruitment remained
16 difficult at this site.

17 Baseline demographic characteristics of the recruited and randomised participants are shown in
18 Table 1.

19 Participant recruitment and flow through the study and reasons for exclusions are outlined in the
20 CONSORT diagram in Figure 2. No data relating to the proportion of patients who were
21 approached and declined to participate or were not eligible were available from Site B.

22 All 14 women who participated in the QPE (for sample characteristics see Table 2) reported a
23 positive attitude to taking part in the research and felt comfortable with the way they were
24 approached and invited to participate in the research study. The participants commented that
25 they considered this an important area of research and findings suggest that this group of women
26 were altruistic, keen and willing to participate in research that would help women in a similar
27 situation to themselves, even if it did not help them personally (see Figure 3A).

28

29 Randomisation- Related Feasibility Outcomes

30 Between February 2014 and March 2016 a combined site total of 47 participants (62.7% of
31 participants who had consented to join the study) informed the researcher of a positive
32 pregnancy test within the protocol-mandated timeframe of 48hrs and were randomised to one of
33 the two study groups. One participant was excluded from randomisation, as she did not notify the
34 researcher of her pregnancy until she had completed 12 weeks of pregnancy. The process of
35 initiating randomisation and allocation to study group appeared to work smoothly and the study

1 statistician confirmed that the computerised randomisation system worked efficiently. After
2 randomisation, study materials (study questionnaires and PRCI if allocated) for the control and
3 intervention groups were posted to the woman within 48 hours of her notifying the researcher of
4 a positive pregnancy test. Study participants found both the concept and process of
5 randomisation acceptable.

6 In the QPE all respondents noted that they had understood the notion of randomisation as
7 described in the PIS. Two interview participants who were randomised to the control group
8 voiced some disappointment that they had not received the study intervention. However, the fact
9 that this study included an element of randomisation did not affect participants' willingness to
10 participate in the study (see Figure 3B).

11 Study Questionnaires – Related Feasibility Outcomes

12

13 *Pre-Intervention Demographic Questionnaire*

14

15 Study participants completed this form at the time of recruitment. Questions were answered in
16 an appropriate way and completed correctly, suggesting that the questionnaire was easy to use
17 for the participant and that there were no general comprehension difficulties.

18

19 *The Hospital Anxiety Depression Scale*

20

21 Study participants were asked to complete the questionnaire on eight occasions at weekly
22 intervals from a positive pregnancy test (normally around 4 weeks of pregnancy) until 12 weeks of
23 pregnancy (but to discontinue its use if they experienced a further miscarriage). Study findings
24 suggest that there were no identified difficulties with comprehension of the questionnaire
25 wording or scoring. Questionnaires were provided in a paper format and participants were asked
26 to return them in a prepaid envelope. Returned questionnaires were all completed correctly,
27 there were no missing data and the forms were completed according to guidance.

28 *Weekly Record Keeping Form*

29

30 Participants were requested to complete this questionnaire weekly, alongside the HADS, until 12
31 weeks of pregnancy (but to discontinue if they experienced a further miscarriage).

32 The study highlighted some issues with the rating scale of the WRK form; the rating scale
33 descriptors reflected different levels of negative impact meaning that it was not possible to rate
34 the positive emotions such as 'happy' and 'hopeful' in an appropriate way. However, the QPE
35 demonstrated that participants in this study chose to rate the positive emotions by scoring the
36 intensity with which they felt it, rather than the degree to which it had a negative impact. The
37 WRK also instructed participants to leave the score box 'blank' if an emotional or physical

1 symptom had not been experienced. This made it difficult to differentiate between a blank score
2 or failure to answer that question. The WRK should be amended to address both of these issues.

3 Overall, participants found the WRK a helpful and supportive questionnaire and interviewees
4 shared numerous positive reflections on the impact of the WRK that suggested an effect
5 additional to any effect of the PRCI. Participants appeared to view the questionnaires as a form of
6 intervention, suggesting that completion of the questionnaires may have promoted psychological
7 well-being. The self-adaptation of the questionnaires into an intervention and source of support
8 appeared to focus on two main areas. Study participants used the questionnaires as a tool to help
9 reflect on the difficult emotions they were experiencing during the waiting period, encouraging an
10 awareness of their emotions, anxieties and feelings, and utilised the weekly completion of them
11 as a method of monitoring the pregnancy's progression (see Figure 3C).

12 Intervention – related Feasibility Outcomes

13

14 It was important in this study to determine the acceptability of the intervention for use by women
15 with RPL as there was a potential that participants would find the use of this self-administered
16 intervention unacceptable. The study PIS introduced the concept of positive reappraisal and
17 participants were given the opportunity to ask questions regarding this at the time of consent. No
18 potential participants expressed concerns or declined taking part in the study as a result of a
19 coping intervention being tested and all seemed amenable to the idea of using the PRCI.

20 Participants who received the PRCI were asked to read and reflect upon it at least twice a day and
21 to record how often they actually used it during the previous week when they completed the
22 WRK. An important aspect of assessing the feasibility and acceptability of the intervention was to
23 determine frequency of use of the intervention and descriptive statistics were used to show this.
24 Answers on the WRK indicated that all women used the PRCI but there was some variation in the
25 frequency of its use as illustrated in Figure 4.

26 Qualitative feedback from the QPE contributed significantly to understanding the participants'
27 perceptions of the PRCI. During the interview, women were asked to comment on the
28 practicalities of using the intervention and to share their personal reflections of using it.

29 First impressions and initial reactions to the PRCI suggested a degree of scepticism as to how such
30 a simple intervention could help in the management of their anxiety. But, overall there was a
31 positive attitude and willingness to engage and participants appeared agreeable to continue with
32 the intervention (see Figure 3D).

33 Respondents were asked to comment on the frequency with which they had used the PRCI. This
34 varied considerably with some interviewees stating that they used the card more at the beginning
35 of the waiting period and others suggesting they used it more as the pregnancy continued as they

1 became more familiar with the intervention and concept of positive reappraisal. However,
2 participants individualised how often they used the PRCI frequently utilising the intervention at
3 time points when their anxiety levels were most elevated (see Figure 3E).

4 Despite initial reservations regarding the use of the PRCI, without exception, all of the
5 interviewees offered varied and candid positive perspectives on the use of the intervention. There
6 was a consensus that the PRCI promoted a positive re-evaluation of the waiting period and that it
7 encouraged an appreciation of the positive aspects of their lives and a renewed appreciation of
8 the everyday things in life. These positive aspects had often been forgotten and lost within the
9 overwhelming feelings of anxiety experienced about the new pregnancy.

10 There were mixed accounts of whether the PRCI actually helped or reduced the anxiety the
11 participants were experiencing. Some women expressed the belief that it had really helped to
12 alleviate their worry and others suggested that the intervention sustained their ability to cope
13 with the continued anxiety during the waiting period (see Figure 3F).

14 This study was not statistically powered to formally calculate the effectiveness of the PRCI in
15 improving psychological well-being of women during the waiting stages of a new pregnancy
16 following RPL. However, the quantitative and qualitative data did make it possible to assess some
17 of the impact of the intervention on measures to be used in a future RCT. Descriptive statistics
18 and graphical displays compared and contrasted anxiety scores within the control and
19 intervention groups to generate data to help inform the power calculation for a definitive clinical
20 study of the PRCI.

21 There were differences in HADS anxiety scores between the intervention and control group as
22 shown in Figure 5. The PRCI group shows an overall downward trend (reducing anxiety levels) as
23 pregnancies progress, reflecting the expectation that anxiety scores would decrease on a weekly
24 basis throughout the waiting period. However, the anxiety scores for the control group were
25 more variable over the eight weeks of questionnaires.

26 Recent publications concerned with ensuring appropriate reporting of feasibility and pilot studies
27 (Shanyinde et al. 2011; Bugge et al. 2013) offer a useful analytic framework for applying
28 methodological issues and summarising findings when assessing feasibility research. Table 3,
29 based on the work of Bugge et al. (2013) summarises the key feasibility findings of this study
30 against the methodological issues for feasibility research.

1 Discussion

2

3 This study aimed to establish the feasibility and acceptability of conducting a multicentre RCT to
4 test the effects of the PRCI on the psychological well-being of women with RPL. The results
5 provide a number of insights pertinent to the successful design of such a study, and of the likely
6 value of the PRCI in this clinical context.

7 Successful recruitment to a future definitive study investigating the use of the PRCI with women
8 with RPL is shown to be possible. There is an appropriate and sizeable population willing to
9 participate. However, as with many trials, recruitment at an external site proved more difficult
10 than anticipated at the outset of the study, despite both using the same study protocol. A number
11 of facilitators and barriers to recruitment were identified.

12 Lack of an on-site researcher to act as a champion to promote the research study and no named
13 clinical lead for RPL patients were likely to have contributed to the relative under recruitment at
14 Site B. In addition, because recruitment was taking place on the EPU and not in a specialist RPL
15 outpatient clinic, patients were informed about the study at the time of their miscarriage. This
16 may have discouraged the staff from inviting participation. These findings highlight the need to
17 consider the broader processes of recruiting participants when planning recruitment sites in a
18 future definitive multi-centre study of the PRCI

19 The validation of data collection forms / questionnaires is fundamental to a feasibility study
20 (Lancaster et al. 2004) and this is particularly important when the questionnaires are completed
21 by the participants themselves. This includes ensuring that the selected questionnaires are the
22 most appropriate data collection methods and provide researchers with the information they
23 require.

24 The QPE highlighted a significant feasibility and internal validity issue, focusing particularly on the
25 WRK. This questionnaire was intended as an instrument to measure emotional and physical
26 reactions during the study time-period. However, many participants reported using the
27 questionnaire as a self-monitoring intervention and may have perceived or experienced a positive
28 effect as a result of weekly rating of the emotional and physical reactions listed on the WRK.

29 Self-monitoring refers to assessment procedures that involve data collection by the client
30 (Korotitsch and Nelson-Gray 1999), and provides the user with continuous and immediate
31 feedback on their situation (Bornstein et al. 1986). It has been shown to have therapeutic effects
32 due in part to the reactive effects of the self-monitoring activity (Korotitsch and Nelson-Gray
33 1999).

34 In this feasibility study, the WRK provided study participants with an opportunity to spend time
35 reflecting on the physical and emotional reactions they were experiencing during the waiting
36 period of their new pregnancy. Participants reported this encouraged an awareness of the

1 emotions, anxieties and feelings they were experiencing, helping them to rationalise them and
2 giving back some control in a situation where the women felt they had little control over the
3 outcome.

4 The self-monitoring and reactivity effect of the WRK was not altogether surprising. A previous
5 study which first investigated the use of the PRCI as a self-help coping intervention in women with
6 miscarriage(s) also highlighted the potential reactivity effects of the WRK questionnaire.
7 Specifically, it concluded that women could experience a positive or negative effect as a result of
8 rating their emotions, physical symptoms, appraisal and coping (Ockhuijsen 2014) .

9 The fundamental issue here appears to be the repeated use of the WRK (daily or weekly),
10 enabling it to act as a self-monitoring technique. From an internal validity point of view, any PRCI
11 benefits may be due to an interaction between the monitoring and the PRCI, rather than the PRCI
12 itself. Indeed, a study by Korotitsch and Nelson-Gray (1999) exploring the concept of self-
13 monitoring research in assessment and treatment proposed that the reactive effects of self-
14 monitoring may make an adjunctive contribution to the beneficial treatment effects when used
15 alongside other interventions.

16 The PRCI was designed to help women re-interpret the demands of the waiting period in a more
17 positive way (Ockhuijsen et al. 2014b) and the aim of the WRK in this feasibility study was to
18 measure treatment specific reactions to using this by capturing the intervention's weekly effects.
19 However, it seems evident that the weekly monitoring and associated reactivity to the WRK in
20 itself have had an impact on the reporting of emotional and physical reactions. A future definitive
21 study of the PRCI would need to pay careful consideration to how to disentangle this
22 'methodological artefact' (Ockhuijsen 2014) and the effects of the PRCI to ensure the internal
23 validity of any future study. Ockhuijsen et al. (2014a) showed that when the PRCI is used alone it
24 demonstrates greater benefits than when combined with monitoring (on quantitative measures).
25

26 Although previous studies had shown no detrimental side effects of the PRCI (Lancastle and Boivin
27 2008; Ockhuijsen et al. 2013b; Ockhuijsen et al. 2014b), establishing the acceptability of the
28 intervention to women with RPL was an important consideration of this study. Indeed, Sekhon et
29 al. (2017) propose that determining acceptability has become an important consideration in the
30 design, evaluation and implementation of health care interventions. Successful implementation of
31 an intervention, such as the PRCI, depends on the acceptability of the intervention to the
32 recipients. Certainly, there was a concern at the outset of this study that women with RPL may
33 find the concept of positive reappraisal difficult to understand and be sceptical of the value of
34 using a self-managed intervention, given the extreme levels of anxiety and emotional turmoil they
35 experience during the waiting period of a new pregnancy. As such, one of the main objectives of
36 this feasibility study was to assess to what extent the PRCI was judged by women as suitable and

1 functional to address their psychological needs and be practical and serviceable to use. In
2 general, the quantitative findings from this feasibility study suggest that participants' willingness
3 to take part in the study and general compliance in using the PRCI is an encouraging sign that
4 women with RPL might be receptive to this intervention.

5 Graphical presentation of the HADS scores (Figure 5) demonstrated an increase in anxiety levels
6 until week five of the questionnaire (week eight of pregnancy). This may reflect the frequency of
7 miscarriages occurring around this gestation, after which the likelihood of an ongoing pregnancy
8 increases. As pregnancies progress to this stage, participants may have begun to emotionally
9 invest in the pregnancy, and to anticipate anxiety of the grief that would accompany a further
10 miscarriage at this stage.

11 The HADS showed reduced anxiety levels in the PRCI study group. While a previous study has
12 demonstrated a lower anxiety level in women who used the PRCI during the IVF waiting period
13 (Ockhuijsen et al. 2014a), the effects of the PRCI on anxiety levels, were attenuated when
14 combined with daily monitoring of the emotions, which itself was found to have an impact.
15 Consistent with this, the qualitative process evaluation suggested that anxiety levels were
16 reduced as a result of completing the study questionnaires. These observed quantitative effects of
17 the PRCI could be used to make a power calculation for a future study in which impact on anxiety
18 is the primary endpoint.

19 Although a previous study of the PRCI during miscarriage waiting periods did not reveal any effect
20 on anxiety (Ockhuijsen et al. 2014b) these participants had no history of recurrent pregnancy loss.
21 In a qualitative study of the perceived usefulness of the PRCI, women with only one past
22 miscarriage did not see the need for such a coping tool, whereas those women with recurrent
23 miscarriage did (Ockhuijsen et al. 2013a). The PRCI might therefore be most useful in those
24 needing to deploy coping effort because their available current coping resources are not sufficient
25 to match the perceived threat (i.e. another miscarriage), resulting in greater levels of anxiety.
26

27 Another key study finding was that participants modified the frequency of use of the PRCI,
28 reducing the overall time spent using the PRCI and decreasing or increasing the number of times
29 per day they read the card, adapting guidance to suit their needs or preference. Participants
30 appeared to base this adaptation on their judgement and perception of the intensity of the
31 emotions (e.g. anxiety, fear and uncertainty) they were experiencing and their assessment of the
32 effect of the intervention on these challenging emotions. For example, some participants elected
33 to utilise the card at times when their anxiety levels were most elevated, using the card more
34 frequently at the beginning of the waiting period and decreasing when they came to feel more
35 confident that the pregnancy would continue. Others increased the use of the PRCI throughout
36 the waiting period as they became familiar with both the card and the process of positive

1 reappraisal. Some participants chose to use the PRCI simply as a method of aiming to manage
2 acute anxiety episodes. Interestingly, there was a general view among the participants that rather
3 than adapting the PRCI guidance, they were personalising the use of the PRCI to suit their
4 individual needs.

5 This observation, which has previously been described (Ockhuijsen 2014; Ockhuijsen et al. 2014b;
6 Ockhuijsen et al. 2015) points to the need to consider how and whether fidelity should be
7 accurately monitored to ensure consistent implementation of the PRCI in a future definitive multi-
8 centre study. It could be that allowing women to individualise their use of the PRCI is likely to
9 increase its effectiveness.

10 A further finding of this study is the large number of variables influencing both the use,
11 interpretation and effects of the PRCI. For example, one person might read the card only once,
12 but it may resonate with her and she keeps the PRCI statements firmly lodged in her memory. The
13 next person may read the card twice a day as requested and start to think differently as a result,
14 but it is a slow process to learn the skill of positive reappraisal. Another person may read it twice a
15 day as requested, like a 'tick box' exercise, but avoid thinking about the concept of positive
16 reappraisal at all, perhaps because it is too far out of her comfort zone and something she has no
17 intention of thinking about. There are many different variants of how women might use and
18 interpret the PRCI, but in terms of broad metrics, simply reading the card does not mean that the
19 person is engaging with positive reappraisal. Indeed, the person who just reads the card once, but
20 its statements resonate with her immediately, may be engaging with positive reappraisal coping
21 most of all.

22 It appears that in this feasibility study 'engagement' and 'intervention fidelity' refer to far more
23 than twice daily reading the PRCI and compliance with the guidelines for use. Given that it is a
24 self-help intervention involving thinking and personal interpretation, it is difficult to measure,
25 control or have insight into how participants precisely used it and this may be a limitation of the
26 intervention and of this feasibility study.

27 The only quantitative measures of use of the PRCI in the current feasibility study were in the WRK
28 questionnaire. Although the QPE added to the understanding of acceptability of the PRCI, it could
29 have extended assessment of the intervention by asking participants in more detail about how
30 and in what ways they tried to positively reappraise the situation (if at all) and about whether
31 they felt that their coping strategies had improved as a result of the PRCI. Previous quantitative
32 research does show that using the guidance as provided to participants in the present study does
33 increase ability to use positive reappraisal coping as measured by another unrelated measure
34 (Domar et al. 2015). However, more in-depth understanding of how the PRCI sustains coping
35 could be a target for future research.

1

2 A key strength of this study is that its development and protocol was guided by an active PPI
3 advisory group and this ensured the patient's perspective was central to the study. Study
4 limitations included the fact that the majority of participants who took part in this study were of
5 White British ethnicity, mainly due to the location of the study sites in the South of England. A
6 more varied ethnicity sample may have provided a more diverse and richer insight into the
7 cultural effects of RPL

8 In conclusion, this study successfully met its original objective determining that an effectiveness
9 RCT of the PRCI is possible; it also highlighted specific feasibility issues (for example around
10 recruitment and study outcome measures) that require further consideration in the planning of a
11 definitive study. However, study participants engaged with the PRCI, were receptive to it and
12 appeared to experience benefits from its use with no apparent downside. Furthermore, the cost
13 of the PRCI is negligible in terms of both resources and finances. The study raises the important
14 question of whether a future definitive multicentre RCT of the PRCI is justified given the
15 substantial investment of finances and time this would require. The demand for healthcare
16 continues to grow and public health systems are challenged to provide high quality, effective care
17 within limited resources. With that in mind, evidence generated in this study suggests that this
18 model of care might already have the potential to be made more widely available as a safe, low
19 cost, convenient and easily deliverable intervention to provide much needed support to a
20 vulnerable patient population. Future research will focus on technically innovative strategies to
21 develop and deliver a supportive package of care, of which the PRCI will be an important
22 component, to support the psychological well-being of women with RPL.

23 Acknowledgements

24

25 The authors would like to thank the women who kindly agreed to participate in this study and the
26 members of the Patient and Public Involvement group for their valuable input into this
27 programme of research.

28 Declarations of interest: None

29

30 Funding sources

31 This work was supported by the National Institute for Health Research UK (award reference
32 number CDRF-2012-03-004)

33 Trial Registration number

34 ISRCTN43571276

References

- Bailey S, Bailey C, Boivin J, Cheong Y, Reading I and Macklon N (2015) A feasibility study for a randomised controlled trial of the Positive Reappraisal Coping Intervention, a novel supportive technique for recurrent miscarriage. *BMJ open* 5:e007322. doi:10.1136/bmjopen-2014-007322
- Bailey S, Boivin J, Cheong Y, Kitson-Reynolds E, Bailey C and Macklon N (2019) Hope for the best ... but expect the worst: a qualitative study to explore how women with recurrent miscarriage experience the early waiting period of a new pregnancy. *BMJ Open* 9:e029354(doi:10.1136/bmjopen-2019-029354)
- Boivin J and Lancaster D (2010) Medical waiting periods: imminence, emotions and coping. *Women's health (London, England)* 6(1): 59-69
- Boivin J and Takefman JE (1995) Stress level across stages of in vitro fertilization in subsequently pregnant and nonpregnant women. *Fertility and Sterility* 64(4): 802-810
- Bornstein P, Hamilton S and Bornstein M (1986) Self-monitoring procedures IN: Ciminero K, Calhoun H and Adams H (eds) *Handbook of Behavioural Assessment* (Second edition Edition). New York: Wiley
- Bowen DJ, Kreuter M, Spring B, Cofta-Woerpel L, Linnan L, Weiner D, Bakken S, Kaplan CP, Squiers L, Fabrizio C and Fernandez M (2009) How We Design Feasibility Studies. *American Journal of Preventive Medicine* 36(5): 452-457
- Bugge C, Williams B, Hagen S, Logan J, Glazener C, Pringle S and Sinclair L (2013) A process for Decision-making after Pilot and feasibility Trials (ADePT): development following a feasibility study of a complex intervention for pelvic organ prolapse. *Trials* 14: 353-353
- Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I and Petticrew M (2013) Developing and evaluating complex interventions: The new Medical Research Council guidance. *International Journal of Nursing Studies* 50(5): 587-592
- Cresswell J (2015) *A Concise Introduction to Mixed Methods Research* Los Angeles: Sage Publishing
- Domar A, Gross J, K R and Boivin J (2015) Exploratory randomized trial on the effect of a brief psychological intervention on emotions, quality of life, discontinuation, and pregnancy rates in invitro fertilization patients. *Fertility and Sterility* 104(2): 440-451
- Eldridge SM, Chan CL, Campbell MJ, O'Cathain A, Bond CM, Hopewell S, Thabane L, Lancaster GA, Altman D, Bretz F, Campbell M, Cobo E, Craig P, Davidson P, Groves T, Gumedze F, Hewison J, Hirst A, Hoddinott P, Lamb SE, Lang T, McColl E, Shanahan DR, Sutton C and Tugwell P (2016) CONSORT 2010 statement: Extension to randomised pilot and feasibility trials. *BMJ (Online)* 355
- ESHRE (2017) *Recurrent Pregnancy Loss. Guideline of the European Society of Human Reproduction and Embryology.*
- Korotitsch WJ and Nelson-Gray RO (1999) An Overview of Self-Monitored Research in Assessment and Treatment. *Psychological Assessment* 11(4): 415
- Lancaster GA, Dodd S and Williamson PR (2004) Design and analysis of pilot studies: recommendations for good practice. *Journal of Evaluation in Clinical Practice* 10(2): 307-312
- Lancaster D and Boivin J (2008) A feasibility study of a brief coping intervention (PRCI) for the waiting period before a pregnancy test during fertility treatment. *Human Reproduction* 23(10): 2299-2307
- Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, Moore L, O'Cathain A, Tinati T, Wight D and Baird J (2015) Process evaluation of complex interventions: Medical Research Council guidance. *BMJ: British Medical Journal* 350(h1258): 1-7
- O'Cathain A, Hoddinott P, Lewin S, Thomas K, Young B, Adamson J, Jansen Y, Mills N, Moore G and Donovan J (2015) Maximising the impact of qualitative research in feasibility studies for randomised controlled trials: guidance for researchers. *Pilot and Feasibility Studies* 1(32)

- Ockhuijsen H (2014) *A Novel Intervention for Medical Waiting Periods in IVF and Early Pregnancy* Unpublished PhD thesis Utrecht, The Netherlands University
- Ockhuijsen H, van den Hoogen A, Eijkemans M, Macklon N and Boivin J (2014a) Clarifying the benefits of the positive reappraisal coping intervention for women waiting for the outcome of IVF. *Human Reproduction* 29(12): 2712-2718
- Ockhuijsen H, van den Hoogen A, Eijkemans M, Macklon N and Boivin J (2014b) The impact of a self-administered coping intervention on emotional well-being in women awaiting the outcome of IVF treatment: a randomized controlled trial. *Human Reproduction* 29(7): 1459-1470
- Ockhuijsen HDL, Boivin J, van den Hoogen A and Macklon NS (2013a) Coping after recurrent miscarriage: uncertainty and bracing for the worst. *Journal of Family Planning & Reproductive Health Care* 39(4): 250-256
- Ockhuijsen HDL, van den Hoogen A, Boivin J, Macklon NS and de Boer F (2014c) Pregnancy After Miscarriage: Balancing Between Loss of Control and Searching for Control. *Research in Nursing and Health* 37(4): 267-275
- Ockhuijsen HDL, van den Hoogen A, Boivin J, Macklon NS and de Boer F (2015) Original Article: Exploring a self-help coping intervention for pregnant women with a miscarriage history. *Applied Nursing Research* 28: 285-292
- Ockhuijsen HDL, van den Hoogen A, Macklon NS and Boivin J (2013b) The PRCI study: design of a randomized clinical trial to evaluate a coping intervention for medical waiting periods used by women undergoing a fertility treatment. *BMC Womens' Health*
- RCOG (2011) The investigation and treatment of couples with recurrent first-trimester and second-trimester miscarriage.
- Sekhon M, Cartwright M and Francis J (2017) Acceptability of health care interventions: an overview of reviews and development of a theoretical framework. *BMC Health Services Research* 17(88)
- Shanyinde M, Pickering RM and Weatherall M (2011) Questions asked and answered in pilot and feasibility randomized controlled trials. *BMC Medical Research Methodology* 11(117): 1471-2288
- Thomas DR (2006) A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation* 27(2): 237-246
- Tong S, Kaur A, Walker S, Bryant V, Onwude J and Permezel M (2008) Miscarriage risk for asymptomatic women after a normal first-trimester prenatal visit. *Obstetrics and Gynaecology* 111(3): 710-714
- Zigmond AS and Snaith RP (1983) The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica* 67(6): 361

Figure Legends

Figure 1: The Positive Reappraisal Coping Intervention

Figure 2: Study CONSORT flow diagram

Figure 3: Qualitative process evaluation interview extracts

Figure 4: Frequency of usage of PRCI during eight weeks of study (weeks 4-12 of pregnancy)

Figure 5: Comparison PRCI and control group HADS mean scores for anxiety weeks 1-8 of questionnaires (weeks 4-12 of pregnancy)

Methodological issues	Findings	Evidence
1. Were women with recurrent miscarriage willing to participate in research?	Recurrent miscarriage patients showed a positive mental attitude to participating in this research	Women reported they were altruistic, keen and willing to take part in research that would help other women, even if it did not help them personally
2. What factors influenced eligibility and what proportion of those approached were eligible?	Ineligibility to participate was mainly due to the fact that the patient was already pregnant, receiving fertility treatment or already participating in another research study	118 potential participants were screened for eligibility in Site A . 99 of these were eligible. No data available from Site B
3. Was recruitment successful?	Recruitment in Site A successful, but fell below expectations in Site B	Total of 75 participants recruited (67 in Site A, 8 in Site B)
4. Did eligible participants consent?	Good conversion from eligibility to consent	Only 6 women declined invitation to participate in study. Main reason for lack of conversion was loss of contact between giving study information and participants confirming they wished to participate
5. Were participants willing to be randomised to control or intervention group and did they find the randomisation process acceptable?	Participants found the concept and process of randomisation acceptable.	Combined randomisation rate for both sites 62.7. The fact that this study included an element of randomisation did not affect the participants' willingness to take part in the research
6. Were participants successfully randomised and did randomisation yield equality in groups?	Randomisation processes worked very well	Almost equal sized groups. Well balanced stratification. Study highlighted need to consider the number of study participants it would be necessary to recruit in order to achieve an adequate randomisation rate - suggest should include a recruitment target that is at least twice the randomisation target.
7. Did participant's use the intervention	Good adherence to overall use of PRCI, but frequency and mode of use differed to specific intervention recommendations	Participants reported consistent but varying use of the PRCI on the WRK questionnaire. Participants adapted PRCI use to suit their individual needs
8. Was the intervention acceptable to the participants?	Participants demonstrated a positive mental attitude to using the PRCI	Only one participant withdrew after randomisation to intervention. Participants reported they found the PRCI an acceptable, practical intervention to use during the stressful waiting period of a new pregnancy

Methodological issues	Findings	Evidence
9. Were study data collection questionnaires completed?	There were excellent completion rates of all questionnaires. Participants reported they were happy with returning questionnaires by post	Only 4 randomised participants (out of 47) did not return questionnaires
10. Were the questionnaires understandable to the participants?	Participants showed good understanding of the pre-intervention demographic questionnaire and the HADS and these were completed accurately. Issues were raised on the use of the WRK	Pre-intervention demographic questionnaire and HADS completed accurately and in full. The study highlighted issues with the rating scale on the WRK (did not allow for the scoring of positive emotions) and confusion over whether a blank score box equated to a zero score or missing data
11. Did the questionnaires provide the researchers with the data they required?	Data generated by the study questionnaires were appropriate and valuable. However, limited data were generated that specifically assessed coping and coping strategies	Because of the lack of data generated by the questionnaires which specifically assessed coping, it was not possible to fully assess the effect of the PRCI on coping mechanisms and strategies
12. Was study retention good?	Retention rates good	Out of the 47 randomised participants, 42 completed the study
13. Were the logistics of running a multicentre study assessed?	Varying recruitment rates in two study sites	Differing recruitment success in Site A and B highlighted issues around recruitment barriers in different sites which would need consideration in future definitive study
14. Did all the components of the protocol work together?	Protocol components had excellent synergy	No difficulties were identified in the various research processes employed in this study or in the researcher's ability to implement them. For example, following recruitment, the randomisation process worked well and the participant's care moved forward to the appropriate trial arm

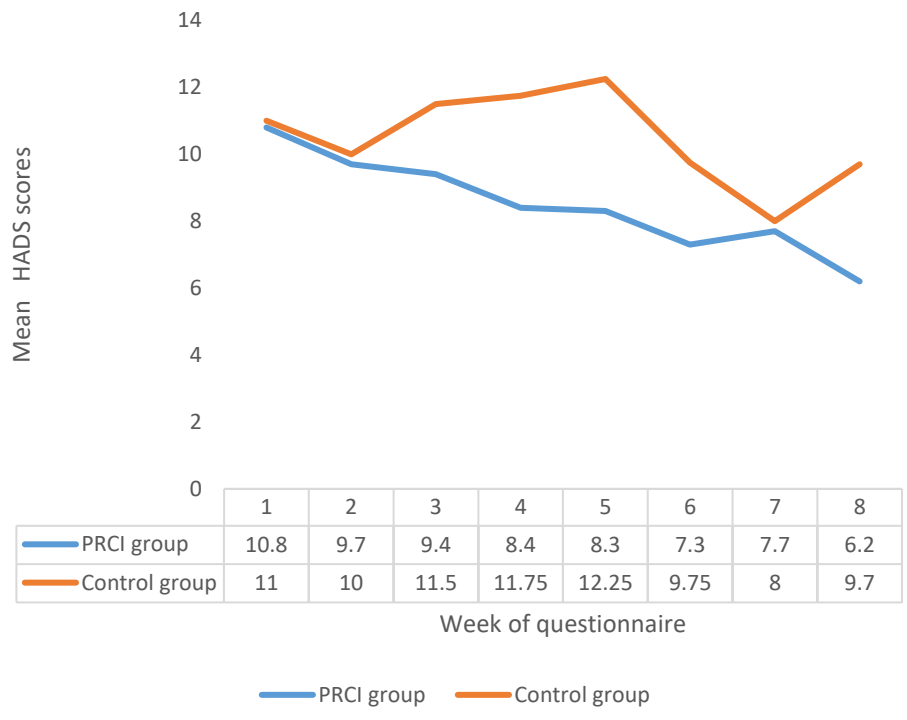
Table 2: Key feasibility findings (based on Shandyinde et al 2011 and Bugge et al 2013)

Participant	Ethnicity	Age	Number of previous miscarriages	Ongoing pregnancy (OP) or further miscarriage (M) at time of QPE interview
1	White British	38	3	OP
2	White British	37	3	OP
3	White British	42	6	M
4	White British	34	4	M
5	White British	31	4	M
6	White British	39	4	M
7	White British	33	4	M
8	White British	37	3	OP
9	Other	29	3	OP
10	White British	38	3	OP
11	White British	34	4	OP
12	White British	36	3	OP
13	White British	40	4	M
14	White British	34	3	OP

Table 2: Sample characteristics of QPE participants.

	Recruited Participants (n=75)	Control group (n=23)	PRCI group (n=24)
Mean age (range)	33.53 (19-44)	33.91 (19-42)	31.79 (20-42)
Ethnic Group n (%)			
White British	69 (92)	23 (100)	21 (87.5)
Other	5 (6.6)	0	3 (12.5)
Missing Data	1 (1.3)	0	0
Level of Education n (%)			
None	2 (2.7)	1 (4.3)	0
GCSE / O Levels	17 (22.7)	5 (21.7)	4 (16.7)
A Levels	4 (5.3)	1 (4.3)	3 (12.5)
Higher Degree	37 (49.3)	12 (52.2)	15 (62.5)
Other	14 (18.7)	4 (17.4)	2 (8.3)
Missing data	1 (1.3)	0	0
Number of previous miscarriages n (%)			
3	29 (38.7)	9 (39.1)	10 (41.7)
4	30 (40)	12 (52.2)	7 (29.2)
5	5 (6.7)	1 (4.3)	3 (12.5)
6	3 (4)	1 (4.3)	1 (4.2)
7	3 (4)	0	2 (8.3)
8	1 (1.3)	0	0
9	2 (2.7)	0	0
10	1 (1.3)	0	1 (4.2)
Missing data	1 (1.3)	0	0
Already have child with partner n (%)			
Yes	34 (45.3)	11 (47.8)	11 (45.8)
No	40 (53.3)	12 (52.2)	13 (54.2)
Missing data	1 (1.3)	0	0
Diagnosed medical reason for miscarriages n (%)			
Yes	9 (12)	1 (4.3)	3 (12.5)
No	65 (86.7)	22 (95.7)	21 (87.5)
Missing data	1 (1.3)	0	0
Seen counsellor for problems related to miscarriages n (%)			
Yes	5 (6.7)	2 (8.7)	3 (12.5)
No	66 (88)	21 (91.3)	19 (79.2)
Missing data	4 (5.3)	0	2 (8.3)

Table 1: Baseline information and sample characteristics of intervention and control groups



Mean HADS scores

14
12
10
8
6
4
2
0

	1	2	3	4	5	6	7	8
PRCI group	10.8	9.7	9.4	8.4	8.3	7.3	7.7	6.2
Control group	11	10	11.5	11.75	12.25	9.75	8	9.7

Week of questionnaire

PRCI group Control group

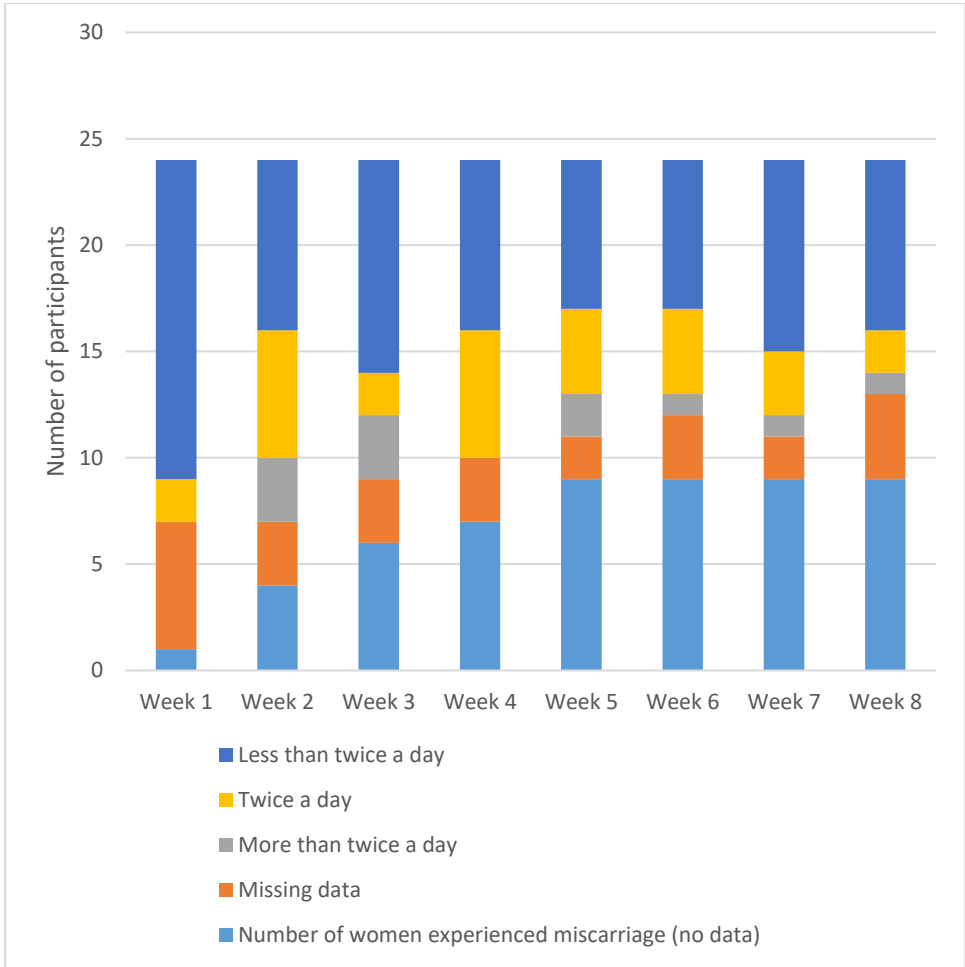


Figure 3: Qualitative Process Evaluation Interview Extracts

Pane A – Qualitative views on recruitment and study participation

I was very happy to participate, I think it's very important and I think that the topic of the research is very important (Participant 12 – 3 miscarriages)

I wanted to be part of something ... and if I was able to help people in the future I was quite positive about that (Participant 11 – 4 miscarriages)

Pane B – Qualitative views on the randomisation process

I mean I wanted the card and I was disappointed that I didn't get that group, but I get the point of it all and I know how it works (Participant 8 – 3 miscarriages)

I was disappointed, I wanted to try something ... but someone always has to be in that group so that's fine. I just wanted to help (Participant 13 – 4 miscarriages)

Pane C – Qualitative views on the study outcome measures

I found them helpful in the way that you could just dump on them ... sort of like when people tell you if you've got a problem to write it down and it just gets it out of your head (Participant 6 – 4 miscarriages)

The questionnaires helped me get through the week, because every time I filled out a new one, I'm like 'well I've just completed a week' and then I'd look at the last ones and the symptoms have changed and the second questionnaire I have filled out seems to be more positive than the last one where I put everything as negative (Participant 9 – 3 miscarriages)

Pane D – Qualitative views on the intervention

When I first saw it I actually thought it was a bit awkward. I thought how am going to use this to make myself feel better or remind myself to stay positive? (Participant 9 – 3 miscarriages)

When I actually sat down and really thought about each one (the statements on the PRCI) very carefully, it made sense and it really helped me to think about those things (Participant 14 – 3 miscarriages)

Pane E – Qualitative views on the frequency of use of intervention

It would suddenly be five am every morning that I was waking up in complete panic, that's the only way I can describe it, then I would have a cup of tea and sit and read the card and think right OK just calm down (Participant 7 – 4 miscarriages)

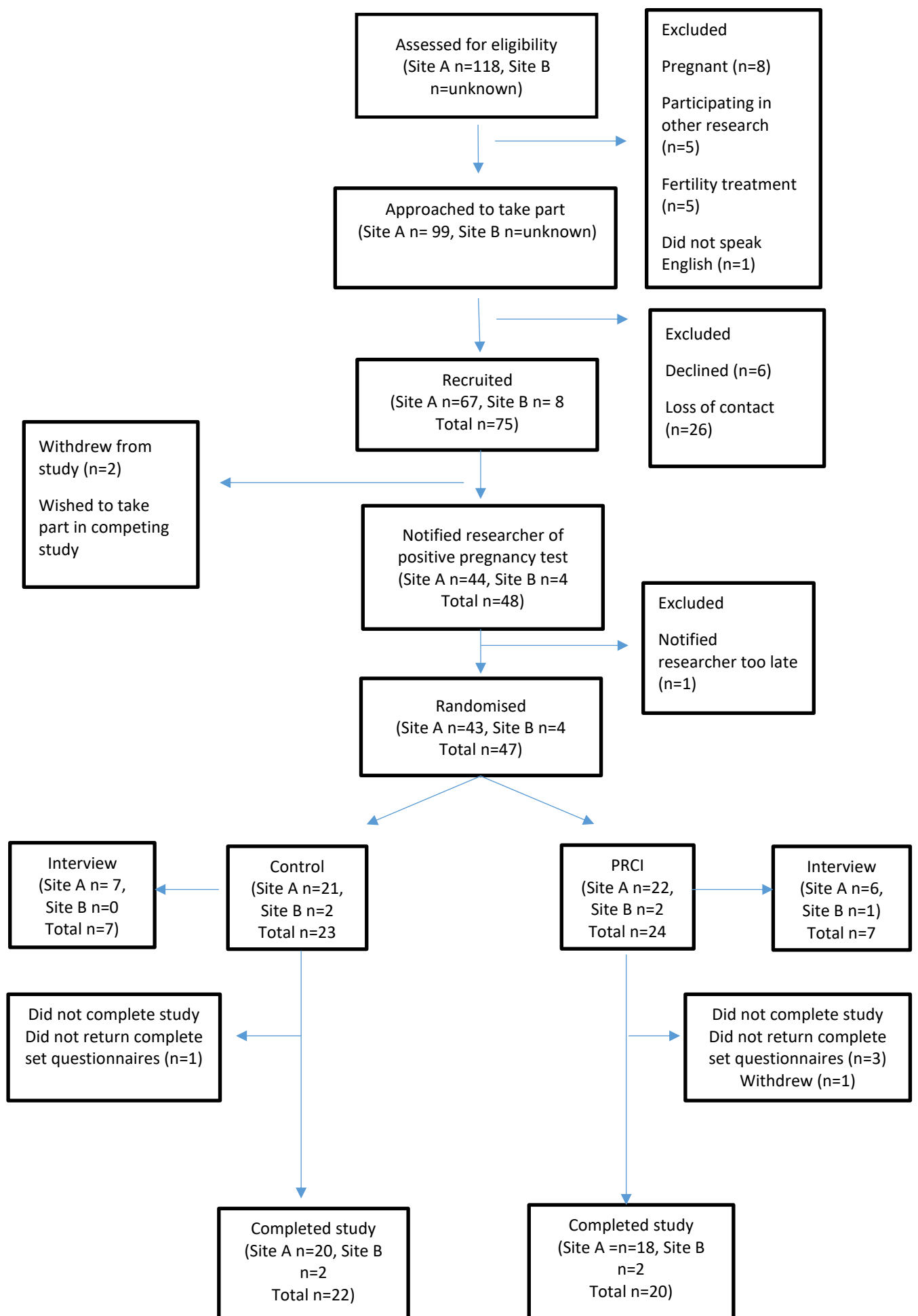
Last thing before I go to bed was always a real worry time for me so I would make sure that I read it at least once, sometimes a couple of times So what I ended up with was a technique very personal to me (Participant 14 – 3 miscarriages)

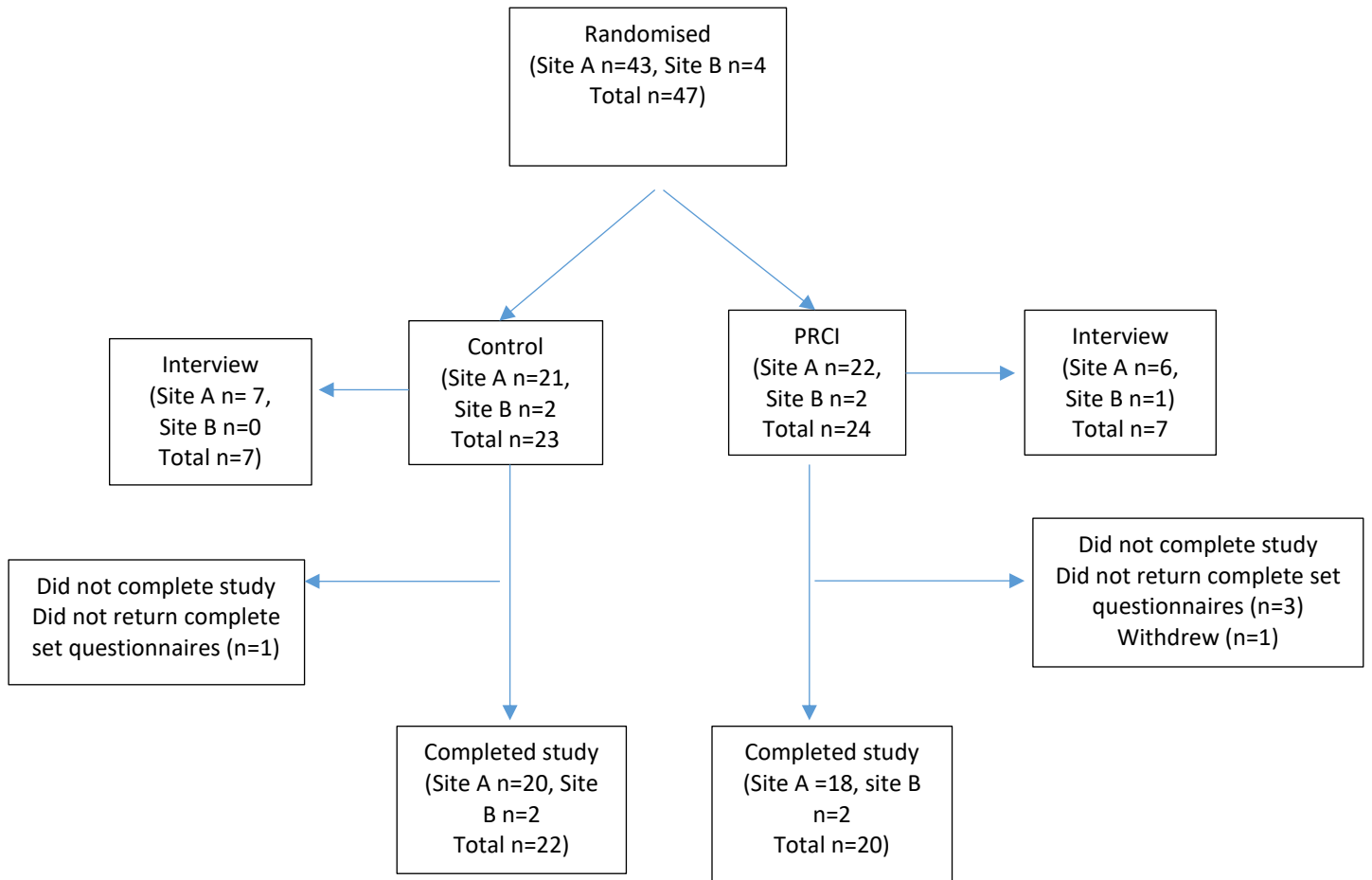
Box F – Qualitative views on psychological impact of intervention

It just made me feel less anxious and made me change how my mind worked really rather than feeling like everything was crashing down (Participant 11 – 4 miscarriages)

It didn't necessarily reduce my anxiety but it did definitely help me cope with the anxious feelings and although it didn't reduce anxiety it made me think more positively so there was still a lot of highs and lows but more highs than I would have had had I not had the technique ... I truly believed it helped me (Participant 14 – 3 miscarriages)

Actually it really did work, maybe not all the points, but the ones that really made it for me was the think of something positive today ... just trying to find something every day and not looking at next week, or two weeks or three weeks. Let's just focus on today and tomorrow will be another day (Participant 7 – 4 miscarriages)





Positive Reappraisal Coping Items (PRCI)

During this experience I will:

1. Try to do something that makes me feel positive
2. See things positively
3. Look on the bright side of things
4. Make the best of the situation
5. Try to think more about the positive things in my life
6. Focus on the positive aspects of the situation
7. Find something good in what is happening
8. Try to do something that is meaningful
9. Focus on the benefits and not just the difficulties
10. Learn from the experience

Figure 1: The Positive Reappraisal Coping intervention