Psychological well-being in women with premature ovarian insufficiency (POI)

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Declaration

I declare that this work has not been submitted for any other degree at the University of Sheffield or any other institution. The work presented is original and all other sources have been referenced accordingly.

Word Count

Part I: Literature Review	
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Part II: Research Report	
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Lay summary

The current research consists of two parts. Part I describes the results of a systematic scoping review investigating factors associated with psychological well-being in women with Premature Ovarian Insufficiency (POI). Part II was a randomised controlled pilot trial to explore the feasibility, necessity, acceptability and possible effectiveness of two gratitude interventions in targeted at improving psychological well-being in women with POI. Participants completed routine outcome measures of psychological well-being before, during, after and at six-week follow-up and provided qualitative opinions on the intervention. To the author's knowledge this two-week pilot was the first time an online positive psychology intervention had been trialled with this client group.

The findings of the systematic scoping review highlighted several factors which may be associated with psychological well-being in women with POI. Factors were grouped into three categories: sociocultural, the diagnostic process and relationships with others. Negative social connotations around female ageing and menopause were associated with feelings of stigma and shame; contributed to a disrupted 'split' identity and exacerbated feelings of loss of control. The diagnostic process was reported unsatisfactory for several reasons: long delays to diagnosis, clinicians lacking knowledge on POI and lacking in sensitivity to terminology used. The cause of POI was not associated with general psychological well-being but may impact sexual function and anxiety levels. Relationships with partners and higher levels of spirituality/faith were associated with greater psychological well-being. However, women reported feeling alienated from their peers and distressed by seeing pregnant women and expressed a preference for emotional support from others with POI.

A randomised controlled pilot trial of a two-week online gratitude diary intervention did not improve psychological well-being in women with POI. Those most likely to complete the intervention were older, higher in trait gratitude and less likely have a diagnosed mental health condition or experience high levels of depression or loneliness. High rates of depression and anxiety at baseline highlight necessity for intervention with this client group, whilst lower rates of diagnosed mental health conditions suggest this need is often undetected. Higher levels of both trait and state gratitude were associated with lower levels of psychopathology and symptom-severity in women with POI. The intervention was found to be acceptable and helpful by the majority of those who completed it. However, women found the diary entries too frequent and the intervention too short. A preference for weekly diaries and an intervention length of at least one month was expressed.

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Part I: Literature Review

Factors impacting the psychological well-being of women with premature ovarian insufficiency (POI): A scoping review

Abstract

Objectives

Premature ovarian insufficiency (POI) is a chronic health condition associated with high levels of psychological distress. The condition can occur at any age up to the age of forty and results in an early menopause. Little is known about the factors that impact psychological well-being in POI and no systematic review currently exists. There is a need to understand these factors as it cannot be assumed that women with POI's needs are the same as those experiencing normal-age menopause. The purpose of this review is to explore existing research to identify factors associated with psychological well-being in POI and highlight areas for future research.

Method

Database searches (Medline, PsychINFO, PubMed, Scopus and CINAHL) were conducted to identify research reporting factors associated with psychological well-being in POI. A narrative-descriptive approach (Popay et al., 2006) was used to analyse data extracted.

Results

A total of 32 papers (*n*= 8217) met inclusion criteria. Factors associated with psychological well-being in women with POI were grouped into three over-arching themes: sociocultural, diagnostic process and relationships with others. Negative social connotations around female ageing and being menopausal were associated with feelings of stigma and shame; contributed to a disrupted 'split' identity and exacerbated feelings of loss of control. The diagnostic process was reported unsatisfactory for several reasons: long delays to diagnosis, clinicians lacking knowledge on POI and language being used insensitively. The cause of POI may impact sexual function and anxiety levels but was not associated with overall psychological well-being. Relationships with others were associated with psychological well-being in unexpected ways. Women reported feeling alienated from their peers and distressed by seeing pregnant women. They expressed a preference for peer support from others with POI. Relationships with partners and higher levels of spirituality/faith were found to be protective of well-being. However, already having children did not impact psychological well-being.

Conclusions

This is the first systematic review exploring factors associated with psychological well-being in POI. There is emerging evidence that sociocultural factors, the diagnostic process and relationships with others may be related to psychological well-being in POI. Selected subthemes identify ways in which care of women with POI may be improved. However, further experimental and longitudinal research is required to explore the relevance of these factors.

Clinician points

- Professionals need to consider the impact receiving a diagnosis of POI may have upon multiple areas of psychosocial functioning, not just physical symptoms.
- POI is a different experience to age-appropriate menopause and therefore distinctions need to be made during interactions and care/treatment planning.
- At diagnosis clinicians need to consider: providing a longer appointment, giving POI specific information, screening for mental health issues and sensitivity to terminology used.
- The impact of POI upon psychological well-being is likely to differ depending on the woman’s life goals and levels of social support.

Limitations

- There was a lack of ethnic and cultural diversity within the studies reviewed.

- Wide variation in measurement of psychological constructs made comparisons across studies difficult.
- The research base is currently small. Further research is required to determine the extent to which factors highlighted are relevant.
- Some researchers were involved in more than one study which may have introduced bias.
- Only English language papers were reviewed and therefore some relevant studies may have been omitted.

Introduction

Premature ovarian insufficiency (POI) is a chronic health condition in which the ovaries ‘fail’ prior to the age of forty which causes an early menopause and for the majority infertility (only 5% will ever be able to become pregnant, Bakalov et al., 2005). The condition causes severe and prolonged vasomotor symptoms and long-term physiological consequences (see Figure 1). It is estimated to occur in 1% of the population before the age of 40 and 0.1% before the age of 30. True prevalence rates are however difficult to establish due to oestrogen-based contraception masking symptoms. It is a life-changing condition about which there are considerable deficiencies in our understanding (Maclaren & Panay, 2015).

[figure removed due to copyright: illustration of physiological consequences of POI published within Australian Family Physician (Nyugen, Milat & Vincent, 2017)]

Figure 1. *Physical and psychological consequences of POI*

POI has multiple aetiologies, including genetic, autoimmune conditions, iatrogenic causes related to chemotherapy/surgery and idiopathic or spontaneous presentation. The latter aetiology accounts for the majority (approximately 80%) of cases (Nelson, 2009). It is thought idiopathic POI has an as yet undiscovered genetic cause (Rossetti, Ferrari, Bonomi & Persani, 2017). Diagnosis is established by two (one month apart) serum FSH (follicle stimulating hormone) levels in the menopausal range (<25IU/I) and at least four months of amenorrhea (menstrual irregularity). There has been an evolution in nomenclature, from early/premature menopause, to premature ovarian failure (POF) and now POI due to criticism that ‘failure’ implied both finality of the condition and individual responsibility (Shuster, Rhodes, Gostout, Grossardt & Rocca, 2010).

POI is not a ‘transition’ like age-appropriate menopause, it is a condition requiring long-term management and forward planning to prevent further physical and psychological complications (Demayo et al., 2019). There is no cure and treatment is limited to hormone replacement therapy (HRT) to manage associated vasomotor symptoms. The condition is associated with high rates of psychological distress (Li et al., 2019) with as many as 76% of women having a psychiatric diagnosis (Engberg et al., 2017). While the medical profession has clear guidelines regarding management of the physical impact of POI (Webber et al., 2016), no guidelines exist on managing the psychological impact of the condition.

Psychological well-being in POI

The term psychological well-being is used interchangeably with quality of life (Utian, 2005) and encompasses a wide range of psychological concepts (Ryff, 1989). There is as yet no consensus on what elements constitute psychological well-being (Goodman, Disabato, Kashdan, & Kauffman, 2017). Seligman’s (2011) proposed PERMA model of well-being highlighted five key elements viewed as the ‘building blocks’ to psychological well-being (see Figure 2). It is likely that POI presents women with multiple threats to these elements due to the systemic impact of infertility (Fisher & Hammarberg, 2020), the additional burden of menopausal symptoms and management of

Figure 2. *Seligman's (2011) PERMA model of psychological well-being*

long-term sequalae.

At first glance, it may appear that the negative psychological impact of POI could be due to the well-researched deleterious impact of lowered oestrogen on mood and anxiety (Sassarini, 2016). However, if this were true, rates of depression and anxiety reported in women experiencing age-appropriate menopause at approximately age 50 (Gold, 2011) would be similar to those with POI, however this is not the case. A meta-analysis by Georgiakis et al. (2016) demonstrated that women experiencing menopause over forty have a 50% *decreased* risk of developing depression. It could also be expected that women with POI taking HRT to boost oestrogen levels would be more likely to have a lower prevalence of mood and anxiety issues compared to those that were not, however research has shown this is not the case (Mann, Singer, Pitkin, Panay & Hunter, 2012; Guerrieri et al., 2014). It may also be expected that the psychological well-being of women who already have children may be less impacted by POI. However, there is no evidence that this is the case (Singer, 2012; Orshan et al., 2009).

The factors influencing psychological well-being in women with POI are not well understood and require further exploration. However, it is likely there are some similarities with other chronic health populations. For example, people with chronic health conditions experience greater levels of stigma (Brown, 2015; Jackson, Beekin & Wardle, 2015), lower self-esteem (Ireys, Gross, Werthamer-Larsson, & Kolodner, 1994) and reduced quality of life (Alonso et al., 2004; da Rocha & Fleck, 2010). Positive relationships with others also result in physical health benefits and better psychological well-being (Cheng, Inder & Chan 2019; Kieholt-Glaser & Newton, 2001; Ridgeway et al., 2014). Self-compassion and resilience can also improve psychological well-being in chronic illness (Sirois, Molnar & Hirsch, 2015) as can personality factors such as higher levels of gratitude (Sirois & Wood, 2017), self-efficacy (Tan-Kristanto & Kiropoulos, 2015) and trait-mindfulness (Bränström, Duncan & Moskowitz, 2011). This review will help identify any commonalities.

Why is this review needed?

Rafique, Sterling and Nelson (2018) called for an evidence-based programme to help women with POI navigate acceptance of the diagnosis, ongoing management of the condition and maintenance of psychological well-being. An understanding of the factors impacting psychological well-being in POI is required to inform the development of evidence-based interventions to ensure women with POI receive the care they need. To date there has been no systematic review of these factors. Without specific knowledge of these factors, assumptions may be made that women with POI are experiencing the same process as age-appropriate menopausal women and this may be damaging. For example, research by Boughton (2002) found that women being given information at diagnosis aimed at those experiencing age-appropriate menopause actually increased distress.

Increased awareness and knowledge of these factors may improve physical and psychological outcomes for women with POI. A scoping review methodology which aims to identify all relevant literature on a topic regardless of study design, is particularly useful when providing and overview of a previously unreviewed complex area (Arksey & O'Malley, 2005). It is particularly helpful when the literature on a topic is heterogenous in nature (Mays, Roberts & Popay, 2001) as is the case with POI research.

Method

This scoping review will explore both qualitative and quantitative research findings to gain both breadth and in-depth insight into factors associated with psychological well-being in women with POI. As factors associated with psychological well-being have not been studied as a primary aim in existing research providing a narrative account is in-fact the only way currently that this research question can be explored. Narrative methods are recognised as useful for investigating heterogeneity across primary studies and developing an understanding of review questions which do not lend themselves to meta-analysis or systematic review (Popay et al., 2006).

A narrative descriptive approach (Popay et al., 2006) was used to synthesise both qualitative and qualitative findings. Popay et al. (2006) suggest this approach is particularly useful when the review question dictates the inclusion of a wide range of research designs. The defining characteristic of the approach is that it adopts a textual approach to 'tell the story' of the findings from the included studies. The primary stage involves the use of a data extraction sheet (Appendix B) to extract key information from the final sample of studies. Study details included: author, year of publication, country of origin, sample demographics (size, age, gender, ethnicity and diagnosis), comparison conditions, methodology (cross-sectional, retrospective or prospective cohort, with or without control), measures and outcomes, analysis procedures, findings and conclusions.

The second stage involves repeatedly reading the completed data extraction forms and inductively generating codes as they relate to the review question and objectives. To ensure inter-rater reliability, a second coder was then invited to review all data extraction sheets in line with Levac, Colquhoun and O'Brien's (2010) enhancements to Arksey and O'Malley's (2005) methodological framework for scoping reviews. Discrepancies in codes identified were resolved through discussion and by reference to supportive data. Agreed upon codes and themes were then organised into meaningful categories by the researcher and second coder based on commonalities in findings and frequency in the studies. By applying this systematic approach comparisons could be made across study findings; both qualitative and quantitative data.

Quality of evidence was not be explored as the aim of a scoping review is not to provide generalisable findings, but instead to provide a descriptive account of existing research (Arksey & O'Malley, 2005). There is therefore no attempt to present an opinion on the 'weight' of evidence. An advantage of the methodology is that it will identify gaps in the literature for future research (Gilleece, Dunwoody, Campbell & Harris, 2019). The stages for conducting a scoping review as recommended by Arksey and O'Malley (2005) and subsequent researcher's modifications (Colquhoun et al., 2014; Daudt, van Moseel & Scott, 2012; Peters et al., 2015) were followed. The PRIMA-Scr checklist for scoping reviews (Tricco et al., 2018) was used to guide reporting (see Appendix A). The protocol was registered on the Open Science Framework on the 21st December 2019 and can be accessed at: https://doi:10.17605/OSF.IO/W2S4X.

Search strategy

An iterative process was used in line with Peters et al. (2015) scoping review methodology. The first stage involved a limited search using keywords related to psychological well-being (e.g. quality of life, anxiety, relationship etc.) and POI to identify a selection of relevant papers. An analysis of key words used in these papers was conducted to expand the list. The second stage used all identified keywords across all databases (Medline, PsychINFO, PubMed, Scopus and CINAHL). Search terms were used which incorporated past and present terminology and international differences for POI. The symbol * was used for truncation. Search terms used were as follows: "Premature ovarian insufficiency" OR "premature ovarian failure" OR "premature menopause" OR "early menopause" OR "ovarian failure" OR "primary ovarian insufficiency" OR "primary ovarian failure" AND "mental health" or "psychological" or "psychosocial" OR "anxiety" or "depression" OR "relationship"* OR "distress" OR "well-being" OR "well being" OR "wellbeing" OR "self-esteem" OR "self esteem" OR "sexual"* OR "quality of life". No past date restrictions were used due to paucity of research and the search included literature published up to 20th December 2019. In the final sample a forward citation search was also conducted. A range of grey literature sources was searched in line with Bell's (2018) guidance.

Selection criteria

Table 1 summarises inclusion and exclusion criteria.

Table 1

Inclusion and exclusion criteria

Inclusion criteria	**Exclusion criteria**
Sample diagnosed with POI at age 40 or below	Unclear at what age participants were diagnosed.
Sample diagnosed with iatrogenic or idiopathic POI	No formal diagnosis of POI given, i.e. self-diagnosed
Sample included any age (due to POI occurring at any age from puberty onwards)	Undifferentiated sample of POI and age-appropriate menopausal women
Studies included a focus on one or more psychological aspect of POI	Study focussed solely on physical menopausal symptoms of POI with no mention of psychological factors
Same sample used in different studies, as long as different factors were being measured	Same sample used and findings repeated in subsequent papers

Contained primary or secondary data from quantitative, qualitative or mixed-methods studies and discussed or measured any factors related to psychological well-being	Data for participants with POI could not be separated from those with other similar infertility related conditions, e.g. Fragile X syndrome
Published in English	Sample undergoing IVF treatment
	Theoretical or discussion pieces

Results

The databases were searched systematically using the search terms, resulting in 4051 papers being retrieved. Duplicates were excluded, and all remaining papers screened by title for relevance using inclusion and exclusion criteria. A search of the grey literature did not return any relevant results. Forty-one full-text articles were considered for inclusion. Of these nine were excluded (reasons provided in Figure 3) resulting in 32 papers being included in the final analysis. There was considerable heterogeneity in included studies in terms of methods, participants and research focus. Study characteristics can be seen in Table 2.

The majority of studies were cross-sectional with the remainder being longtitudinal. Six studies used qualitative methods, 24 quantitative and two mixed-methods. Within the six qualitative studies reviewed two employed face to face conversational style interviews to explore women's experience of POI, three semi-structured interviews and one analysed 1350 messages posted by 98 women on an online POI support forum. A range of methods were used to analyse data: discourse analysis, domain analysis, thematic analysis, phenomenology and hermeneutic phenomenology. The two mixed-methods studies used semi-structured interviews and thematic analysis alongside descriptive statistics. The 24 quantitative studies measured the impact of POI on diverse aspects of psychosocial functioning. These measures were used as outcomes, independent variables or mediators depending on the research question.

The studies included a total of 8217 participants from seven countries: Australia, Argentina, Turkey, United States, the Netherlands, Brazil and the UK. Participants ranged in age from 18-57. Number of participants ranged from 6 to 4968. The same sample was used in more than one study. Deeks et al. (2011) and Gibson-Helm et al., (2014) used the same sample. Mann et al., (2012) used the same sample as Singer et al., (2011). Vanderhoof et al. (2009) used the same sample as Covington et al. (2009). However, as there was no replication of findings and the variables explored were different in each, all were included.

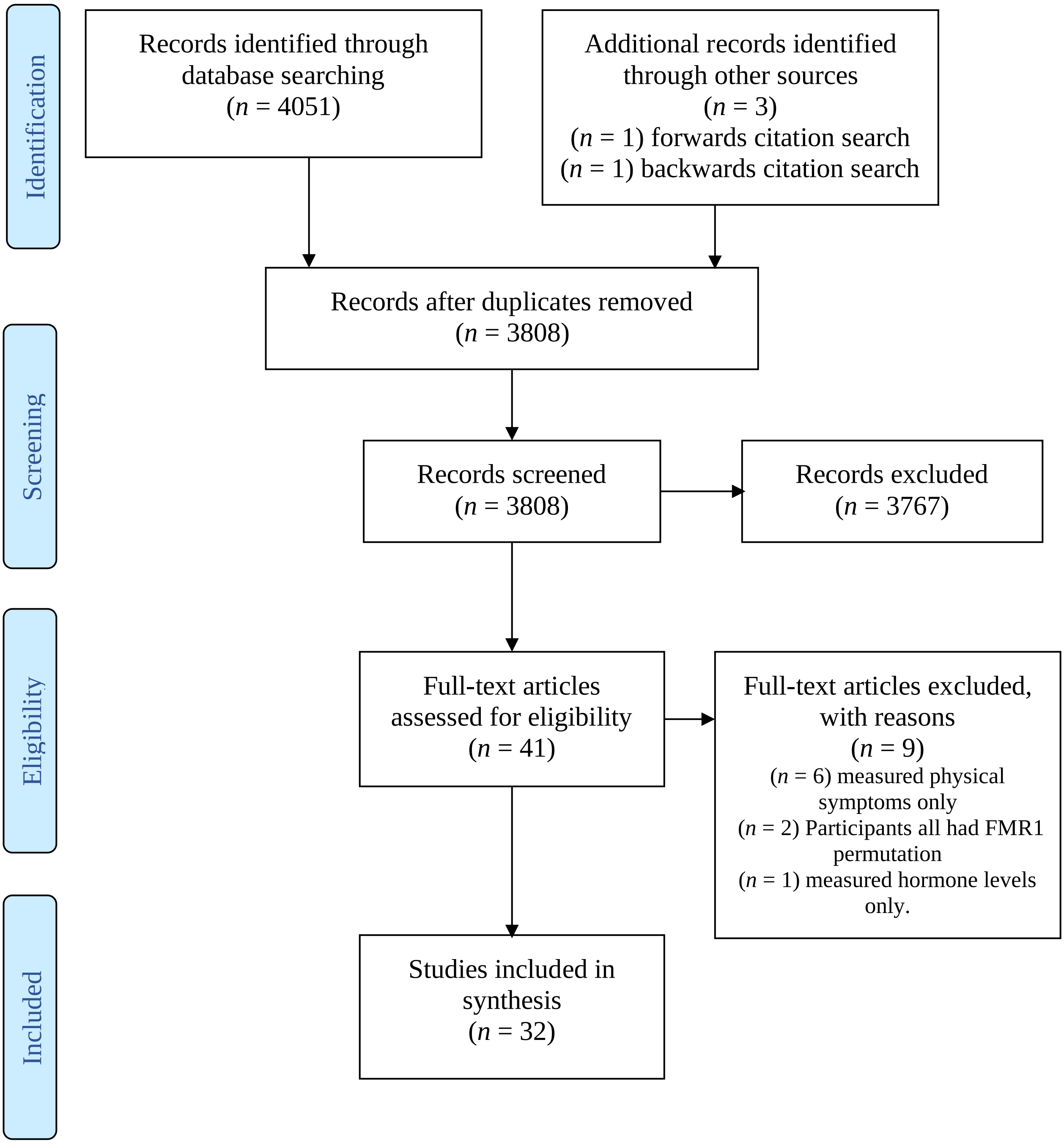

Figure 3. PRISMA flow diagram

Table 2. *Summary of articles included in the final synthesis*

	Author(s) **Year** **Location**	**Study design**	**Outcomes measured**	**Sample size (*n*)** **Age range (years)**	**Key findings & themes**	**Limitations**
1	Allhouse, Semple & Santoro 2015 USA	Quantitative cross-sectional	Menopause related quality of life (MenQOL)	*n* = 160 18-63	No association found between menopause related quality of life and time since diagnosis (*r* = -0.12, *p* = 0.14), symptom severity (*r* = -0.20, *p* = 0.90), current age (*r* = -0.02, *p* = 0.84) or age at diagnosis (*r* = 0.03, *p* = 0.67). Depression symptoms reported by 46% with 26% stating symptoms present more than 5 years before diagnosis.	Self-report measures and convenience sample used. Participants recruited from one institution.
2	Alzubaidi, Chapin, Vanderhoof, Calis & Nelson 2002 USA	Quantitative cross-sectional	Satisfaction with diagnostic process using yes/no and multiple-choice questions	*n* = 48 Mean age 33.5 (SD 4.8)	54% of women dissatisfied with manner in which diagnosed and 74% with information provided. 25% of women reported diagnosis took 5> years from symptom onset with 50% seeing 3 or more clinicians to obtain a diagnosis. Spending more time with the clinician was associated with higher levels of satisfaction (*r* = 0.21, *p* <.05).	Self-report measures and convenience sample used. Participants recruited from one institution.
3	Aydin, Ates, Aydin & Batmaz 2017 Turkey	Quantitative cross-sectional comparison between women diagnosed with POI and those	Sexual function (FSFI)	*n* = 80 24-39	There was a statistically significant difference in sexual function scores between those who were aware they had POI (*M* = 15.3, *SD* = 12.4, *p* <.05) and those unaware of their diagnosis (*M* = 10.3, *SD*, 7.3), *p* <.05.	Self-report measures and convenience sample used. Participants recruited from one institution.

		not diagnosed but symptomatic				
4	Benetti-Pinto, Soares, Giraldo & Yela 2014 Brazil	Quantitative cross-sectional	Sexual function (FSFI)	$n = 160$ Age not provided	The FSFI domain with greatest influence on sexual function was arousal, followed by desire, together accounting for 41%. The domains with less influence were arousal and desire, together accounting for 25% of FSFI scores.	Self-report measures and convenience sample used. Participants recruited from one institution.
5	Boughton 2002 Australia	Qualitative cross-sectional	Not applicable	$n = 30$ Age range not provided	Body confusion: a sense of alienation; the conspicuous symptomatic body; a different body; menopause stereotype discordance; conforming to the image of a menopausal woman: the stereotype? social self-identity disruption; the failing body: grieving the loss of fertility.	Small sample size limits generalisability
6	Boughton 2008 Australia	Qualitative cross-sectional	Not applicable	$n = 35$ Age range not provided	Uncertainty regarding non-specific nature of symptoms experienced; unhelpful reaction of health professionals; the contested legitimacy of symptoms; age and its impact on being diagnosed.	Small sample size limits generalisability
7	Covington, Davis, Vanderhoof, Koziol & Nelson	Quantitative cross-sectional comparison with normal controls	Perceived mastery (PPMS), depression (CES-D), state anxiety (STAI), positive	$n = 100$ 18-42	Women with POI scored significantly lower ($M = 21.5$, $SD = 17.2$) than normal controls ($M = 24.5$, SD, 14.5), $p < .05$ on PMS. Perceived mastery significantly correlated with CES-D ($r = -0.56$), STAI ($r = -0.35$, Negative Affect ($r = -0.34$), Positive affect ($r = 0.48$) (all p <.01).	Self-report measures and convenience sample used.

	2009 USA		and negative affect (PANAS)			
8	Davis et al. 2010 USA	Quantitative cross-sectional comparison to normal controls	Illness uncertainty (MUIS); depression (CES-D); Purpose in Life (subscale of PMWBI)	$n = 160$ 18-42	Compared to normal controls illness uncertainty and purpose in life were significant independent factors associated with anxiety in women with POI ($R^2 = 0.47$), stigma and purpose in life were significant independent factors associated with depression ($R^2 = 0.51$) and purpose in life was significantly and independently associated with positive affect ($R^2 = 0.43$) (all p <.01).	Self-report measures and convenience sample used. Participants recruited from only one institution.
9	Deeks, Gibson-Helm, Teede & Vincent 2011 Australia	Quantitative cross-sectional comparison of idiopathic and medically induced premature menopause (MIPM) and normal controls	Sexual function (GCS); anxiety and depression (HADS) plus yes/no questions regarding diagnostic process	$n = 77$ 34.8 (SD 5.7)	Compared to controls women with POI had: higher rates of depression ($M = 5.1$, $SD = 3.4$ vs $M = 2.7$, $SD = 3.4$), $p =$ p <.05; higher rates of anxiety ($M = 9.1$, $SD = 3.9$ vs $M = 6.3$, $SD = 3.9$), p = <.01, higher levels of dyspareunia ($M = 2.5$, $SD = 1.5$ vs $M = 1.6$, $SD = 1.0$), p <.05) and lower levels of sexual responsiveness ($M = 2.7$, $SD = 1.4$ vs $M = 3.8$, $SD = 1.1$, p <.05). Women with surgically induced POI ($M = 11.1$, $SD = 5.6$) were more anxious than those with idiopathic ($M = 9.1$, $SD = 3.9$), p p <.05. The majority of women (77%) were dissatisfied with the diagnostic process.	Self-report measures and convenience sample used.
10	Driscoll et al. 2016 USA	Quantitative Longitudinal	Stigma (LSS); Self-esteem (RSES); coping (Brief COPE); depression (CES-D); anxiety (STAI)	$n = 102$ 18-42	Higher levels of stigma were associated with higher levels of depression ($r = 0.58$, p <.01) and anxiety ($r = 0.33$, p <.01). Avoidance was associated with higher levels of depression and anxiety over time (ab) = 0.10 (SE = 0.04); 95% CI [0.03, 0.21].	Self-report measures and convenience sample used.

11	Engberg et al. 2017 Sweden	Quantitative cross-sectional	Presence of psychiatric issues (MINI+)	*n* = 33 21-57	64% of women with POI had psychiatric diagnoses. Cause of POI was not associated with psychiatric diagnoses (*r* = 0.14, *p* = 0.80).	Small sample. Self-report measures and convenience sample used.
12	Gibson-Helm, Teede & Vincent 2014 Australia	Quantitative cross-sectional comparison of idiopathic and medically induced POI and controls	Symptom experience (GCS)	*n* = 77 20-41	Depression symptoms were higher in the MIPM group 38-59% compared to idiopathic POI group 20-25%, *p* <.05). Women with idiopathic POI (52%) and MIPM (54%) showed less interest in sex compared to controls (17%), *p* *p* <.05.	Self-report measures used.
13	Groff et al. 2005 USA	Mixed methods cross-sectional	Structured telephone interviews using yes/no, multiple choice and open-ended questions regarding diagnosis of POI	*n* = 100 Age range not provided.	71% dissatisfied with manner of diagnosis. 89% reported severe emotional distress at time of diagnosis. Emotional distress was associated with the degree of dissatisfaction with the manner in which diagnosed (*r* = .25, *p* <.01). 53% of women reported clinician had very limited knowledge of POI. 63% of those with a partner cited them as most important form of support. Single women were most likely (58%) to turn to family.	Convenience sample used from one treatment centre. Possible selection bias.
14	Halliday & Boughton 2009 UK	Qualitative cross-sectional analysis of messages posted on POI forum	Not applicable	*n* = 98 Age range not provided.	Themes identified: legitimising the symptoms; the impact of diagnosis (“losing me”); treatment (“regaining me”) and feeling alone.	Small sample size limits generalisability

15	Islam & Cartwright 2011 UK	Quantitative longitudinal 1958 birth-cohort study	Quality of life (SF-36)	*n* = 4968 up to 50 years	Women with POI were twice as likely to report poor quality of life compared to general population (OR 2.11, 95% CI 1.66-2.68, *p* <.01). There were no significant differences between those with idiopathic and iatrogenic POI (*p* = 0.97).	Self-report measures used.
16	Kalantaridou et al. 2008 USA	Quantitative longitudinal	Sexual function (DISF-SR)	*n* = 213 18-42	Participants with POI had lower sexual function scores (*M* = 43.0, *SD* = 12.0) compared to controls (*M* = 53.0, *SD* = 11.7), *p* <.01. Current age, time since diagnosis, level of education and age at onset were not associated with sexual function scores.	Self-report measures and convenience sample used.
17	Liao, Wood & Conway 2000 UK	Quantitative cross-sectional comparison to normal controls	Depression (CES-D); Life satisfaction (SLS)	*n* = 64 18-40	Participants with partners had significantly higher life satisfaction scores compared to those without *t*(61) = 2.00; *p* <.05 and having children accounted for a significant proportion of variance (R^2 = 0.10, *F*(1,60) = 6.32, *p* <.05. Being diagnosed at a younger age was associated with higher levels of depression F(2, 57) = 3.81, *p* <.05.	Self-report measures and convenience sample used. Participants recruited from only one institution.
18	Mann, Singer, Pitkin, Panay & Hunter, 2012 UK	Quantitative cross-sectional	Quality of life (SF-36); Health (WHQ)	*n* = 136 Mean age 38.71 (SD 7.03)	Being older predicted better quality of life (ß = 0.18) and less anxiety/fear (ß = -0.19). Satisfaction with medical services predicted better SF-36 mental health (ß = -0.18) and social functioning (ß = 0.19). Having children was not associated with higher quality of life.	Self-report measures and convenience sample used.

19	Nicopoullos et al. 2009 UK	Quantitative cross-sectional retrospective observational analysis	Associations between age and aetiology on quality of life (MenQOL) and sexual function (FSFI)	$n = 239$ Age range not provided.	Age 30-35 associated with greater sexual dysfunction and lower psychological well-being ($r = 0.24$, $p <.05$). Lower sexual function in those with disease aetiology ($M = 14.9$, $SD = 12.4$) compared to those with idiopathic POI ($M = 10.1$, SD, 7.3), $p <.05$	Self-report measures and convenience sample used. Participants recruited from only one institution.
20	Onder & Batigun 2016 Turkey	Quantitative cross-sectional comparison with women experiencing normal menopause	Coping (WCI), marital adjustment (MAT), stress (SRS)	$n = 224$ 34-45	POI group had significantly higher stress scores ($t = 2.57$, p<.05) and lower marital adjustment ($t = 2.26$, $p <.01$). A helpless coping style predicted greater distress in both groups ($F = 13.35$, SD = 4.94, $p <.01$). No associations found between current age and having children on outcome measures.	Self-report measures and convenience sample used. Participants recruited from only one institution.
21	Orshan, Furniss, Forst & Santoro 2000 USA	Qualitative cross-sectional	Not applicable	$n = 6$ 25-41	Themes identified: I was treated like a diagnosis instead of a person; I am grieving the death of the future I dreamed; I exist in a world with others, most of whom are fertile; I'm too young to be so old.	Small sample size limits generalisability.
22	Orshan et al. 2009 USA	Quantitative cross-sectional comparison with normal controls	Personal and social resources (PRQ-85)	$n = 217$ 18-42	Women with POI had significantly lower perceived social support compared to controls (152 [92-174] vs. 156 [117-174], $p <.01$) and lower self-esteem (9 [0-10] vs. 10 [7-10], $p <.01$. No associations with age at diagnosis and having children.	Self-report measures and convenience sample used. Participants recruited from only one institution.

23	Pasquali 1999 USA	Qualitative cross-sectional	Not applicable	$n = 11$ 32-50	Major factors impacting sense of self: Change/loss; connectedness/disconnectedness; transcendence/transformation.	Small sample size limits generalisability and convenience sample used.
24	Singer 2012 UK	Mixed methods cross-sectional	Yes/no, multiple-choice and open questions on POI	$n = 220$ 19-61	79% of women were dissatisfied with the way in which they received their diagnosis. 55% felt they were given adequate information. Loss of fertility was a concern to 71% of women regardless of whether they already had children. Social support from peers with POI was preferred by 69%.	Self-report measures and convenience sample used.
25	Singer & Hunter 1999 UK	Qualitative cross-sectional	Women's experience of POI using discourse analysis	$n = 13$ 23-40	Theme 1: Reactions: negotiating blame and responsibility; fertility, lost life plan. Theme 2: Medical consultations and treatments. Theme 3: Impact on sense of self; Am I normal? The bad self/body; sexuality; self in relation to others.	Small sample size limits generalisability.
26	Singer, Mann, Hunter, Pitkin & Panay 2011 UK	Quantitative cross-sectional comparison with normal controls	Young Menopause Assessment (devised by researchers); sexual function (SPEQ); self-esteem (RSES); quality of life (SF-36)	$n = 136$ 19-61	Compared to normal controls women with POI have lower quality of life ($M = 54.74$, $SD = 22.10$ vs. $M = 71.77$, $SD = 19.54$), $p < .05$; lower self-esteem $M = 27.54$, $SD = 7.1$ vs. $M = 35.78$, $SD = 5.2$), $p < .01$. 50% of women with POI experienced sexual dysfunction. 78% of women reported POI had a negative impact on their self-image. The majority wanted more age-appropriate information on POI (60%) and 49% wanted psychological support.	Self-report data and convenience sample used.

27	Sterling et al. 2009 USA	Quantitative cross-sectional	Spiritual well-being in chronic illness (FACIT-sp-Ex)	$n = 140$ 18-42	Significant correlation between relational aspects of spirituality and functional well-being ($r_s = 0.44$, $p < .01$) and meaning/peace ($r_s = 0.82$, $p < .01$) and functional well-being.	Self-report data and convenience sample used.
28	de Taraciuk et al. 2008 Argentina	Quantitative cross-sectional	Depression (BDI); anxiety (STAI)	$n = 21$ 18-39	Cause of POI was not associated with depression ($r = 0.270$, $X^2 = 0.254$), state anxiety ($r = 0.555$, $X^2 = 0.335$) or trait anxiety ($r = 0.802$, $X^2 = 0.540$). 61.9% of participants displayed clinical levels of state anxiety and 47.6% of trait. 33% were in clinical range for depression.	Small sample size. Self-report measures and convenience sample used. Participants recruited from one institution.
29	van der Stege et al. 2008 Netherlands	Quantitative cross-sectional comparison with normal controls	Sexual dysfunction (QSSD); psychological distress (SCL-90)	$n = 149$ 20-42	Compared to controls omen with POI had higher psychological distress ($M = 131$, $SD = 114.0$ vs. $M = 114$, $SD = 120.2$), $p < .01$ and sexual dysfunction ($M = 16.6$, $SD = 5.9$ vs. $M = 11.3$, $SD = 7.1$), $p < .05$. Having a partner was associated with less psychological distress ($r = 0.32$, $p < .05$) and greater sexual satisfaction ($r = 0.12$, $p < .05$). No differences in number of sexual contacts between groups.	Self-report measures and convenience sample used.
30	Vanderhoof et al. 2009 USA	Quantitative cross-sectional comparison with normal controls	Spirituality (SRS); depression (CES-D); anxiety (STAI)	$n = 100$ 18-42	Women with POI had higher mean score on spirituality compared to controls (2.82 vs. 2.57, $p < .05$) but not on religiousness (2.43 vs. 2.41, $p = .08$). Degree of spirituality was not associated with depression or anxiety.	Self-report measures and convenience sample used.

31	Ventura et al. 2007 USA	Quantitative cross-sectional	Spiritual well-being in chronic illness (FACIT-sp-Ex)	*n* = 138 Age range not provided	Higher scores on meaning/peace subscale significantly predicted functional well-being ($r^2 = 0.63$, $p < .01$). Functional well-being is positively correlated with spirituality ($r_s = 0.68$, $p < .01$).No associations with age, time since diagnosis, partner, children or racial status on well-being.	Self-report measures and convenience sample used. Participants recruited from one institution.
32	Yela, Soares & Benetti-Pinto 2017 Brazil	Quantitative cross-sectional case-control comparison	Sexual function (FSFI); quality of life (WHOQoL-BREF)	*n* = 160 Age range not provided	Women with POI had significantly lower sexual function scores compared to controls ($M = 24.0$, SD = 5.7 vs. $M = 27.7$, SD = 4.6), $p < .01$. FSFI score was correlated with quality of life scores ($r = 0.26$, $p < .05$).	Self-report measures and convenience sample used. Participants recruited from one institution.

Note: MenQOL = Menopause related Quality of Life (Hilditch et al., 1996); FSFI = Female Sexual Function Index (Rosen et al., 2000); PPMS = Pearlin Perceived Mastery Scale (Pearlin & Schooler,1978); STAI = State-Trait Anxiety Index (Spielberger, Gorsuch, & Lushene, 1970); BDI = Beck Depression Inventory (Beck, Steer, & Brown, 1996); PMWBI = Positive Mental Well-Being Inventory (Clarke et al., 2010); GCS = Greene Climacteric Scale (Greene, 2008); HADS = Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983); MBSRQ = Multidimensional Body Self-Relations Questionnaire (Cash, 2000); CDSS = Chronic Disease Self-Efficacy Scale (Wigal et al., 1991); SPEQ = Shortened Personal Experiences Questionnaire (McCoy & Matyas, 1996); LSS = Lennon Stigma Scale (Lennon et al., 1989); RSES = Rosenberg Self-Esteem Scale (Rosenberg, 1965); MINI+ = Mini International Neuropsychiatric Interview plus (Sheehan, 1998); DISF-SR = Derogatis Interview for Sexual Function Self-Report (Derogatis, 1997); SLS = Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985); WCI = Ways of Coping Inventory (Folkman, Lazarus, Gruen & DeLongis, 1986); MAT = Marital Adjustment Test (Locke & Wallace, 1959); SRS = Stress Reactions Scale (Chandler, 1983); PRQ-85 = Personal Resources Questionnaire – 85 item (Burlingame, 1996); YMA = Young Menopause Assessment; FACIT-Sp-Ex = Functional Assessment of Chronic Illness Therapy – spiritual well-being scale – expanded (Cella, 2002); QSSD = Questionnaire for Screening Sexual Dysfunction (Bartula, 2003); SRS = Spirituality and religiousness scale (Piedmont & Leach, 2002); Brief Coping Orientation for Problem Experiences, B-Cope (Carver, 1997); Short-From Health Survey, SF-36 (Ware & Sherbourne, 1992); Symptom Checklist-90, SCL-90 (Derogatis & Unger, 2010); CES-D = Center for Epidemiological Studies Depression Scale (Devins, 1985); Positive and Negative Affect Scale, PANAS (Watson, Clark, & Tellegen, 1988); PSS = Perceived Stress Scale (Cohen, Kamarck, & Merelstein, 1983; 1994).

Synthesis of the findings

Factors identified were grouped into three logical categories as illustrated in Figure 4. Prevalence across the studies is represented by numbers in brackets ().

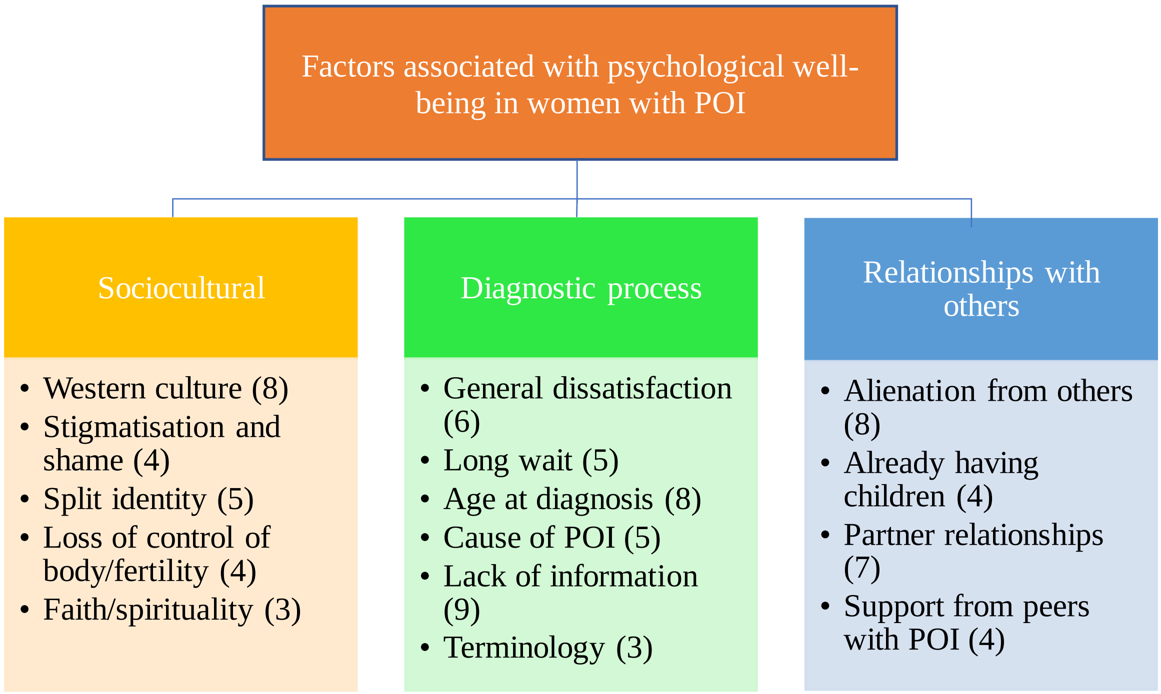

Figure 4. *Factors associated with psychological well-being in women with POI (n = 32)*

Factors associated with psychological well-being in POI

Sociocultural

Western culture emerged as a theme across eight of the studies reviewed. Boughton (2002) and Davis et al. (2010) posited Western culture is one in which ageing and menopause are inextricably linked and both are constructed as undesirable. Singer and Hunter (1999) found that negative societal constructions of menopausal women negatively impacted the self-esteem of women with POI and noted women with POI felt ‘neutered’ with one participant reporting she could no longer ‘flirt’. Benetti-Pinto et al. (2014) and Yela et al. (2017) both found women felt ‘unsexy’ following diagnosis. However, despite reporting feeling less sexual women reported having the same number of sexual contacts compared to controls (van der Stege et al., 2008) and this did not deteriorate over time (Kalantaridou et al., 2008). Interestingly, Aydin et al.'s (2017) found that when unaware they have POI women's sexual function was not impacted. These findings suggest that how a woman feels about herself as a sexual being is linked to societal notions of female sexuality.

Stigmatisation as a result of having POI was identified in four studies. Women reported feeling embarrassed and ashamed about their POI and that they no longer felt like a 'real' woman (Singer & Hunter, 1999). Boughton (2002) reported that women felt abnormal and stigmatised. Singer (2012) reported that a teenage girl was told by her family to keep her POI a secret, suggesting that disclosure may make others see her in a new and damaging light. Driscoll et al. (2016) explored how stigma in POI impacted mental health and found that higher levels of stigma were associated with greater depression. The findings suggest that POI creates feelings of being 'different' to others and that this may have a negative impact on at least one aspect of mental health.

Split identity can be caused by body confusion when there is a disruption between the outer and inner self (Boughton, 2002). Five studies highlighted this feeling of being 'split'. Halliday and Boughton (2009) found that women felt a loss of self-identity and felt less feminine. Pasquali (1999) reported a sense of self-concept dislocation and increased anxiety. Boughton (2002) reported as a result of the 'split', outer body image became more important. Singer (2012) and Singer and Hunter (1999) found women felt confused and compelled to redefine their identity in light of the dissonance created by feeling old inside and young outside. The findings suggest POI is a significant challenge which creates the need for a renegotiation of identity.

Loss of control of body/fertility was reported in four studies. Orshan et al. (2000) and Covington et al. (2009) found that POI made women feel as if they had lost control of their body and the loss was associated with increased negative affect. Loss of control over fertility was also a concern for 71% of women (Singer, 2012) whether they already had children or not. Singer and Hunter (1999) found that this feeling of loss of control was exacerbated by a lack of medical support and information. These findings suggest that a feeling of loss of control of the body may negatively impact psychological well-being.

Faith and spirituality were also found to be protective to psychological well-being within four studies (Groff et al., 2005; Sterling et al., 2009; Vanderhoof et al., 2009; Ventura et al., 2007;). Both Ventura et al. (2007) and Vanderhoof et al. (2009) found that the meaning/peace subscales of the measured used were the highest rated by women with POI. Sterling et al. (2009) also found a correlation between the relational aspects of spirituality and psychological well-being, suggesting that relationships with others are an important aspect of practicing faith in those with POI.

Diagnostic Process

General dissatisfaction with the process was expressed in six of the studies reviewed. Singer et al. (2011) found that only 21% of women were satisfied with the way in which they received their diagnosis. Clinicians were reported as excellent at treating physical symptoms but not the psychological (Orshan et al., 2000). Women felt diagnosis delivery was often insensitive (Groff et al., 2005; Singer & Hunter, 1999). Mann et al. (2012) found that lower levels of satisfaction with medical services received predicted poorer mental health. Alzubaidi et al. (2002) found those who spent more than 5 minutes with the clinician reported greater satisfaction. Overall, women felt clinicians were skilled in dealing with the vasomotor symptoms of POI, but not the psychological.

Long wait to diagnosis was reported in five studies reviewed. Singer et al. (2011), Singer and Hunter (1999) and Halliday and Boughton (2009) all found the longer the time to diagnosis the more psychological distress women experienced. Boughton (2008) reported women felt invalidated by the process, with one describing she felt she was “going mad” with symptoms being repeatedly blamed upon stress. Singer (2012) also reported women felt they were being a ‘nuisance’. Alzubaidi et al. (2002) found 25% of participants reported diagnosis took five or more years from symptom onset and 50% of women saw three or more clinicians to obtain one. These findings suggest that POI is not readily recognised by clinicians and during the delay women may become increasingly distressed.

Age at diagnosis was considered in eight of the studies reviewed. Liao et al. (2000) found younger age was associated with poorer mental health outcomes. Boughton (2002) found women in their thirties experienced greater distress. Nicopoullos et al. (2009) also reported that women in the 30-35 age range had the lowest levels of psychological well-being. Mann et al. (2012) found that older age (40+) predicted less anxiety. Singer et al. (2011) found that single teenagers were the most vulnerable and that older age was associated with greater adjustment. However, Allhouse et al. (2015) and Onder and Batigun (2016) found no correlation between age and psychological well-being and Kalantaridou et al. (2008) no association with sexual function. It is unclear therefore whether age is associated with psychological well-being or whether the age ranges reported to show higher levels of distress are the age bracket women are most likely to be diagnosed and/or trying to become pregnant. Further research is required to understand how age relates to psychological well-being in POI.

Cause of POI was explored in five studies. The largest study compared the impact of idiopathic POI to iatrogenic on quality of life using 4968 women’s UK 1958 birth cohort data (Islam & Cartwright, 2011). They found cause did not correlate significantly with quality of life scores. De Taraciuk et al. (2008) also found cause was not significantly associated with depression and anxiety. Engberg et al. (2017) found cause was not associated with the presence of psychiatric issues. However, some studies did report cause may be associated with aspects of well-being. Deeks et al. (2011) found that participants with surgically induced POI were more anxious than those with idiopathic. Nicopoullos et al. (2009) found that women with a disease aetiology had lower sexual function scores than those with idiopathic POI. These results suggest that some aspects of psychological well-being may be impacted by the cause of POI, however further research is required to determine which.

Lack of information on POI at diagnosis was reported in nine of the studies reviewed. Singer et al., (2011) and Deeks et al. (2011) found the majority of women were dissatisfied with the information provided and the internet was their primary information source. Women reported that in addition to being given little information about POI clinicians did not have sufficient knowledge of POI (Groff et al., 2005; Singer & Hunter, 1999). Davis et al. (2010) found lack of information on POI created illness uncertainty which led to higher levels of anxiety. Alzubaidi et al. (2002) found that greater information at diagnosis directly correlated with higher levels of satisfaction. Mann et al. (2012) found greater satisfaction with medical services (including information given at diagnosis) predicted better mental health outcomes. Boughton and Halliday (2008) highlighted that information provided was often aimed at middle-aged women experiencing age-appropriate menopause, thus perpetuating and consolidating the women's views of themselves as 'old'. These findings suggest that providing adequate and POI specific information at diagnosis is crucial.

Terminology used was found to be problematic within three qualitative studies. Boughton and Halliday (2008) and Singer (2012) found that words used to describe POI such as 'failure' and 'insufficient' increased women's distress. Singer and Hunter (1999) suggest that terminology is important when delivering the diagnosis and that words such as 'atrophy' 'menopausal' etc. can increase distress by aligning these younger women with older women experiencing age-appropriate menopause. Women in their study were noted to prefer the term 'hormone imbalance' to be used instead of menopause. These findings indicate that clinicians needing to be mindful of the negative connotations of some of the terminology used.

Relationships with others

Alienation from others was reported across eight studies. In Halliday and Boughton (2009) women reported feeling alone and isolated from peers. In Pasquali (1999), Singer et al. (2011) and Singer (2012) women stated they felt reluctant to talked about POI with friends as they did not feel friends would understand. Boughton (2002) stated women felt alienated from their fertile peers. In Orshan et al. (2000) women depicted having ‘mixed emotions’ regarding their partners and in Pasquali (1999) felt disconnected from them. Singer and Hunter (1999) reported women’s reluctance to discuss POI was due to concern that others see them in a new and damaging light. Being around pregnant peers was reported as being particularly painful (Boughton, 2002; Singer & Hunter, 1999; Singer, 2012). These findings suggest that the channels of support women may typically access at times of need may be changed by POI.

Already having children did not appear to impact psychological well-being in four studies. Fertility was a concern to 71% of women whether they have children already or not (Singer, 2012). Contrary to expectations, Mann et al. (2012) found that already having children did not predict better psychosocial functioning with the exception than plans for future children were correlate with slightly less emotional role limitation. Orshan et al. (2009) found that already having children did not predict higher levels of self-esteem. However, Liao et al. (2000) found that already having children was associated with higher life satisfaction. The findings are unclear and it may be that having children impacts some areas of psychological wellbeing more than others. It may also be that loss of fertility may have a negative psychological impact which is less related to reproductive ability than the impact being infertile has on self-concept.

Partner relationships were acknowledged as being protective of well-being in seven of the studies. Groff et al (2005) found married women relied on partners for support. Van der Stege (2008) found having a close partner was associated with better psychological well-being. Orshan et al. (2009) highlighted a significant positive correlation between levels of any type of good social support (including partners) and self-esteem. Onder and Batigun (2016) found higher levels of marital satisfaction correlated with higher levels of psychological well-being. Liao et al. (2000) found that having a partner was associated with higher life satisfaction. Singer (2012) and Singer et al. (2011) found that having a supportive partner helped reduce the negative psychological impact of POI. These findings highlight that a close partner can be protective.

Support from peers with POI was the type of social support preferred by the majority of women with POI in four studies: Groff et al. (2005); Singer et al. (2011); Singer (2012); Orshan et al. (2009). However, in Singer et al. (2011) 50% of women stated they would not want to participate in a group due to reticence in talking about their own experiences of POI. Orshan et al. (2009) found that support from women experiencing age-appropriate menopause was particularly unwelcome and may cause further distress. These findings are interesting and suggest that women with POI feel they can only be understood by others experiencing it. This may reflect a lack of knowledge and awareness in society however it may also reflect a reluctance to talk about POI.

Quality and relative contribution of included studies

A formal appraisal of methodological quality or risk of bias is not consistent with scoping review methodology according to Arksey and O’Malley’s (2005) original framework and subsequent enhancements (Joanna Briggs Institute, 2017; Levac et al. 2010; Munn et al., 2018; Peters et al., 2015). The aim being to map all existing research on a given topic rather than provide generalisable findings (Sucharew & Macaluso, 2019). However, limitations and the relative contribution of included studies need to be considered to allow the reader to consider the ‘weight’ of evidence for each identified theme. It is of note that whilst qualitative studies were in the minority (*n* = 8) versus quantitative (*n* = 24), their contribution across themes was greater. For example, Singer and Hunter (1999) appeared in eight subthemes, whereas the majority of quantitative study findings only appeared once. This is perhaps not surprising due to the range of topics covered within qualitative studies and the narrower focus of quantitative research, however the small sample sizes used in these studies limit the extent to which findings may be relevant to others with POI.

The majority of the quantitative research reviewed (22 out of 24 studies) used cross-sectional designs, meaning that conclusions regarding causality are limited (Barker, Pistrang, & Elliott, 2002). All used self-report measures which may have also introduced sampling and response bias. The majority (78%) of studies used a convenience sample which may reduce reliability due to not being representative of women with POI as a whole. The themes identified within this review therefore need to be interpreted with caution but provide an interesting overview of the current research available exploring factors which may be related to psychological well-being in POI.

Discussion

The current scoping review aimed to identify factors associated with psychological well-being in women with POI and highlight areas for future research. Several factors were identified across the studies reviewed and these were categorised into three groups: sociocultural, the diagnostic process and relationships with others. The findings highlight the complex multifactorial impact POI can have on psychological well-being.

Sociocultural factors

Several factors were identified in this review, the first being the influence of

Western culture. It could be argued that in the West a ‘double standard’ still exists in which women are under pressure to keep their youthful looks as a sign of desirability and social currency whereas men are able to age with no loss of currency (Sontag, 1972). This reflects a society in which youth is valued more than old age (Chrisler, 2007) and the ageing female body loses its social significance with the loss of reproductive capacity (Lupton, 1996). These negative attitudes towards ageing and the menopause have been found to predict lower levels of psychological well-being (Hunter & Mann, 2010). Contrast this with findings of studies conducted in Non-Western cultures. For example, in a study comparing perceptions of menopause of Australian women in Laos, Australian women reported greater fears associated with ageing and higher rates of depression compared to Laos women who viewed menopause as a positive event (Sayakhot, Vincent & Teede 2012). For Rajput women of Northern-India the menopause is seen as positive as it signals the end of purdah (seclusion) and allows greater freedom within society (Robinson, 1996). For Chinese-Canadian women the menopause signals a rise in social status (Spitzer, 2009). The culture in which a woman experiences menopause is therefore relevant with regards to how women view themselves and how they perceive others will view them, with those in Western cultures being more negatively impacted.

Cultural influences may also impact vasomotor symptoms of POI. Daly (1995) found that the interpretation of these symptoms is socially mediated in that non-Western women are less likely to report vasomotor issues or experience embarrassment or distress if they do (Lock, 1994). It is possible therefore the experiencing menopausal symptoms, which are in themselves a marker of decline (Woodward, 1999) may increase psychological distress as well as being physically uncomfortable. Whether these cultural differences in menopausal symptoms were due to physiological differences or socially constructed was explored by Nosek, Kennedy and Gudmunsdöttir (2008) who found that non-Western women’s experiences align with Western women’s when acculturation takes place. It is perhaps no surprise that women with POI feel stigmatised, embarrassed and ashamed and these emotions have been linked to poor mental health (Mak, Poon, Pun & Cheung, 2007) and can negatively impact adjustment (Charmaz, 2010). These findings reflect the powerful influence negative societal connotations of the menopause have on both the psychological and physical experience of POI.

The reported ‘split’ women with POI reported (Boughton, 2001; Halliday & Boughton, 2009; Orshan et al., 2000; Singer, 2012; Singer & Hunter, 2007) is also seen in the literature around female ageing. A recent review by Cameron, Ward, Mandeville-Anstey and Coombs (2019) found that many women felt disconnected from their aging body as they felt young inside but were seen by others as old. As a result, women frequently engaged in beauty and surgical interventions to facilitate congruity between their appearance and their sense of felt identity and age (Clarke & Griffin, 2007). Boughton (2002) found that the outer body becomes more important in women with POI which may link Cameron et al.’s (2019) finding. In this context POI may be viewed as a threat which women defend themselves against by attempting to maintain a youthful appearance (Hunter & O’Dea, 1997). It is also possible that the desire to remain youthful and therefore desirable helps explain why women with POI maintain the same amount of sexual contacts as pre-diagnosis despite higher incidences of physical discomfort when having sex (van der Stege et al., 2008) and feeling less desire (Benetti-Pinto et al., 2014). Person’s (1980) research suggests that sexuality is central to a woman’s identity and that if this is disrupted a new identity needs to be created. Further research is required to explore how social constructions of menopausal women impact identity in women with POI and how women manage this split or renegotiated identity going forward.

A feeling of losing control/mastery over the body (Orshan et al., 2000; Singer, 2012; Singer & Hunter, 2007; Vanderhoof et al., 2009) was associated with reduced psychological well-being. This association may be moderated by cultural influences.

Research on undergraduate students in developed countries found women consistently overestimate the likelihood of becoming pregnant and the success of fertility treatment and that this finding is more marked the more educated the woman is (Peterson, Pirritano, Tucker & Lampic, 2012). A possible explanation is that advances in medical treatment increase a sense of control over body/fertility (Sabarre, Khan, Whitten, Remes & Phillips, 2013). Women from non-developed culture's do not appear to hold the same assumptions around fertility and are more accepting of being unable to bear children (Fernández & Fogli, 2006) perhaps due to living in a less medically advanced society. The vasomotor symptoms may also create feelings of not being in control of one's body. Further research is required to explore the impact this sense of loss of control has on women with POI. For example, loss of control may link to reduced self-efficacy which research has shown is linked to the development of anxiety and depression (Kashdan & Roberts, 2004).

Faith or spirituality being protective of well-being was perhaps predictable and has been well-documented (Domar et al., 2005; Van Cappellen, Toth-Gauthier, Saroglou, & Fredrickson, 2016). However, the dominance of high scores on the meaning/peace subscale of the questionnaires used in both Ventura et al. (2007) and Vanderhoof et al. (2009) are interesting. Ventura et al. (2007) suggested that meaning/peace questions are more associated with a general sense of control and meaning in life rather than faith. These findings may indicate that women with POI are searching for new meaning and identity as an infertile woman following diagnosis. Pargament (1999) suggested that faith helps people cope with situations they can't control and psychology helps them cope with situations they can control. Further research is required to identify which aspects faith or spirituality are most helpful to women with POI as these factors (e.g. social contact etc.) may be reproduced in other ways.

Diagnostic process

The process of POI diagnosis itself was problematic for several reasons, with an overall sense of dissatisfaction pervading the studies reviewed. This review highlights several possible explanations for the dissatisfaction and ways in which these could be addressed. Firstly, delays to diagnosis were commonly reported to increase distress (Boughton, 2008; Halliday & Boughton, 2009; Singer, 2012; Singer & Hunter, 2007). Women are also likely to be suffering from severe vasomotor symptoms during this delay. Delays are however common in people presenting with rare conditions (Roll, 2012). This appears to be a broad systemic issue rather than a POI specific problem. Nevertheless, increasing clinician awareness and knowledge of the condition may help clinicians recognise the condition sooner.

Women reported they did not receive adequate information during the diagnostic process (Alzubaidi et al., 2002; Deeks et al., 2011; Groff et al., 2005; Singer et al., 2011; Singer, 2012; Singer & Hunter, 2007). The consequence of this was increased anxiety (Davis et al., 2008). When helpful information was provided women experienced less helpless coping styles (Onder & Batigun, 2016). However, these studies did not state what type of information was provided or why the information was not provided. It may be that clinicians lack knowledge or time. If the latter is true, providing extensive information during the diagnostic session may not be possible due to time constraints. Primary care is an acute care model where appointments are brief and the clinician is often unprepared (Wagner, 2019; World Health Organisation, 2017). Alzubaidi et al. (2002) did find that more time spent with a clinician directly correlated with greater satisfaction which does suggest providing a longer appointment may be beneficial. Further research is required to determine the reasons for the lack of information and to determine what type of information women with POI would find most helpful.

The findings from this review suggest that women with POI require POI specific information. Providing the wrong type of information, i.e. aimed at women experiencing an age-appropriate menopause, may increase distress by reinforcing a menopausal narrative women with POI strongly resist (Boughton, 2002). Words associated with ageing/menopause and descriptors such as premature ovarian *failure*, may also increase distress (Boughton & Halliday, 2008; Singer, 2012; Singer & Hunter, 1999). Women with POI do not want to identify with women experiencing age-appropriate menopause and a distinction needs to be made between the two conditions. Clinicians therefore need to be mindful and thoughtful regarding the terminology used and the type of information they provide during diagnosis and thereafter. Support from POI specific charity's such as The Daisy Network UK may prove helpful in this endeavour in the absence of formal clinical guidelines.

The findings regarding how age is related to psychological well-being were unclear. Some suggested that the 30-35 age group is associated with higher levels of distress (Boughton, 2002; Mann et al., 2012; Nicopoullos et al. 2009). This is perhaps not surprising as in the UK the average age of first-time mothers is twenty-nine (Office for National Statistics, 2019). It is likely that women stop taking contraception, try to become pregnant and fail and also begin experiencing menopausal symptoms and seek to find a cause all of which takes time. However, Liao et al. (2000) and Singer's (2012) findings suggest that chronological age may not be the most salient predictor of levels of distress, as distress may be due to the particular life goals and concerns of the woman at the time. For example, if a woman was attempting to become pregnant aged twenty or forty would their distress levels be likely to be any lower? This may explain why other studies did not find an association between age and psychological well-being (Allhouse et al., 2015; Onder & Batigun, 2016). Further research is required to understand the links between age and psychological well-being.

The cause of POI was not found to not impact psychological well-being overall in this review when measuring well-being using broad constructs such as quality of life (Engberg et al., 1017; Islam & Cartwright, 2011). However, this review highlights some more nuanced findings. Singer (2012) found that not knowing the cause of the POI hindered adjustment to POI. One study found that those with surgically induced POI were more anxious than those with idiopathic (Deeks et al., 2011) and had lower sexual function scores Nicopoullos et al. (2009). This is perhaps not surprising as in those women, additional concerns regarding the disease for which they were being operated on, e.g. cancer would be present. The findings suggest cause is perhaps not a major contributor to psychological well-being in POI but specific areas of functioning may understandably be impacted due to the increased burden of a co-morbid and possibly life-threatening illness.

Relationships with others

It is a well-researched finding that social support can be a protective factor for those with long-term health conditions (Maguire, Hanly & Maguire, 2019) and those experiencing age-appropriate menopause (Zhao et al., 2019). It is recognised that any chronic health condition impacts not only the person but their social environment, which includes their partners (Revenson & DeLongis, 2011). Across several studies in this review women sited the relationship with their partners as being protective and helpful in coping with their POI diagnosis (Groff et al., 2005; Liao et al., 2000; Onder & Batigun, 2016; Orshan et al., 2009; Van der Stege, 2008). This positive impact may be explained by the notion of dyadic coping (Bodenmann 1997; Lyons, Mickelson, Sullivan & Coyne, 1998) which in chronic illness refers to management of a stressor that primarily impacts one partner but also involves the other. Research has shown that when partners see the chronic illness as a shared ‘threat’ and work together to manage it physical and mental health benefits ensue for both partners (Berg et al., 2008: Rottman et al., 2015). These findings do however raise the question of how those without a partner cope. Singer (2012) highlighted that young single women are likely to be most vulnerable. Further research is required to understand this how women cope with and adjust to the condition at different ages and stages of life.

It is also interesting to consider how dyadic coping might impact intimacy. Despite the finding that sex becomes less enjoyable due to increased pain and lack of lubrication (Kalantaridou et al., 2008) women have sex with the same frequency as they did pre-diagnosis (Aydin et al., 2017) and the same number of sexual contacts as 'normal controls' (Van der Stege, 2008). This is unexpected as a reasonable assumption may be that the number of contacts and frequency of sexual intercourse would reduce due to physical discomfort. Interestingly, when unaware of their diagnosis women with POI's sex lives were not impacted (Aydin et al., 2017). This finding suggests that psychological factors are influencing the women's sexual function and is in line with previous research highlighting that the psychosocial impact of a chronic condition can have a more significant impact on sexual function than biomedical factors (Basson, 2007; McInnes, 2003). It may also be the case that women maintain their sex lives to "glue" (Barker & Gabb, 2016) their relationship when faced with infertility and concerns their partner may leave them (Luk & Loke, 2015).

Whilst the support of others was felt to be of great benefit by women with POI, they also felt unable to use their usual social network of friends for support (Boughton, 2002; Halliday & Boughton, 2009; Pasquali, 1999; Singer, 2012; Singer & Hunter, 2007; Singer et al., 2011). There were several reasons for this; feeling others would not understand what they are going through, feeling 'different' or 'abnormal' and not wanting to be around pregnant women as it reminded them of their own loss. This is important as women with POI may self-isolate and limit their contact with others which is a well-researched contributory factor in the development of mental health issues (Wang et al., 2017). Women experiencing age-appropriate menopause are unlikely to feel this sense of alienation as they can draw upon peer support and solidarity in their shared experience with peers (Namazi, Sadeghi & Moghadam, 2019). This is an important difference between those experiencing POI and those an age-appropriate menopause.

Infertility was shown to have a negative impact on psychological well-being whether women already have children or not. It could be argued that infertility impacts women’s meaning in life and sense of accomplishment, elements identified Seligman (2018) as important for psychological well-being. It could also be argued that a woman’s value is inextricably linked to her ability to be produce offspring (Yival-Davis, 1996). If so, women are perhaps more likely to feel the loss of fertility more deeply and question their role in society. It may also be that the negative societal connotations of becoming infertile and menopausal have just as great an impact on psychological functioning as not being able to have a child does. Further research is required to determine if this is the case as it may be that women with children are assumed to be less impacted by infertility and their distress could be overlooked.

Peer support was clearly the preferred mode of support expressed by women with POI across studies and this preference has been confirmed in recent research by Conway (2019). This preference for peer support does however raise the question of why women with POI prefer this type of support over their established peer group and support network. Peer support can fulfil multiple functions such as: experiential knowledge, a sense of connection, reduced isolation, finding meaning and reciprocity (Embuldeniya et al. (2013). Whilst there may be advantages to accessing peer support groups, this review has shown that this may be due to a reluctance to talk about POI within existing friendships due to fears of not being understood and avoiding seeing peers if they are pregnant. Rather than being an additional source of support for women with POI, peer support may be an alternative and could reinforce a narrative around keeping POI a ‘secret’. Further research is required to explore the barriers to women communicating with existing social support networks and the benefits and disadvantages of peer support.

The current review has highlighted several gaps in the literature around factors impacting well-being in women with POI. Broadly speaking, existing research has focussed on either measuring psychopathology or describing the experience of POI. There is a lack of research into how women adapt to a diagnosis of POI over time and which factors are related to better coping and adjustment and illness management. All of the papers reviewed were based in West, highlighting that there is clear need to discover the opinions of a more diverse population of women with POI. No research has explored positive psychological traits which may be protective of well-being in women with POI. Knowledge of such traits may help inform the development of interventions to increase them. Research using focus groups to ask women what type of psychological or social support they would find most helpful would be useful as would asking them for their opinions on how the diagnostic process could be improved.

Limitations

The findings of this review must be interpreted in light of a number of limitations. Using a scoping review methodology is inherently limited in that no quality appraisal is conducted on papers reviewed (Tricco et al., 2018). Therefore, the quality of the studies reviewed is variable and limits the extent to which recommendations based upon the findings can be made in practice. Future research focusing specifically on factors related to POI is required in which experimental or randomised controlled design incorporating measurement over time and manipulation of variables are conducted (Gorin, 2010). In addition, the lack of longitudinal data limits the scope of the findings in identifying factors associated with long-term psychological well-being in POI which may act as moderators or mediators in the relationship with psychological well-being.

As POI is a niche topic, the same researchers were involved in more than one study: Boughton (2002); Boughton and Halliday (2008) and Halliday and Boughton (2009); Singer (2012) and Singer and Hunter (1999) and dominate qualitative research in this area. This bias is reflected in similar themes being investigated across their research. The papers included were peer-reviewed articles published in English which may have introduced selection bias. The interpretation and synthesis of the current findings were drawn by the primary reviewer, and as such despite best efforts to minimise bias by use of data extraction sheets and a coding scheme, the conclusions are vulnerable to subjective interpretations. Future research can address these criticisms by the inclusion of more than one researcher in data extraction and interpretation of findings and conducting calibration exercises at each step of the review process to ensure interrater agreement.

Clinical implications

Clinicians working with women with POI need to be mindful of several factors. Delivering a diagnosis of POI is not a routine appointment and more time may be required to allow time for an exploration of the main concerns regarding the diagnosis (Alzubaidi et al. 2002). According to Harris (2007) during diagnosis the clinician should be aware of how the diagnosis will impact the patient and possess enough ‘content’ (i.e. knowledge to be able to answer questions) and provide access to appropriate support. During a ten-minute standard GP appointment this may be difficult to achieve. A follow-up appointment may provide the opportunity for additional discussion.

The diagnosis in itself is likely to cause distress (Singer, 2012). Women with POI’s experience cannot be assumed to be the same as women experiencing age-appropriate menopause and therefore comparisons are not helpful (Orshan et al., 2000). It also cannot be assumed that levels of distress in women who already have children will be less than those who have not. The woman’s primary POI-related concerns may be different depending upon their age and life goals. At diagnosis clinicians need to be well-informed, be mindful of terminology used, allow adequate time and provide appropriate POI specific information. It would also be helpful to discuss support systems and enquire if signposting to peer-support groups or online forums (for those who do not want to access groups) would be welcomed.

Women with POI may also be experiencing increased loneliness and isolation due to avoiding peers (Singer, 2012). This may be a risk factor for developing mental health issues and screening would be beneficial. There is also the possibility that women will be reticent to discuss the extent of the issues they are experiencing with their clinician due to feelings of shame and stigma. Clinicians normalising these feelings as being commonly experienced may aid discussion. Psychological support should be offered alongside treatment for the physical symptoms of POI. The role of the clinical psychologist may be particularly helpful in their ability to flexibly use a variety of psychological models to respond to the needs of the client at different life stages and with different life goals. Support offered would ideally be needs-led due to the differing concerns women may be experiencing when diagnosed and may need to be ongoing for those whom it is of benefit.

Conclusion

To the author’s knowledge this is the first systematic scoping review summarising the factors impacting psychological well-being in women with POI. Despite the limitations of the review, the findings highlight some interesting and clinically useful findings. Negative societal connotations around being menopausal may negatively impact psychological well-being, in creating feelings of stigma and shame and a sense of split identity. Women with POI are also less likely to rely upon their usual friendship group and prefer the support others with POI. Partners were felt to be protective of well-being as was having Faith/spiritual beliefs. The findings suggest that women with POI require POI specific information and support as it cannot be assumed their experience is the same as those experiencing age-appropriate menopause. Therefore, there is a need for clinicians to differentiate between POI and age-appropriate menopause in their interactions with patients. The process of diagnosis needs to improve as does our understanding of the ongoing psychological needs of women with POI.

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Appendices

Appendix A: PRISMA-ScR Checklist

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	

Appendix B: Data extraction sheet

Information extracted from final sample

1 Authors

2 Year of publication

3 Country of origin

4 Database found

5 Publication type

6 Study design

7 Exclusion and inclusion criteria

8 Sample size

9 Diagnosed with POI aged 40 or below.

10 Age (Mean/median + standard deviation, range where available)

11 Comparison group type (e.g. normal, surgical, chemically induced POI)

12 Analysis methods used

13 Primary aim of the study

14 Factors explored (e.g. age, cause etc.)

15 Measures used to explore psychological well-being

16 Key findings

Part II: Research report

Online Gratitude Interventions for Women Diagnosed with Premature Ovarian Insufficiency: Feasibility, Necessity and Acceptability

Abstract

Objectives

This study aimed to investigate the feasibility, necessity and acceptability of two-week online gratitude intervention in improving psychological well-being in women with Premature Ovarian Insufficiency (POI). The study also aimed to provide preliminary findings on effectiveness.

Method

Ninety-five women with a diagnosis of POI were recruited via a POI charity (The Daisy Network UK) and POI specific Facebook support groups. Participants were randomised into one of three groups: a generalised gratitude condition (*n* = 32), a benefit-triggered gratitude condition (*n* = 33) or an active control condition (*n* = 30). Participants in all conditions completed an online diary and brief outcome measure every two days. They also completed a battery of outcome measures assessing levels of depression, anxiety, state and trait gratitude, menopausal symptom severity, loneliness and self-esteem before, after and six-weeks post-intervention. Post-intervention participants were asked to complete questionnaires regarding acceptability.

Results

A completer analysis using Analysis of Covariance (ANCOVA) found no differences in psychological well-being post-intervention in any of the three groups. Analysis of completer characteristics suggested those most likely to complete the intervention were: older, higher in trait gratitude, and less likely to be depressed/lonely

or have a diagnosed mental health condition. High levels of depression and particularly anxiety were observed on outcome measures at baseline indicating a need for intervention. Higher levels of both state and trait gratitude were associated with lower levels of depression, loneliness and anxiety. The majority of those who completed the intervention stated this type of intervention is helpful for women with POI and the logistics were acceptable: timing of emails, online format and instructions provided. However, most felt that diary entries every two days were too frequent and repetitive and two-weeks was too short a duration. A preference for weekly diary entries and an intervention length of at least one month was expressed. Attrition levels were in line with other research using online gratitude interventions.

Conclusion

The two-week gratitude intervention was not effective in improving psychological well-being in women with POI. However, the research highlighted some helpful changes which could be made to improve the intervention and also provided clinically useful information regarding the psychological well-being of women with POI. The research also illustrated characteristics of those most likely to complete this type of intervention. The observed associations between both state and trait gratitude and lower levels of psychopathology and symptom severity in women with POI suggests that interventions aimed at developing and nurturing gratitude may be beneficial. Further research is required to determine what type of intervention may be helpful for women with POI.

Practitioner points

- While gratitude interventions have been shown to be effective for non-clinical and some clinical populations, their effectiveness for women with POI remains unclear.
- Further research is required to investigate what type of intervention would be most

helpful for the majority of women with POI.

Limitations

- There was a lack of diversity in the sample with the majority of participants being white and highly educated.
- High levels of attrition reduce the generalisability of the findings.
- Whilst participants were blinded to condition it is possible that participants had knowledge of gratitude journaling.
- No POI-specific outcome measures exist which reduces the reliability of the symptom severity measure (MRS) used in this study.
- The low rate of return of questionnaires sent to those who did not complete the intervention may have resulted in responses reported being more positively skewed as non-completers may have viewed the intervention less favourably.
- The study was conducted online. It might be that the sample is not representative of broader POI samples.

Introduction

Premature ovarian insufficiency (POI) is a chronic health condition, with profound physical and psychological consequences (Maclaren & Panay, 2015). POI is associated with increased lifetime risk for major depression and anxiety disorders (Schmidt, et al., 2011) with as many as 64% having psychiatric diagnoses (Engberg et al., 2017). The only meta-analysis currently in existence on the psychological impact of POI found significantly lower quality of life and sexual function scores (medium effect size) in women with POI compared to controls (Li et al., 2019). The condition is most often detected when women stop taking oral contraception and attempt (unsuccessfully) to become pregnant and begin experiencing severe menopausal symptoms (Webber et al., 2016). The most common words women use to describe being diagnosed are: “devastated”, “shocked” and “confused” (Groff et al., 2005) and for most (80-90% approximately) the cause is unknown (De Vos, Devroey & Fauser, 2010). Women also report POI causes difficulties in relationships with peers and partners (Grazziottin, 2010; Singer, Mann, Hunter, Pitkin & Panay, 2011).

To date there has been no research into psychological interventions for women with POI. It is important such research is conducted due to the high levels of emotional distress women with POI continue to experience despite growing knowledge of the condition. Traditional psychological approaches have focussed upon targeting depression and anxiety directly using talking therapy such as cognitive behavioural therapy (NICE, 2011; 2014). However, Wood and Tarrier (2010) argue that focussing solely on the negative neglects the potential to employ positive psychological traits to help ‘buffer’ the impact of negative events. Martz and Livneh (2016) also argue that approaches which target negative emotion fail to consider the recurrent and ongoing nature of difficulties experienced within the context of chronic illness. The positive clinical psychology movement has highlighted several personality traits associated with better psychological well-being in chronic illness populations. For example, self-compassion was found to reduce emotional distress and physical pain in arthritis (Sirois, Molnar & Hirsch, 2015) as did greater optimism (Brenner, Melamed & Panush, 1994). Gratitude is also related to psychological well-being and the link may be unique and causal (Wood, Froh & Geraghty, 2010).

Gratitude can be described as a life orientation towards noticing the positive, incorporating a broad appreciation of what one has as well as thankfulness towards others (Steindl-Rast, 2004; Wood, Maltby, Stewart & Joseph, 2008). This type of gratitude is termed ‘generalised’ gratitude (Emmons & McCullough, 2003) and can encompass gratefulness for any aspect of life: a delicious meal, the warm sun or for the presence of cherished others. As a trait, gratitude is associated with higher levels of psychological well-being in those with chronic health conditions (Eaton, Bradley & Morrissey, 2014; Legler, Celano, Beale, Hoeppner & Huffman, 2018; Sherman et al., 2019; Sirois & Wood, 2017; Toussaint et al., 2017; Wood, Maltby, Gillet, Linley & Joseph, 2008). Gratitude has also been linked to adaptive coping in chronic illness (Wood, Joseph & Linley, 2007), better adjustment (Pinto-Gouveai, Costa & Marôco, 2013) and illness acceptance (McCracke, 1998). Due to commonalities in the psychological impact of living with a chronic health condition (McCormick & Cushman, 2019), associations between gratitude and psychological well-being are also likely to be relevant for those with POI.

Going beyond the experiencing of ‘generalised’ gratitude it has been suggested that there are a variety of gratitude experiences which each may confer different benefits and require clear definition (Lambert, Graham & Fincham, 2009). Simmel (1950) posited that gratitude is a cognitive-emotional reminder to people of their need to reciprocate (Simmel, 1950). This is supported by more recent research which suggests that gratitude serves an evolutionary function in strengthening relationships with partners (Algoe, 2012), termed ‘find-remind-and-bind’ (Algoe, Gable & Maisel, 2010; Algoe, Haidt &

Gable, 2008). Lambert, Clark, Durtschi, Fincham and Graham (2010) defined gratitude felt as a direct benefit of something someone else had done for them as ‘benefit-triggered gratitude’ and also found that it strengthened interpersonal bonds. This is important as evidence shows that strong interpersonal relationships are directly related to better psychological well-being and physical health outcomes (Diener & Chan, 2011; Holt-Lundstad, Robles & Sbarra, 2017). Emmons and Mishra (2011) suggest that among positive psychology traits, gratitude is unique in its ability to target both psychological well-being and relationships with others. This benefit-triggered type of gratitude may be of particular benefit to women with POI in counteracting the feeling of disconnectedness they experience towards their normal friendship group and their partners (Grazziottin, 2010; Singer et al., 2011).

Gratitude can be encouraged and developed through interventions, which may have long-standing effects (Harbaugh & Vasey, 2014). The “three good things” exercise developed by Emmons and McCullough (2003) is a simple journaling exercise in which participants are asked to write down three things they feel grateful for. Emmons and McCullough (2003) found that performing this exercise regularly increases levels of gratitude and improves psychological well-being, a finding that has been replicated in other research (Jackowska, Brown, Ronaldson & Steptoe, 2016; Kerr, O’Donovan & Pepping, 2015; Lau & Cheng, 2017). Layous, Sweeny, Armenta, Choi and Lyubomirsky (2017) found writing about a time they felt grateful towards someone significantly increased feelings of connectedness towards others. The use of gratitude interventions has been shown to improve psychological well-being in those with chronic health conditions (Chan, 2011; Cheng, Tsui & Lam, 2015; Geraghty, Wood & Hyland, 2010; Jung & Han, 2017; Otto, Szczesny, Soriano, Laurenceau & Siegel, 2016) and those without (Davis et al., 2016; Timmons & Ekas, 2018). Gratitude interventions also provide opportunities for positive reappraisal of difficult events (Lambert, Fincham & Stillman, 2012; Sin &

Lyubomirsky, 2009) which may be particularly helpful for women with POI due to the traumatic nature of being diagnosed.

The current study

The primary aim of the study was to explore the feasibility, necessity, and acceptability of two different online gratitude interventions, a generalised gratitude and a benefit-triggered gratitude intervention. The secondary aim of the study was to provide preliminary data on whether the intervention was effective in improving psychological well-being in women with POI and if so if the benefit-triggered or generalised gratitude condition was more effective. The outcome measures were selected based upon existing research showing raised levels of depression and anxiety and lower self-esteem in women with POI (Davis et al., 2010; Deeks, Gibson-Helm, Teede & Vincent, 2011; Mann, Singer, Pitkin, Panay & Hunter, 2012) and social disconnectedness/isolation (Orshan, Furniss & Forst, 2000; Pasquali, 1999). No *a priori* criteria for determining feasibility, necessity and acceptability were developed prior to the study as there is no existing intervention research on women with POI to allow for comparison. Instead, feasibility was determined by comparing attrition and recruitment rates with research using other online positive psychology interventions; necessity by determining 'caseness' on outcome measures at baseline and acceptability by establishing the majority opinion, using a combination of yes/no and open-ended questions. Not having an established *a priori* criteria does however leave findings open to interpretation and limits the reliability of the conclusions inferred from the data. As no research on this type of intervention had been conducted with women with POI before a randomised controlled pilot trail was indicated (Eldridge et al., 2016).

Clinical Implications

Online gratitude diary interventions such as "three good things" (Emmons &

McCullough, 2003) are easy to deliver and reflect a general trend in the use of online interventions to make low-intensity psychological interventions more available to help bridge the treatment gap (Department of Health, 2014; Hollis et al., 2015; Mental Health Network NHS Confederation, 2014; Mental Health Taskforce, 2016). The exercise demands little resource and is highly unlikely to have any negative impact on participants (Ghielen, van Woerkom & Meyers, 2018). This type of intervention could be provided by multiple providers, such as charities contacted for support following diagnosis and does not require formal psychological or medical training to administer. If the evidence base in favour of such interventions grows, they could be incorporated into stepped care as a waiting-list or low-intensity intervention. Online interventions are also another way of increasing access for those who may struggle to do so due to mental or physical health issues or other restrictions such as location.

Method

Participants

A convenience sample of 95 women diagnosed with POI at aged forty or under was recruited from August to December 2019 via online invitations. The POI charity (The Daisy Network UK) emailed their entire membership (366) in August, with 36 members (10% approximately) agreeing to participate. The invitation was also posted on various Facebook POI support groups (see Appendix A for list of groups and membership numbers) every two weeks from September to December 2019. The average age of participants was 35 (age range 18-51). Participants were predominantly white (91%) and British (71%), highly educated (74% with at least undergraduate degree) and married/living with a partner (79%) (see Table 1).

Ethics

Ethical approval was granted by the University of Sheffield Ethics Committee in

March 2019 (Reference 024619, see Appendix B). Service-user feedback from The Daisy Network UK was also sought on all research materials to be used and minor wording changes subsequently made. Password-protected computers, accessible only to the researcher stored data securely. Emails were deleted and replaced with numerical identifiers once data pre-, post- and six-week after intervention were matched and the two winners of the prize draw had been selected. Contact details for the researchers was provided in the event participants had questions or complaints about the study. British Psychological Society guidance on internet-conducted research was adhered to throughout (BPS, 2017).

Design

The study was a randomised (1:1:1), single-blind, active-control, parallel-group intervention trial conducted online. Participants were allocated to one of three conditions: generalised gratitude; benefit-triggered gratitude or active control group. Due to the nature of pilot trials, there was no hypothesis testing (Eldridge et al., 2016; Lancaster, Dodd & Williamson, 2004).

Sample size

No formal power calculation is required for a pilot study (Arain, Campbell, Cooper & Lancaster, 2010). Arain et al. (2010) recommend sample size should be adequate to estimate critical parameters such as recruitment rates and attrition. Twelve participants per condition has been recommended by several researchers (Birkett & Day, 1994; Julious, 2005; Wittes & Brittain, 1990). However, due to high attrition rates in self-directed online gratitude interventions, e.g. 62% (Geraghty et al., 2010), 61% (Gander, Proyer, Ruch and Wyss, 2012) more than double this number was recruited for each condition.

Procedure

The invitation to participate (see Appendix C) was emailed or posted online and contained a Qualtrics (Qualtrics, Provo, UT) link to the information sheet (see Appendix D) and brief screening questions (see Appendix E). Participants were excluded if they had not been formally diagnosed. Internationally, diagnosis of POI is established by two (one month apart) serum FSH (follicle stimulating hormone) levels in the menopausal range (<25IU/I) and at least four months of amenorrhea or menstrual irregularity. Women were also excluded if they were undergoing fertility treatment, as research suggests the treatment adversely impacts mood and anxiety symptoms (Holley et al., 2015). In addition, those diagnosed with a serious and enduring mental illness such as schizophrenia were excluded due to no research existing currently on how those with POI are impacted, making comparisons problematic. Those not meeting criteria were sent an email explaining why (see Appendix F), and those who did were asked to complete a consent form (see Appendix G) and provide their email address. Participants were then asked to complete a series of demographic questions (see Appendix H), a physical health questionnaire (see Appendix I) and a series of questionnaires (see Appendix J). The order of the questionnaires within the survey were randomised to account for possible order effects.

Participants were then randomly allocated to one of the three groups: generalised or benefit-triggered gratitude or the active control by Qualtrics and received task instructions dependent upon group (see Appendix K for all group instructions). The generalised gratitude group were asked to note three things they felt grateful for. The 'benefit-triggered' gratitude group were asked to note three things they felt grateful for someone doing for them. The active but neutral control group was asked to write down three things that had happened to them that day as previous research highlighted that robust control conditions are required to account for possible monitoring effects

(Woodworth, O'Brien-Malone, Diamond, & Schüz, 2017). All groups completed diary entries and a brief outcome measure every two days. Automated emails (see Appendix L) were sent at (18:00) on alternate evenings and reminders after twenty-four hours. After two weeks participants were asked to complete post-intervention measures and a questionnaire regarding how they found the intervention (see Appendix M). At six-week follow-up participants were again asked to complete outcome measures and a questionnaire (see Appendix N). A formal debrief was then sent (see Appendix O). Participants who did not complete the intervention were sent an alternative debrief (see Appendix P). Participants were automatically entered into a prize draw to win £50 (or currency equivalent) Amazon voucher post-intervention and at six-week follow-up.

Measures

Menopausal symptoms. The severity of menopausal symptoms was measured using the 11-item Menopause Rating Scale or MRS (Schneider, Heinemann, Rosemeier, Potthoff & Behre, 2000). The scale asks women to rate severity of symptoms from none to very severe. The MRS is an instrument with known psychometric properties and formally validated in several languages and is the most extensively used around the world to evaluate menopausal symptoms. The aim of the scale is to: enable comparisons of symptoms of aging between groups of women under different conditions; to compare symptom severity over time and finally to measure changes pre-, post-treatment. It has good internal consistency with optimal Cronbach α values on all scales from 0.70 to 0.90.

Loneliness. Chronic loneliness was measured using the UCLA Loneliness Scale (Russell, Peplau & Catrona, 1980). This 20-item Likert scale assesses subjective feelings of loneliness as well as social isolation. Participants are required to respond from 1 'never' to 4 'often' to statements evaluating frequency of feelings of loneliness and sociability. Equal numbers of items are negatively and positively worded to reduce the effects of response bias. The measure is highly reliable, both in terms of internal consistency

(Cronbach α values ranging from 0.89 to 0.94) and test-retest reliability (r = .73). Convergent validity was established by significant correlations with other measures of loneliness and although it correlates significantly with scales of depression and anxiety, it has discriminant validity (Russell et al.,1980). It is the most widely used measure of loneliness, used within an estimated 80% of all empirical studies on loneliness (Cacioppo, Grippo, London, Goossens & Cacioppo, 2015).

Self-esteem. Global self-esteem was measured using the Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965). This 10-item scale measures self-esteem related to self-acceptance and self-respect. It measures global self-worth by measuring both positive and negative feelings about the self. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree. It has high internal consistency with a Cronbach α values ranging from 0.77 to 0.88. Test-retest reliability ranges from 0.82 to 0.85. It has a Criterion validity of 0.55 and construct validity correlations with anxiety (-0.64), depression (-0.54), and anomie (-0.43).

Social Support. Perceived social support was measured using the Multi-Dimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988). The scale consists of 12 items scored on a 7-point Likert scale. There are three subscales: family's support, friends' support, and others' support. There are four items per subscale, each with response options ranging from 1 (very strongly disagree) to 7 (very strongly agree). Higher scores on each of the subscales indicate higher levels of perceived support, and a sum of the three scales yields a global score. The scale has good reliability, factorial validity and adequate construct validity confirmed in numerous studies using different samples from normal and clinical populations, and also different cultures, racial and ethnic groups. Cronbach α values for the MPSS ranges from 0.81 to 0.90 (Zimet et al., 1988).

Depression and Anxiety. The Hospital Anxiety and Depression Scale or HADS

(Zigmond & Snaith, 1983) was used to capture depression and anxiety symptoms. HADS is a self-report questionnaire with 14 items and two subscales (7 items each) rated using a 4-point Likert-type scale. People are asked to rate how much each item applied to them over the past week (ranging from 0 to 3). The two subscales are scored separately. Higher scores indicate greater emotional distress. The scale has been found to have high internal consistency on the subscales with Cronbach α values for HADS-A ranging from .67 to .93 and HADS-D from .67 to .90. It has been widely used in both clinical and non-clinical populations, as it is not diagnosis specific. The concurrent validity of the HADS is supported by moderate to high correlations (r= 0.49 -0.83) with related measures of depression and anxiety.

Gratitude (trait). Dispositional gratitude was measured using the Gratitude Questionnaire six (GQ-6) (McCullough, Emmons, & Tsang, 2002). The GQ-6 is a well-validated 6-item measure that measures gratitude as a life orientation towards noticing and appreciating the positive in life. Participants are asked to respond to items (two are reverse coded) on a scale from 1-7 from strongly disagree to strongly agree. It has been found to have high internal consistency (Cronbach α value of .82). The scale has good temporal stability (r = .59) (Wood, Maltby, Gillett, Linley & Joseph, 2008). It has also been found to have no relationship with socially desirable responding and independence from other related constructs (McCullough et a., 2002).

Gratitude (state). State gratitude was measured using the Gratitude Adjectives checklist (GAC) which is an adjunct of the 20-item Positive and Negative Affect Scale (PANAS-X) (Watson & Clark, 1999). The 3-item GAC lists three words reflecting state gratitude (grateful, appreciative, and thankful) and correlates (r = .75) with the GQ-6. Items are measured on a Likert scale ranging from 1 to 7, with higher scores indicating higher levels of state gratitude. A positive relationship between dispositional and state measures of gratitude r = .65 p < .001 was found (McCullough et al., 2002). The PANAS scales have been found to have high internal consistency (Cronbach α values ranging from .83 to .90 for positive affect).

Process measures. State gratitude was measured every two days using the 3-item GAC (McCullough et al., 2002). The GAC was added to the 10-item Positive and Negative Affect Scale (PANAS-10; Watson & Clark, 1999) which was used to capture positive and negative affect during the intervention. The PANAS-10 and its subscales have been demonstrated high internal consistency (Cronbach α value of .94).

Analysis

Quantitative data

Statistical Package for the Social Sciences (SPSS, Version 25; IMB corp., 2017) was used to analyse data. Missing data was identified using descriptive statistics. As very little data was missing linear interpolation was used to replace it. This method is recommended for small amounts of missing data (Noor, Abdullah, Yahaya, & Ramli, 2015; Twisk & de Vente, 2002). Data was checked as a whole sample (*n*=95) and by group to ensure no violations of the assumptions of; normality, linearity, multicollinearity and homoscedasticity. Since normality tests (e.g. Kolmogorov-Smirnov) can be receptive to small deviations in normality with large samples (Field, 2013), histograms and Q-Q plots were used. Slight skew was observed on trait gratitude (GQ-6) scores and perceived social support (MSPSS) scores. However, the statistics used were deemed to be robust enough to manage small deviations in normality with the large sample (Field, 2013). All test variables were therefore treated as normally distributed. Outliers were identified within SPSS using box-plots. At baseline there were two high scores on the RSES and post-intervention and three low scores on GQ-6. However, these scores remained in the analysis as not extreme, to make full use of the data available (Fidell & Tabachnik, 2003). Demographic data and study variables were analysed descriptively (means, frequencies and standard deviations). Results were presented graphically and with proportions where appropriate.

Qualitative data

Inductive thematic analysis in line with Braun and Clarke's (2006) six-step framework was conducted on qualitative responses provided post-intervention and at six-week follow-up. Step one involves becoming familiar with the data by repeated readings. During step two initial codes are generated. In step three potential themes are identified, followed by review of themes at step four and then definition of them at step five. Step six is the write-up. Inter-rater reliability was conducted by an independent rater working collaboratively with the author. The independent rater and author began by reading the data independently before using line by line coding to independently generate initial codes and themes. At this point in analysis the independent rater and author met to discuss and compare codes and themes. Discrepancies were resolved by discussion and consensus as recommended by van den Hoonaard (2008).

Results

Figure 1 illustrates the number of participants whom completed the screening questionnaire, were eligible for inclusion and included in the final analysis.

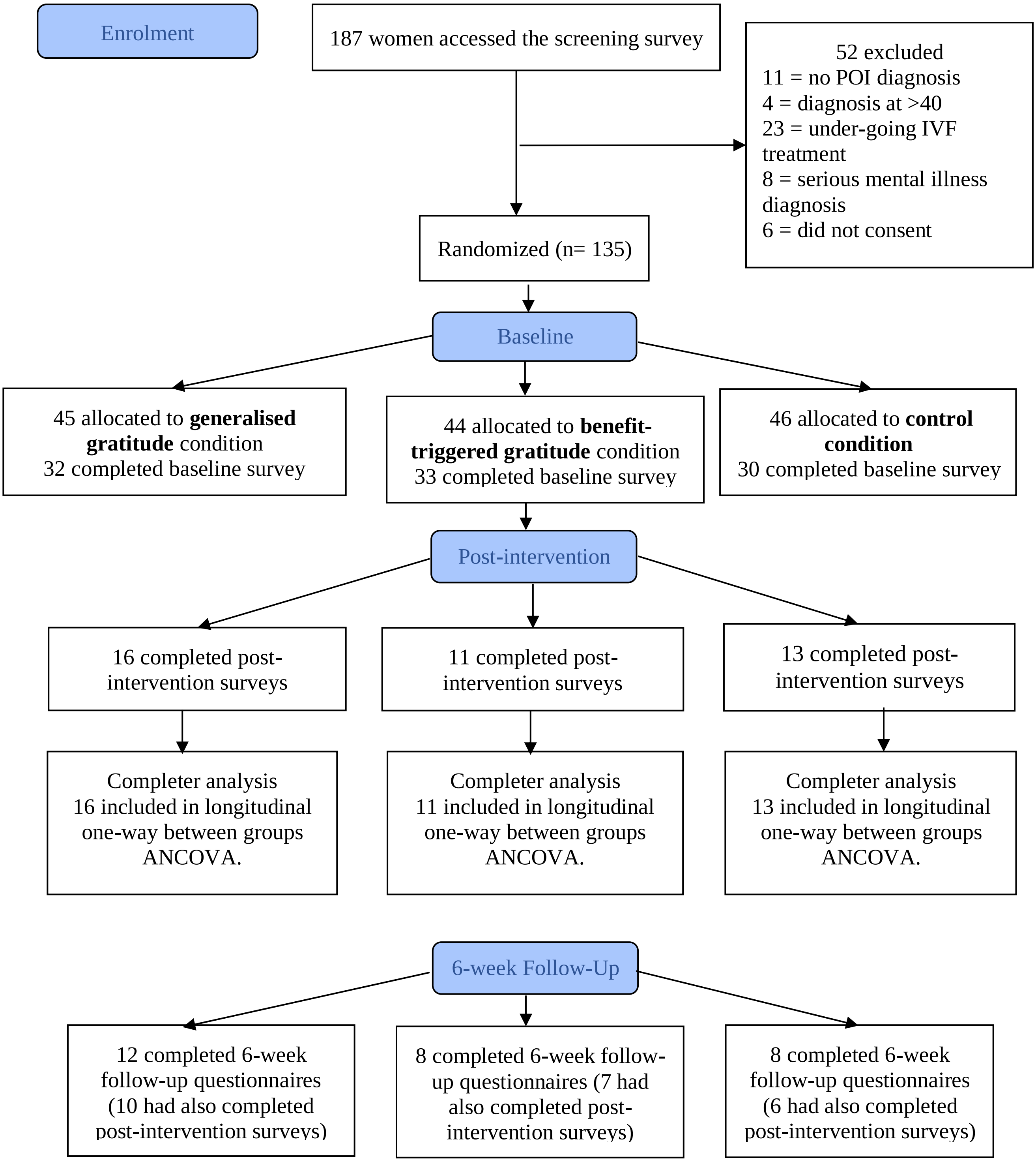

Figure 1. CONSORT diagram

Screening

Of the 187 potential participants who entered the study 46 were screened out. Figure 2 displays the reasons.

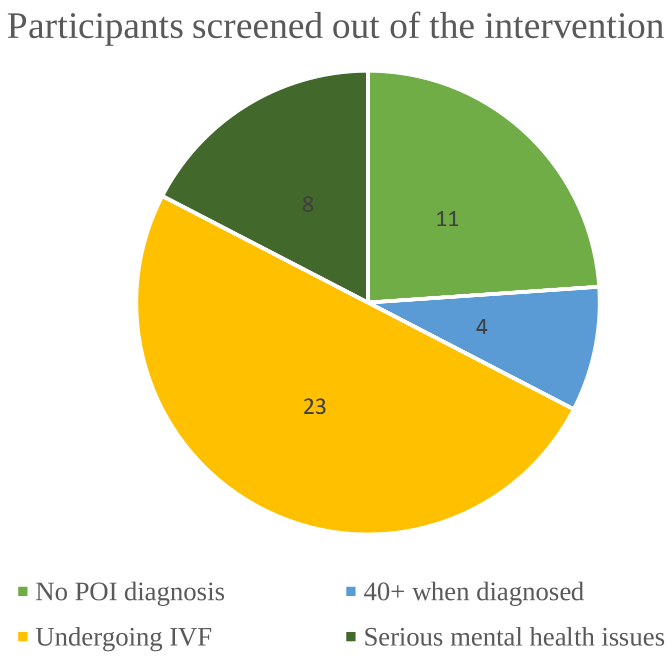

Figure 2. Number of women screened out of the intervention and reasons

Baseline Demographic characteristics

Demographic data and study variables were analysed descriptively (means, frequencies and standard deviations). Please see Table 1 for results.

Table 1

Baseline demographic characteristics overall and by group in percentages

	Overall *n* = 95	Generalised gratitude *n* = 32	Benefit-triggered gratitude *n* = 33	Control *n* = 30
Mean age (SD) in years	35(5.8)	35(5.0)	33(6.1)	37(6.1)
Age range (in years)	18–51	24-45	18-46	22-51
Country of residence (%)				
United Kingdom	71.5	65.5	75.7	70.0
Europe	7.4	15.6	9.1	3.3
Canada	2.1	0	6.1	0
United States	9.5	12.5	13.0	10.0
Australia	6.3	6.4	6.1	6.7

Other	3.2	0	0	10.0
Ethnicity (%)				
White British	72.6	73.2	69.7	70.0
White other	19.0	21.9	18.2	23.3
South Asia	1.0	0	3.0	0
South East Asia	2.1	3.1	0	3.3
Central Asia	1.1	0	3.0	0
Western Asia	1.1	0	0	3.3
Australasian	3.2	0	6.1	3.3
Highest education (%)				
Some high school	4.2	0	3.0	10.0
High school graduate	11.6	18.7	6.1	10.0
Some college/university	11.6	9.4	18.2	5.1
Undergraduate	35.8	25.0	42.4	40.0
Some postgraduate study	6.3	12.5	0	5.1
Postgraduate degree	31.6	34.4	30.3	30.0
Relationship status (%)				
Married/living with partner	78.9	71.8	78.8	86.6
Separated/divorced	3.2	0	6.0	3.3
Never married	17.9	28.2	15.2	10.0
Widowed	0	0	0	0
Years since diagnosis (%)				
Within last year	15.8	18.8	15.2	13.3
1-4 years	42.1	42.7	42.4	43.3
5-10 years	18.9	21.9	21.2	13.3
11+ years	22.0	6.0	21.2	30.0
Range	0-25	0-21	0-17	0-25
Women taking HRT (%)	70.5	71.9	68.7	73.3
Participants with children (%)	29.5	21.9	36.4	30.0
Known cause of POI (%)	16.8	21.9	15.6	13.3
Religious/spiritual beliefs (%)				
Yes	24.2	18.2	24.2	30.0
No	55.8	59.4	54.5	53.3
Not sure	20.0	21.9	21.2	16.6
Diagnosed mental health condition (%)				
Yes	42.1	53.1	51.5	43.3
If yes, what condition?				
Depression	27.5	23.5	11.6	29.4
Anxiety	42.5	41.1	41.1	23.1
Depression & anxiety	27.5	35.3	17.6	15.4
Other	2.5	5.9	0	0

Acute and chronic health conditions

Prevalence of acute and chronic health conditions at baseline are illustrated in Tables 2 and 3. Of interest is the high rate of chronic migraines/headaches reported by 54% which is considerably higher than population prevalence of 3-4% (NICE, 2016). Irritable bowel syndrome is reported by 35% which is higher than general population prevalence of 11% (Lovell & Ford, 2012). All other conditions were within expected population norms.

Table 2

Prevalence of acute health conditions overall and by group at baseline in percentages

	Overall *n* = 95	Generalised gratitude *n* = 32	Benefit-triggered gratitude *n* = 33	Control *n* = 30
Back pain	31.6	31.3	39.4	23.3
Sprains/muscle strain	18.9	12.5	21.2	23.3
Headaches	48.2	56.3	51.5	36.6
Digestive issues	32.6	34.4	33.3	30.0
Insomnia	34.7	31.2	33.3	40.0
Bacterial infection	7.4	12.5	6.1	3.3
Flu/cold/fever	23.2	21.2	27.3	20.0
Dental	16.6	18.7	15.2	13.3
Allergies	18.9	18.7	24.2	13.3
Skin	35.8	53.1	27.3	33.3
Menstrual	51.2	56.2	48.5	50.0
Other	8.4	9.4	6.1	10.0

Table 3

Prevalence of chronic health conditions overall and by group at baseline in percentages

	Overall *n* = 95	Generalised gratitude *n* = 32	Benefit-triggered gratitude *n* = 33	Control *n* = 30
Chronic migraines/headaches	53.7	62.5	48.5	50.0
Heart disease	12.6	6.3	9.1	10.0
High blood pressure (hypertension)	11.6	12.5	12.1	10.0
Asthma	10.5	12.5	6.1	13.3
Diabetes	5.3	3.2	6.1	6.6
Cancer	8.4	12.5	6.1	6.6
Arthritis	10.5	12.5	6.1	13.3
Fibromyalgia	4.2	0	3.0	10.0

Inflammatory bowel disease (Crohn’s, colitis)	11.6	9.4	9.1	16.6
Multiple Sclerosis	3.2	0	3.0	6.6
Chronic fatigue syndrome	17.9	12.5	18.2	23.3
Irritable bowel syndrome	35.8	28.2	42.0	36.6
Liver disease	2.1	0	0	6.6
Lung disease/COPD	1.1	0	0	3.3
Kidney disease	4.2	0	0	13.3
Chronic back problems	31.6	34.4	36.4	23.3
Other	16.8	15.6	18.2	16.6

Randomisation check

A series of one-way between-groups analysis of variance (ANOVA’s) were conducted to determine if the randomisation process within Qualtrics produced balanced groups. No significant difference between the three groups was found: GQ-6 (trait gratitude): $F(2, 92) = 1.02$, $p = .36$; GAC (state gratitude): $F(2,92) = 1.46$, $p = 0.24$; HADS-Anxiety: $F(2, 02) = 1.76$, $p = .17$; HADS-Depression: $F(2, 92) = 2.78$, $p = .07$; Menopause symptom severity (MRS): $F(2, 92) = 1.16$, $p = .32$; Perceived Social Support (MSPSS): $F(2, 92) = 0.42$, $p = .66$; Self-esteem (RSES): $F(2, 92) = .69$, $p = .50$; Chronic loneliness (UCLA): $F(2, 92) = 1.06$, $p = .35$; Years since diagnosis: $F(2, 92) = .43$, $p = .65$; Current age: $F(2, 92) = 1.20$, $p = .31$. The findings indicate the automatic randomisation process produced balanced groups as indicated by no significant differences between groups on outcome measure scores, age (in years) and time since diagnosis.

Baseline correlational analysis

Table 4 illustrates bivariate correlations using Pearson’s Product Moment correlations. According to Cohen’s (1988) criteria, trait gratitude displayed medium sized correlations with depression ($r = -.59$, $p = <.01$), loneliness ($r = -.64$, $p = <.01$), anxiety ($r = -.38$, $p = <.01$), symptom severity ($r = -.34$, $p = <.01$) and perceived social support ($r = .60$, $p = <.01$). State gratitude had small to medium sized correlations with depression (r -.46= , $p = <.01$), loneliness ($r = -.35$, $p = <.01$), perceived social support ($r = .37$, $p = <.01$), symptom severity ($r = -.24$, p = <.01) and anxiety ($r = -.20$, $p = <.01$). These correlations indicate that higher levels of both trait and state gratitude were associated with greater psychological well-being. Current age was associated with small to medium correlations with trait gratitude (*r* = .31, *p* = <.05), symptom severity (*r* = .54, *p* = <.01), and loneliness (*r* = -.24, *p* = <.05) suggesting that younger age may be related to higher symptom severity and loneliness. Time since diagnosis demonstrated a small correlation with symptom severity (*r* = -.28, *p* = <.01) suggesting symptoms may reduce over time.

Clinical necessity

Figure 3 shows the percentage of participants meeting 'caseness' or scoring within the clinical range on measures of psychological well-being at baseline. Of note here are the very high rates of anxiety (66%) and depression (37%). Loneliness levels were in line with population norms (ONS, 2018) as were self-esteem levels (Pradhan, Shah, Rao, Ashturkar & Ghaisas, 2003).

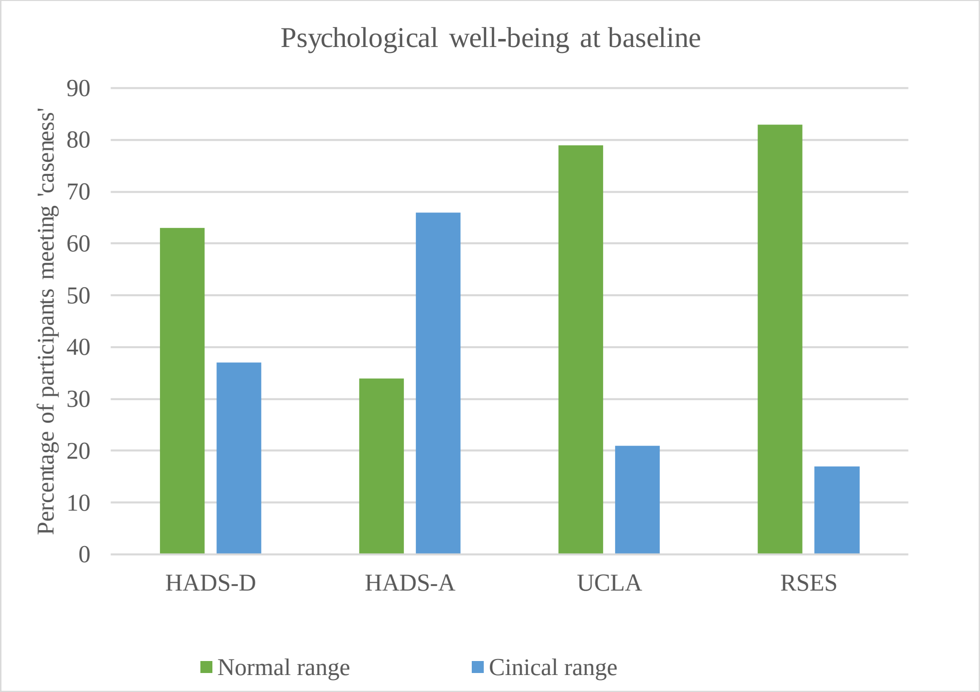

Figure 3. Percentage of participants scoring within the clinical range at baseline (*n*=95)

Note. HADS-D = Hospital Anxiety and Depression Scale – Depression subscale; HADS-A = Hospital Anxiety and Depression Scale – Anxiety subscale; UCLA = Chronic Loneliness Scale; RSES = Rosenberg Self-Esteem Scale.

Table 4

Pearson correlations among study variables at baseline (n = 95)

Variable	1	2	3	4	5	6	7	8
1. GQ6	_							
2. GAC	.58**	_						
3. HADS-A	-.38**	-.20**	_					
4. HADS-D	-.59**	-.46**	.39**	_				
5. MRS	-.34**	-.24**	.56**	.54**	_			
6. MSPSS	.60**	.37**	-.27**	-.39**	-.36**	_		
7. RSES	-.17	-.05	.29**	-.09	.21*	-.21*	_	
8. UCLA	-.64**	-.35**	.44**	.62**	.54**	-.71**	.33**	
9. Current age (in years)	.31*	.16	-.20	-.08	-.23*	.14	-.18	-.24*
10. Time since diagnosis	.15	.13	-.11	-.13	-.28**	.04	-.06	-.13
Mean	42	24.5	32.3	30.8	32.4	27.45	19	-
SD	18	12.9	14.1	21.9	11.9	25.8	11	-

**p* = < .05, ***p* = *< .01.*

Note. GQ-6 = Gratitude Questionnaire; GAC = Gratitude Adjectives Checklist; HADS = Hospital Anxiety and Depression Scale; MRS = Menopause Rating Scale; MSPSS = Multidimensional Scale of Perceived Social Support; RSES = Rosenberg Self-Esteem Scale; UCLA = Chronic Loneliness Scale.

Baseline predictor variables

To investigate the high levels of anxiety and depression observed at baseline on HADS, standard linear multiple regression analysis was used to explore the contribution of the outcome measure scores and current age and years since diagnosis as possible predictor variables (see Tables 5 and 6).

Table 5

Regression analysis of ***anxiety*** *levels at baseline*

Measures used	*b*	*SE B*	*ß*	*p*
Trait gratitude (GQ-6)	-.13 [-.28,.03]	.08	-.22	.114
State gratitude (GAC)	.03 [-.22,.29]	.13	.03	.809
Depression (HADS-D)	.01 [-.27,.28]	.14	.01	.969
Menopausal symptoms (MRS)	.23 [.12,.34]	.06	.46	.000**
Perceived social support (MSPSS)	.04 [-.04,.12]	.04	.13	.323
Self-esteem (RSES)	.25 [-.05,.54]	.15	.15	.108
Chronic loneliness (UCLA)	.03 [-.06,.12]	.05	.12	.502
Years since diagnosis	.05 [-.06,.15]	.05	.08	.401
Current age	-.02 [-.16,.12]	.07	-.03	.795

*p = < .05, **p = < .01.

Total variance explained by the model was *R* = 39%, *F* (9, 85) = 78, *p* = <.001. Menopausal symptom severity (MRS) was the only variable which made a significant and unique contribution to anxiety (HADS-A) scores at baseline (*beta* = .46, *p* = <.001).

Table 6

Regression analysis of ***depression*** *levels at baseline*

Measures used	*b*	*SE B*	*ß*	*p*
Trait gratitude (GQ-6)	-.18 [-.30,-.06]	.06	-.33	.004*
State gratitude (GAC)	-.19 [-.39,.01]	.10	-.16	.061
Anxiety (HADS-A)	.03	.09	.00	.969

	[-.17,.18]			
Menopausal symptoms (MRS)	.14 [.05,.24]	.05	.30	.002*
Perceived social support (MSPSS)	.09 [.01,.12]	.03	.23	.033*
Self-esteem (RSES)	-.16 [-.40,.08]	.12	-.10	.191
Chronic loneliness (UCLA)	.11 [.05,.18]	.03	.42	.001**
Years since diagnosis	-.03 [-.08,.83]	.04	-.01	.949
Current age	.12 [.01,.23]	.06	.17	.040

**p = < .05, **p = < .01.*

Total variance explained by the model was *R* = 58%, *F* (9, 85) = 116, *p* = <.001. Several variables made a unique and statistically significant contribution to depression scores at baseline: trait gratitude (*beta* = -.18, *p* = <.004); menopausal symptoms (*beta* = .14, *p* = <.002); perceived social support (*beta* = .09, *p* = .033); chronic loneliness (*beta* = .11, *p* = <.001) and current age (*beta* = .12, *p* = .040).

Intervention analysis

Attrition rates

Of the 95 participants who began the intervention, 40 completed the post-intervention battery, which reflects an attrition rate of 58%. At six-week follow-up 28 participants completed outcome measures, with an overall attrition rate from baseline of 70%.

Diary completion

Diary entries were completed every two days during the two-week intervention (see Figure 5). The generalised gratitude and control groups had a similar pattern of completion; however, the benefit-triggered gratitude reflects a more pronounced decline. At the end of the two-week intervention participants were asked if they intended to continue with their diary task; 56% percent said yes and 44% no. At six-week follow-up 39% had continued and 61% had not. Seventy-nine percent had stopped immediately, 16% within a week and 5% within four weeks.

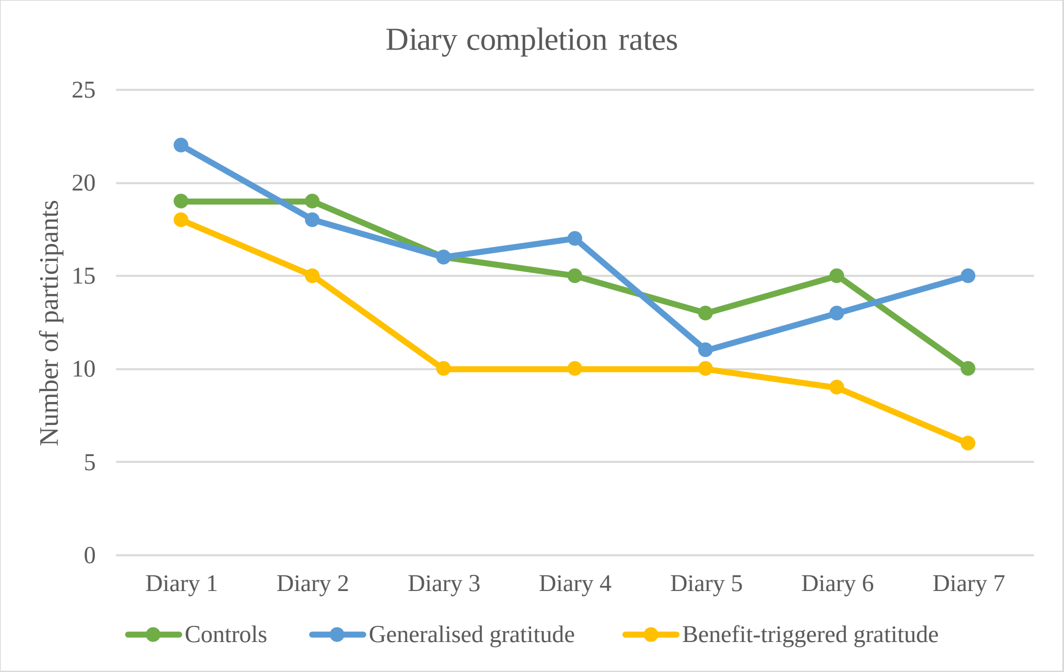

Figure 5. Pattern of diary completion by group

Process measures

See Figures 6, 7 and 8 for a visual representation of mean scores on PANAS-10 + GAC by group. The control group showed little fluctuation as would be expected due to the neutral nature of the task. Within the generalised gratitude group, levels of state gratitude and positive affect showed little fluctuation however negative affect scores had a 'spikier' profile and decreased over time. Within the benefit-triggered group as positive affect increased so did levels of state gratitude whilst negative affect lowered. This effect is particularly marked at time six where the highest levels of positive affect and state gratitude are shown and the lowest levels of negative affect. These different patterns across groups suggest different processes were occurring within the groups. It is interesting to note all groups 'dipped' at Diary five, possibly reflecting fatigue with the intervention.

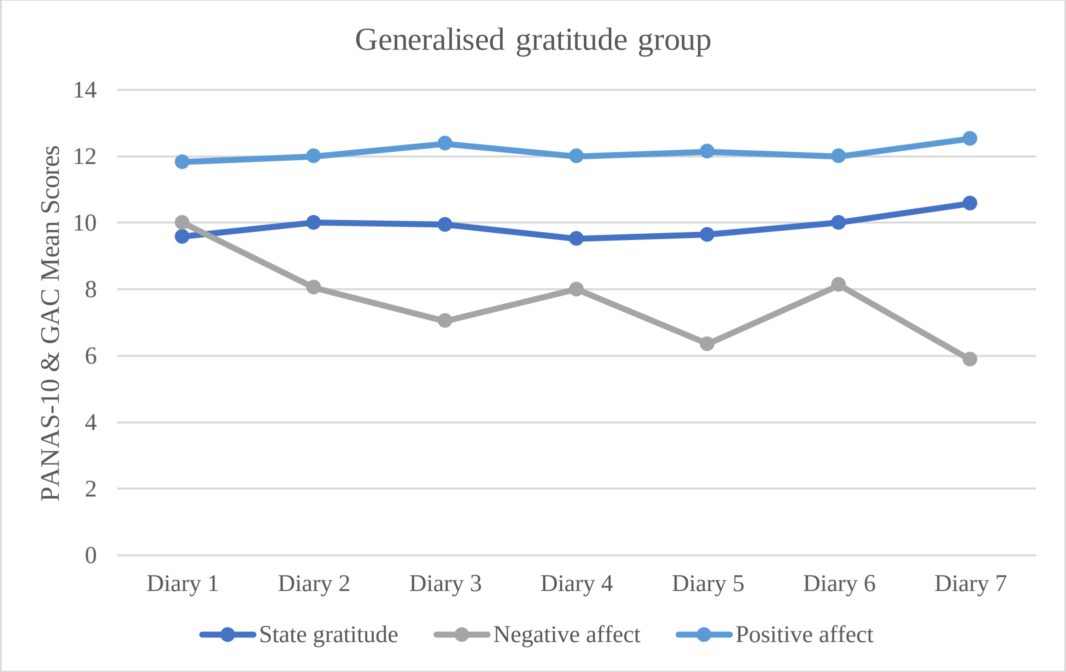

Figure 6. Process measures for the generalised gratitude group

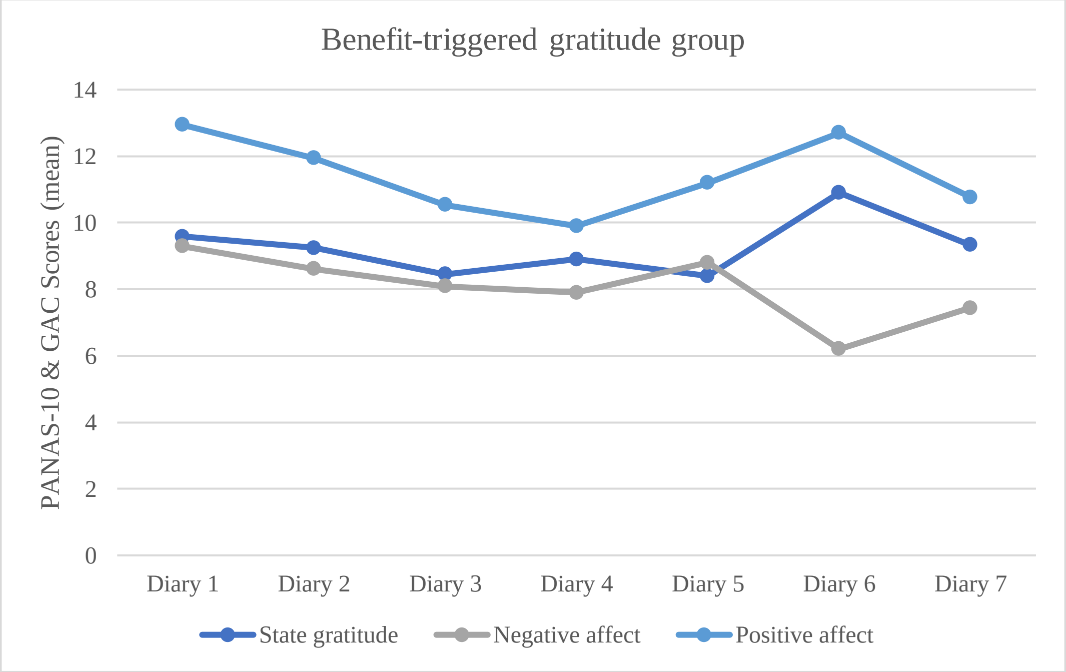

Figure 7. Process measures for the benefit-triggered gratitude group

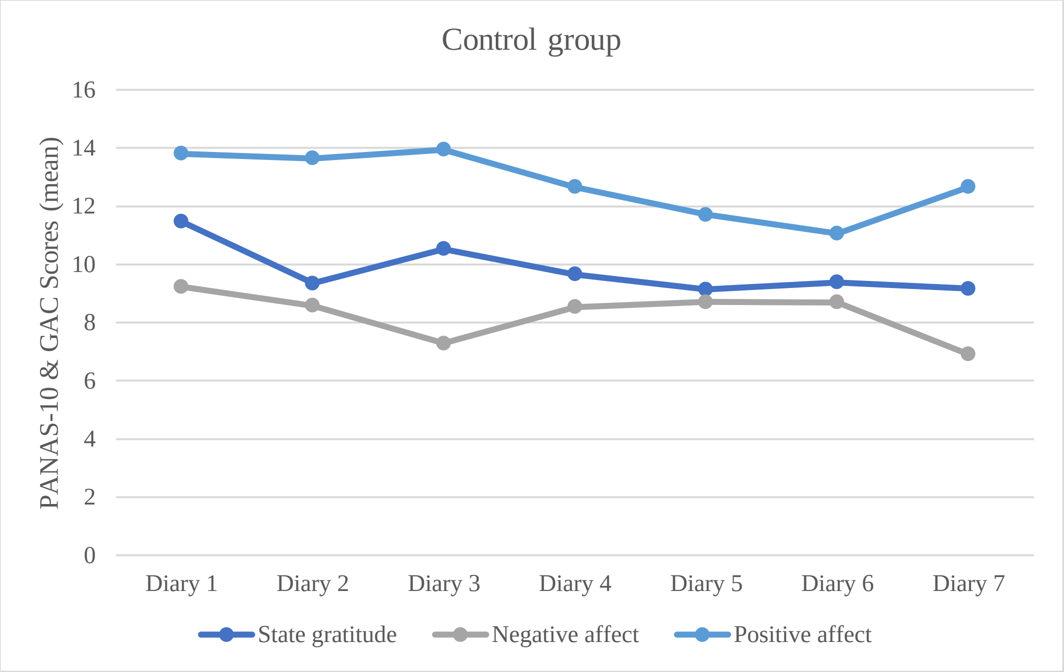

Figure 8. Process measures for the control group

Time spent on task

The pre-, post- and six-week follow-up battery of tests took on average 15 minutes, 7 seconds (SD = 7 minutes 42 seconds). The generalised gratitude group diary entries took on average 8 minutes 30 seconds (SD = 4 minutes 21 seconds). The control group took 6 minutes 44 seconds (SD = 3 minutes 58 seconds). The benefit-triggered gratitude group took far longer at an average of 164 minutes 49 seconds (SD = 137 minutes forty-two seconds).

Psychological well-being pre-, post-intervention and at six-week follow-up

Table 7. illustrates the mean (SDs) for pre- and post-intervention and at six-week follow-up on all outcome measures.

Table 7

Mean (SDs) for pre-post and six-week follow-up outcome variables

	Baseline			**Post-intervention**			**Six-week follow-up**		
	Generalised Gratitude *n* = 32	Benefit-triggered Gratitude *n* = 33	Control *n* = 30	Generalised Gratitude *n* = 16	Benefit-triggered Gratitude *n* = 11	Control *n* = 13	Generalised Gratitude *n* = 11	Benefit-triggered Gratitude *n* = 8	Control *n* = 9
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*
GQ-6	29.84(7.08)	32.27(7.90)	31.97(7.86)	34.75(6.28)	34.81(6.27)	32.54 (8.12)	34.50(5.04)	33.87(9.11)	35.12(5.77)
GAC	9.16(3.46)	8.82(3.80)	10.47(3.38)	10.25(2.43)	9.09(3.44)	9.76(3.63)	10.33(3.05)	8.25(3.41)	9.50(3.34)
HADS-A	11.16(4.26)	9.42(4.65)	9.40(3.89)	9.00(3.93)	9.18(2.82)	9.76(3.41)	8.75(3.91)	9.00(4.72)	8.87(2.53)
HADS-D	7.44(4.45)	5.39(3.97)	7.20(3.81)	6.19(4.15)	4.81(4.35)	6.69(3.63)	4.33(2.74)	4.87(3.72)	6.12(2.85)
MRS	19.31(8.38)	16.52(8.30)	16.93(9.23)	16.93(7.34)	16.09(8.37)	13.61(6.70)	13.75(6.57)	12.37(5.21)	11.37(6.76)
MSPSS	57.94(14.20)	60.42(17.38)	61.20(15.35)	62.18(16.91)	64.18(16.40)	60.92(11.74)	63.42(14.35)	60.25(22.73)	60.12(16.45)
RSES	17.13(2.73)	16.73(2.55)	16.37(2.64)	16.06(1.80)	13.81(2.60)	16.92(2.46)	15.75(1.05)	15.87(3.22)	16.12(1.73)
UCLA	30.19(16.68)	25.06(16.29)	25.73(12.21)	19.87(12.65)	23.27(18.12)	23.61(13.83)	20.50(12.12)	16.63(13.04)	25.37(18.35)

Note. GQ-6 = (trait) Gratitude; GAC = (state) Gratitude Adjectives Checklist; HADS = Hospital Anxiety and Depression Scale; MRS = Menopause Rating Scale; MSPSS = Multidimensional Scale of Perceived Social Support; RSES = Rosenberg Self-Esteem Scale; UCLA = Chronic Loneliness Scale.

Completers versus non-completers

Group differences on demographic characteristics were analysed using independent *t*-tests (continuous variables) and Chi-square tests (categorical variables) (see Table 8). When assumptions of Chi-square were violated (more than 20% of expected cells <5 for analyses greater than 2x2) then the Likelihood Ratio was reported (McHugh, 2013). Completers were more likely to be older, not have a diagnosed mental health condition, be higher in trait gratitude and have lower depression and loneliness scores.

Table 8

Demographic data and test statistics for differences between groups

Variable	Overall *n* = 95	Completer *n* = 40	Non-completer *n* = 55	Test statistic completer versus non-completer	Effect size (Cohen's d or phi coefficient)
Mean age (SD) in years	35.86	37.65	34.53	*t*(93) = 2.712, *p* = .008**	.56
Range (in years)	18 – 51	30-51	18-47		
Ethnicity (%)				χ^2 = 3.140, *p* = .076	*.18*
White British	74.7	90.0	63.6		
White other	16.8	10.0	21.8		
South Asia	1.1	0	1.8		
South East Asia	3.2	0	5.5		
Central Asia	1.1	0	1.8		
Western Asia	1.1	0	1.8		
Australasian	3.2	0	5.5		
Country of residence (%)				χ^2 = 1.889, *p* = .170	*.14*
United Kingdom	71.6	82.5	63.6		
Europe	8.4	7.5	9.1		
Canada	2.1	0	3.6		
United States	9.5	5.0	12.7		
Australia	6.3	5.0	7.3		
Other	3.2	0	5.5		

Variable	Overall $n = 95$	Completer $n = 40$	Non-completer $n = 55$	Test statistic completer versus non-completer	Effect size (Cohen's d or phi coefficient)
Highest education (%)				$\chi^2 = .519$, $p = .471$	*.07*
Some high school	5.3	7.5	3.6		
High school graduate	12.6	10.0	14.5		
Some college/university	11.6	7.5	14.5		
Undergraduate	36.8	30.0	41.8		
Some postgraduate study	5.3	10.0	1.8		
Postgraduate degree	28.4	32.5	25.5		
Relationship status (%)				$\chi^2 = 1.169$, $p = .557$	*.09*
Married/living with partner	78.9	80.0	78.2		
Separated/divorced	3.2	5.0	1.8		
Never married	17.9	15.0	20.0		
Widowed	0	0	0		
Years since diagnosis (%)				$t(93) = 1.174$ $p = .243$	*0.24*
Within last year	16.8	5.0	25.5		
1-4 years	37.9	40.0	36.4		
5-10 years	23.2	25.0	21.8		
11+ years	20.0	25.0	16.4		
Range (years)	0-25	0-25	0-22		
Women taking HRT (%)	70.5	72.5	69.1	$\chi^2 = .029$,	*.02*

Variable	Overall $n = 95$	Completer $n = 40$	Non-completer $n = 55$	Test statistic completer versus non-completer	Effect size (Cohen's d or phi coefficient)
				$p = .865$	
Participants with children (%)	33.7	42.5	27.3	$\chi^2 = 1.837$, $p = .175$	*.14*
Known cause of POI (%)	16.8	12.5	20.0	$\chi^2 = .930$, $p = .335$	-*.09*
Religious/spiritual beliefs (%)				$\chi^2 = .110$, $p = .740$	-*.03*
Yes	23.2	22.5	23.6		
No	56.8	55.0	58.2		
Not sure	20.0	22.5	18.2		
Diagnosed mental health condition (%)				$\chi^2 = 4.153$, $p = .042$*	-*.21*
Yes	44.2	30.0	54.5		
If yes, what condition					
Depression	27.4	25.0	29.1		
Anxiety	43.2	42.5	43.7		
Other (e.g. burnout)	3.2	7.5	0		

Note: SD = Standard deviation, χ^2 = Chi-Square Statistic, t = independent t-test, *$p < .05$

Table 9

Cronbach's alphas, descriptive data of outcomes and test statistics for differences between groups

Variable	α	Overall *n* = 95	Completer *n* = 40	Non-completer *n* = 55	Test statistic completer versus non-completer	Effect size (Cohen's d)
		Mean(SD)	Mean(SD)	Mean(SD)		
GQ-6	.89	31.36(7.62)	33.15(5.88)	30.05(8.48)	*t*(93) = 2.100 *p* = .038*	.42
GAC	.87	9.45(3.61)	10.30(3.44)	8.83(3.64)	*t*(93) = 1.981 *p* = .051	.41
HADS-A	.90	9.96(4.30)	9.75(3.43)	10.18(4.90)	*t*(93) = -.479 *p* = .633	.10
HADS-D	.93	6.65(4.15)	5.55(3.75)	7.45(4.28)	*t*(93) = 2.256, *p* = .026*	.47
MRS	.92	17.59(8.64)	16.47(8.23)	18.40(8.91)	*t*(93) = -1.073, *p* = .286	.22
MSPSS	.86	59.83(15.62)	62.27(13.29)	58.05(17.02)	*t*(93) = 1.356 *p* = .178	.28
RSES	.90	16.75(2.63)	16.55(1.88)	16.89(3.07)	*t*(93) = -.621 *p* = .536	.13
UCLA	.84	27.00(15.28)	22.67(13.71)	30.14(15.70)	*t*(93) = -2.413, *p* = .018*	.51

Note: SD = Standard deviation, *α = Cronbach alpha value, t* = independent t-test, **p* < .05

Participant feedback

Table 10 displays responses provided post-intervention by those who completed pre- and post-intervention outcome measures and a minimum of four diary entries (*n* = 40).

Table 10

Completer responses regarding acceptability (%)

Question	Yes	No
Is this type of intervention helpful for women with POI?	82.5	17.5
Was the timing of the emails acceptable?	100	0
Were the instructions clear enough?	92.5	7.5
Did the online format function well?	87.5	12.5
Would you have preferred a choice of ways of keeping your diary?*	17.5	82.5
Was completing the diary entry every other day too much?	87.5	12.5
Or too little?	12.5	87.5
Would you have preferred the intervention to be longer than 2 weeks?	92.5	7.5
Were there any ‘glitches’?	0.0	100.0
Was it difficult to think of things to write?	20.0	80.0
Was completing a questionnaire after the diary entry acceptable?	82.5	17.5
Did you find the task improved your relationship with others?	35.0	65.0
Was the Amazon voucher an incentive to take part?	10.0	90.0

*five participants expressed preference for an APP and two for pen and paper.

Non-completers

Non-completers (*n*=55) were sent a questionnaire asking for feedback and eight responded. Four stated this type of intervention would be helpful for women with POI. All found the timing of the emails acceptable. Seven found the instructions and online format worked well, however two said they had experienced ‘glitches’. Three said they would have preferred a choice of how they kept their diary, with one expressing a preference for pen and paper and two for an App. Six stated diary entries every two days was too frequent. Although this is too small a sample to allow any conclusions to be drawn, the responses broadly reflect completer responses (Table 9) with the exception of the perceived helpfulness of the intervention.

Completer Analysis

A one-way between-groups analysis of covariance (ANCOVA) was conducted to compare outcomes pre-, post-intervention between groups whilst controlling for baseline scores. Preliminary checks were conducted to ensure that was no violation of assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes and reliable measurement of the covariate. As the sample size was small (n=28) at 6-week follow-up and only 22 of those participants had also completed post-intervention outcome measures a longitudinal pre-, post- and follow-up analysis was not conducted due to likelihood of increasing Type II error.

After adjusting for pre-intervention scores, there was no statistically significant differences between the groups on scores of trait gratitude (GQ-6) F (2, 35) = .34, p = .71 partial eta squared = .02; state gratitude (GAC) F (2, 35) = .79, p = .46, partial eta squared = .04; anxiety (HADS-A) F (2, 35) = .23, p = .79, partial eta squared = .01; depression (HADS-D) F (2, 35) = .14, p = .87, partial eta squared = .01; menopause symptom severity F (2, 35) = .46, p = .64, partial eta squared = .02; perceived social support (MSPSS) F (2, 35) = .04, p = .96, partial eta squared = .01; chronic loneliness (UCLA) F (2, 35) = .25, p = .78, partial eta squared = .01. A small significant difference was found between preand post-intervention scores between groups on self-esteem (RSES) with lower scores being found in the benefit-triggered gratitude group when compared to active controls and the generalised gratitude condition *F* (2, 35) = 7.18, *p* = .002, partial eta squared = .29.

Thematic analysis

Both completers and non-completers were asked for their opinions on the intervention. The analysis below incorporates both (*n* = 48; 40 completers, 8 non-completers). Themes and subthemes emerging from the data are presented in Figure 9.

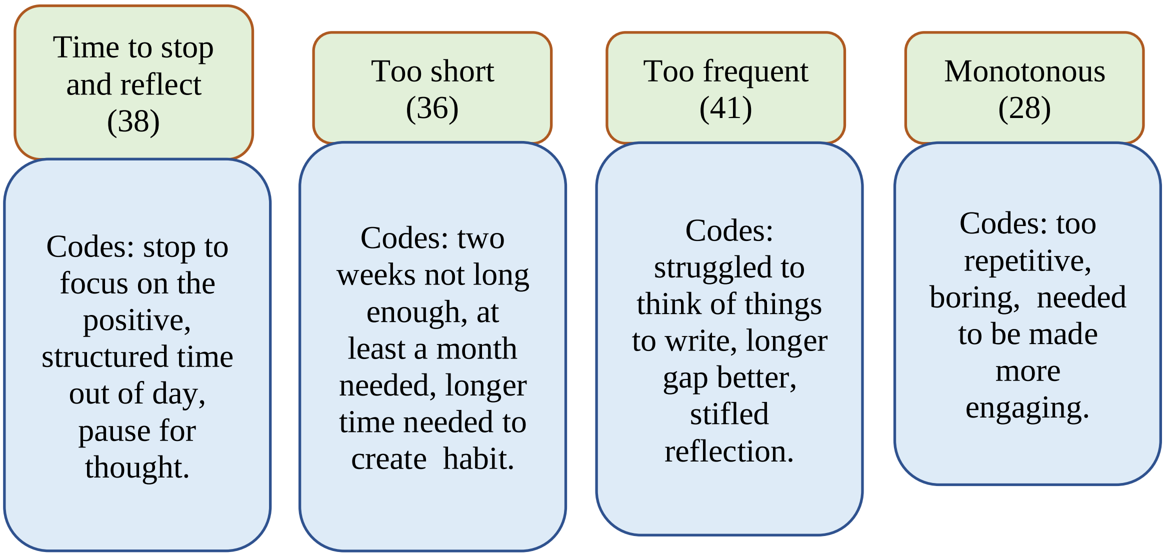

Figure 9. Themes and subthemes expressed by participants regarding the intervention (*n* = 48)

Theme 1: Time to stop and reflect. Participants' comments suggested that the diary exercise provided structured time out from their busy lives to reflect on the positive.

Participant 15: *"It encourages you to think more deeply about why you might be feeling a certain way and encourages you to acknowledge the positive aspects of life"*

Participant 31: *"A helpful way of 'reframing' some of my negative thought patterns."*

Participant 72: *"It's been good to think about what I am grateful for in a scheduled way because life can be busy and you don't realise what you have when you're facing dilemmas or sadness".*

Participant 27: *"I found I appreciated my partner and the things he does for me a lot and enable me to be more patient".*

Theme 2: Too short. When asked how long they would like the intervention to be ideally and why participants responses suggested that at least one month would be preferred by the majority.

Participant 2: *"I would suggest a month so you can see the full spectrum of thoughts over that time period."*

Participant 63: *"Maybe a month, difficult to track just 2 weeks."*

Participant 72: *"six weeks to form a habit."*

Participant 95: *"Over a month as your cycle will come into it".*

Theme 3: Too frequent. When the participants were asked to comment on frequency the majority stated that every other day was too often.

Participant 11: "*A longer time period for the questionnaire would have been better and I would have been able to think of better scenario examples."*

Participant 41: *"You don't always have time to do it, so it becomes a chore, then habit which makes it less likely to be completed".*

Participant 91: *"My feelings were very similar and did not change a lot of that period".*

Participant 67: *"Some days it was hard to think of things to write especially as I'm having* *a tough time at the moment".*

Theme 4: Monotonous. Participants comments reflected a lack of engagement at times due to the generic and simple nature of the intervention.

Participant 25: *"It's a bit too repetitive".*

Participant 53: *"The repetitive questions, it's not as personal as it could be. POI is such a personal thing".*

Participant 22: *"It would have been helpful to have an inspirational, positive thought or quote with each set of journal entries".*

Participant 95: *"It was quite monotonous".*

Discussion

This is the first study to evaluate the feasibility, acceptability, necessity and possible effectiveness of an online gratitude intervention for women with POI. Whilst no improvement in psychological well-being was observed post-intervention, the research provided helpful findings regarding how both state and trait gratitude were associated with the psychological well-being of women with POI. The characteristics of those most likely to complete this type of intervention were also highlighted. Completers were likely to be older, higher in trait gratitude, lower in depression and loneliness scores and less likely to have a diagnosed mental health condition. The intervention was feasible to deliver and acceptable to the majority of those whom completed it. However, improvements were suggested. Clinical need for intervention was determined by the high levels of depression and anxiety observed at baseline. The findings provide clinically useful data as well as highlighting areas for future research.

The lack of improvement in psychological well-being observed is in conflict with previous research which found increased levels of gratitude and psychological well-being post-intervention (Davis et al., 2016; Kerr et al., 2015). However, a meta-analysis by Mongrain and Anselmo-Matthews (2012) highlights the "file-drawer" issue in positive psychology intervention research, which may lead to over-inflation of positive effects being reported. This has also been found in a recent meta-analysis by Dickens (2017) which suggests that whilst gratitude interventions can lead to improvements on some outcomes, they have no beneficial impact on others, and their unique benefits may be overemphasised in the literature. The lack of effect may also be due to the intervention "dose" in the current study. Previous research by Emmons and McCullough (2003) and Lyubomirsky, Sheldon and Schkade (2005) both found that completing gratitude diary's weekly is more effective than completing gratitude tasks three times a week. This is supported by preferences expressed by participants in the current study.

The positive associations between gratitude and psychological well-being in the current sample highlighted the possible benefits of cultivating this personality trait in women with POI. Higher levels of both state and trait gratitude were associated with lower levels of depression, loneliness and anxiety. This positive relationship between trait gratitude and psychological well-being has also been observed in people with fibromyalgia (Toussaint et al., 2017), breast cancer (Ruini & Vescovelli, 2013) and arthritis (Sirois & Wood, 2017). The associations between higher state and trait gratitude and lower menopausal symptom severity in the current study were also of interest as analysis also demonstrated that higher symptom severity uniquely predicted higher levels of anxiety. Therefore, if gratitude levels can be increased through intervention in women with POI it is possible anxiety may decrease. Higher levels of state and trait gratitude were also associated with greater perceived social support. Kong, Ding and Zhao (2015) hypothesised that gratitude encourages "broaden and build" behaviour (Frederickson,

2013) by increasing receptiveness to pleasant or meaningful relationships. O'Connell, O'Shea and Gallagher (2017) also found that higher levels of gratitude cultivated by a journaling exercise improved perceived friendship quality over time. In addition, Dür et al. (2014) found that appreciation for help given by others was associated with better physical health outcomes. Higher levels of gratitude appear therefore to be beneficial to both psychological well-being and symptom management. However, further research is required to explore these links further to establish causal factors.

Baseline demographic information demonstrated that participants were more educated and more likely to be in a committed relationship compared to normative data (Shelton et al., 2019). Research suggests being highly educated is associated with 'high information seeking' following diagnosis of a chronic health condition (Loiselle, 2019) and that women who are highly educated are more likely to be married (Boertien & Härkönen, 2018). Those recently diagnosed seeking out information has been observed across a wide range of chronic health issues (Tanis, 2008). The sample was also predominantly white (91.6%) which is slightly higher than the general population of 86.6% according to Office for National Statistics (2014) census data. Further research is required to determine what type of support single, non-white, less educated women with POI would find helpful. The prevalence of HRT use was 70% in the current sample which is reflective of population norms (Cox & Liu, 2014; Sullivan, Sarrel & Nelson, 2016). The number of women who already had children was 30%, which is in line with normative data from meta-analyses of women with POI (Li et al., 2019). The proportion of women who knew the cause of their POI was 17%, which falls within the range observed within previous research (Faubion, Kuhle, Shuster & Rocca, 2015). The participant characteristics suggest the current sample is reflective of POI samples used in other studies, allowing for greater comparison of findings.

Current age was found to be associated with specific aspects of psychological well-being. Younger age was associated with greater menopausal symptom severity and loneliness and lower levels of perceived social support and trait gratitude. When combined with the outcome of the regression analysis which found that symptom severity predicted anxiety levels and older women tended to be less depressed, the suggestion is that younger recently diagnosed women are most likely to be distressed. This is supported by previous research (Davis et al., 2010; Mann et al., 2012; Singer, 2012). Longer time since diagnosis was only associated with lower symptom severity; however, this may simply be due to those more recently diagnosed having not begun HRT. The lack of association with other aspects of psychological well-being suggests that time since diagnosis is not a significant factor and that older age may be a better predictor of psychological well-being. Whilst this study has highlighted possible associations between these factors, further research is required to understand causal factors.

Recruitment for the study was brisk initially. However, as Figure 3 illustrates, numbers quickly reduced despite re-posting the invitation every two weeks. A longer recruitment period would be required to obtain a large enough sample to conduct an RCT. Asking participants where they heard about the research would have been helpful to determine effective recruitment sources. The attrition rates (56%) were not unusual and are in line with similar previous online gratitude interventions of 62% (Geraghty et al., 2010) and 61% (Harbaugh & Vasey, 2014). Attrition may be due to a variety of factors (Couper et al., 2010). For example, fully self-directed online interventions without human guidance or contact often suffer from high attrition (Eysenbach, 2015). Recent evidence also suggests attrition may be related to low computer confidence, or high stress and busyness (Rübsamen, Akmatov, Castell, Karch, & Mikolajczyk, 2017). Some find the focus on self-action unsupportive (Walsh, Szymczynska, Taylor & Priebe, 2018). It has also been argued that for people experiencing psychosocial difficulties a focus on the positive may be exhausting and stressful (La Torre, 2007). This type of intervention, as with any intervention, is not likely to suit everyone. However, improvements may reduce attrition rates.

A recent systematic review by Looyestyn et al. (2017) suggested that ‘gamification’, in which rewards are provided and graphics made more visually interesting reduces attrition. Receiving a smiley face emoji upon task completion has been found to reduce attrition without impacting data quality (Bacon, Barlas, Dowling & Thomas, 2017). Noar, Benac and Harris (2007) found that personalising emails encourages engagement. A thank you message after each diary task was not used in the current study and may have reduced attrition (van Selm & Janowski, 2006). These adjustments could all be easily made. The length of the survey battery may also have increased attrition. Bacon et al. (2017) found surveys which take more than 10 minutes to complete are associated with higher attrition rates. In the current study the survey battery took on average fifteen minutes to complete. Participant (#6) commented *“I didn’t mind taking part but the last two questionnaires I thought oh God how many more!”* suggesting a shorter battery of questionnaires would be preferable.

Necessity for intervention was clearly reflected in high rates of clinical level anxiety (66%) and depression (37%) observed at baseline. Although elevated, depression levels are in line with others with chronic health conditions according to a recent meta-analysis by Daré et al. (2019). However, the anxiety levels were higher than the 53% commonly observed in other chronic health conditions (Gerontoukou, Michaelidoy, Rekleiti, Saridi, & Souliotis, 2015). It is of note that diagnosed rates of depression (26%) and anxiety (41%) are lower than those observed on outcome measures in the current sample. This suggests clinical levels of psychological distress are not being recognised, which is a concern. Interestingly, there was also a marked high rate of reported acute headaches (48%) irritable bowel symptoms (35%) and chronic migraine/headaches (54%). These symptoms commonly coexist and are known to be related to high anxiety levels (Perveen et al., 2016). Further research is required to understand these links further. It may be that due to feelings of stigma and shame associated with POI (Singer et al., 2011) women internalise their distress and this manifests itself in physical health symptoms (van Brakel, 2006).

The majority (83%) of women who completed the intervention stated they thought the intervention was helpful for women with POI. However, it is of note that only 42% of those who began the intervention actually completed it and the remaining 58% may have experienced the intervention more negatively. The figure or 83% acceptability is therefore to be interpreted with caution as it only represents 32 participant's opinions out of a possible 95. It is also of interest that although the intervention was deemed helpful by most, no improvement in psychological well-being was observed post-intervention. This may be due to completers being higher in trait gratitude than non-completers. According to McCullough et al.'s (2004) 'resistance hypothesis', there may be a ceiling effect for those already high in trait gratitude and that those low in trait gratitude are most likely to see improvements in psychological well-being through intervention.

The online functionality was deemed acceptable by the majority, however some commented that they would have preferred an App or pen and paper. Only 10% stated entry into the prize draw for £50 (or currency equivalent) Amazon voucher was an incentive to participate. However, previous research has found that incentives such as gift vouchers almost double the odds of response rates in online interventions (Edwards et al., 2009). The voucher may have been more effective than responses would indicate. The active control group appeared acceptable in that attrition rates were not significantly different across groups. The benefit-triggered gratitude task may however have been too difficult as reflected in markedly longer completion times and higher attrition rates. If the task had been weekly, participants would have had more interactions with others and may find the task easier. It was hoped that the benefit-triggered group would show higher levels of perceived social support post-intervention, however this was not the case. O'Connell et al. (2017) also found the use of an interpersonal gratitude journal did not improve life satisfaction post-intervention, but a traditional gratitude journal did. The use of benefit-triggered gratitude interventions requires further research.

Despite finding the intervention largely acceptable, both qualitative and quantitative feedback suggested diary entries were too frequent and the intervention was too short. The frequency may have created intervention fatigue and account for the dip in completion at time point five (10 days) observed across the three groups. A preference for once weekly diary entries and an intervention duration of at least a month was preferred by the vast majority of those expressing an opinion. The majority of participants also found the diary task monotonous. Participants made some helpful suggestions in their qualitative feedback on how this could be improved.

Limitations

There were several limitations to the current study. Not using *a priori* criteria to determine feasibility, necessity and acceptability introduced a level of subjectivity into interpretation of the study findings. Sidani, Epstein, Bootzin, Moritz and Miranda (2009) convincingly argue that acceptability for an intervention should be established prior to the intervention start and should encompass both anticipated and experienced acceptability which was not considered in the current research. The limited number of questionnaires returned from non-completers may have introduced response bias by an overrepresentation of more positive viewpoints as those who did not complete are more likely to have had more negative views. This would have been useful information to help improve the intervention and limits the generalisability of findings. Offering a small incentive (e.g. £5 Amazon voucher) may help increase response rates in any future trial.

Demographic information also suggested there was a lack of diversity among the sample, reducing the generalisability of findings. In addition, the benefit-triggered gratitude condition was devised by the researchers and therefore has not been used previously, making comparisons difficult. It is also possible that some participants had knowledge of gratitude journaling. Including a question asking this at the end of the intervention would have been helpful. Analysis of the diary entries would also have been interesting to determine for example if those in the control condition were writing 'neutral' events and to explore differences and similarities between the generalised and benefit-triggered gratitude groups.

One strength of the current study is the randomised controlled design, which reduces sampling error that may inadvertently bias findings. In addition, this study is the first systematic investigation into gratitude as an intervention for women with POI. As such it contributes to the current literature on gratitude interventions and provides a 'snapshot' of the types of issues women with POI are experiencing and who might be most likely to engage. The use of qualitative information was another strength in that it helped improve the reliability of findings by providing additional information to help explain some of the quantitative findings and provided suggestions for improvements.

Conclusion and clinical implications

An online gratitude intervention overall was feasible to deliver and acceptable to the majority of those who completed it, however no effect on psychological well-being was observed post-intervention. Necessity for intervention was indicated by the high levels of anxiety and depression in the sample at baseline and lower levels of diagnosed issues. This finding highlights the need for routine screening of common mental health issues when women are accessing primary care. This may particularly be the case for single, non-white, less educated women with POI who may be less likely to seek out support and information and were under-represented in the sample. The findings indicate that those most likely to complete this type of intervention are older and less likely to have a diagnosed mental health condition or report depression or loneliness when compared to non-completers. Overall, this suggests that this type of low-intensity intervention is most suitable when women are not experiencing high levels of distress. The current study highlighted the beneficial role of gratitude in its associations with better psychological well-being and lower menopausal symptom severity in women with POI. Adaptations to the intervention were also suggested. A future trial could assess how effective these changes are.

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Appendices

Appendix A: Ethics approval

Downloaded: 12/03/2019 Approved: 05/03/2019

Siobhan Dunleavy

Registration number: 170149363

Psychology

Programme: Doctorate in Clinical Psychology

Dear Siobhan

PROJECT TITLE: Online Gratitude Interventions for Women Diagnosed with Premature Ovarian Insufficiency: Feasibility, Necessity and Acceptability

APPLICATION: Reference Number 024619

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 05/03/2019 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

University research ethics application form 024619 (dated 01/03/2019). Participant information sheet 1055884 version 1 (06/02/2019). Participant information sheet 1055885 version 1 (06/02/2019). Participant information sheet 1055886 version 1 (06/02/2019). Participant information sheet 1055887 version 1 (06/02/2019). Participant information sheet 1055888 version 1 (06/02/2019). Participant information sheet 1055907 version 1 (06/02/2019). Participant information sheet 1055906 version 1 (06/02/2019). Participant information sheet 1055904 version 1 (06/02/2019). Participant information sheet 1055903 version 1 (06/02/2019). Participant information sheet 1055902 version 1 (06/02/2019). Participant information sheet 1055901 version 2 (01/03/2019). Participant information sheet 1055900 version 1 (06/02/2019). Participant information sheet 1055889 version 1 (06/02/2019). Participant consent form 1055899 version 1 (06/02/2019).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Yours sincerely

Jilly Martin

Ethics Administrator Psychology

Appendix B: Recruitment sources

The Daisy Network UK (366 members). Website: https://www.daisynetwork.org.

Facebook groups

- Premature Menopause (668 members)
- Early Menopause & Premature Menopause at My Second Spring Group (116 members)
- Premature Ovarian Failure-Primary Ovarian Insufficiency (3811 members)
- Premature Ovarian Failure UK (847 members)
- Early/Young menopause and hysterectomy help and support group (2247 members)
- Premature ovarian failure & Insufficiency POF/POI: Women Supporting Women (3452 members)

Appendix C: Invitation

Subject line: PARTICIPANTS WANTED: Investigating online psychology programmes for women with POI

To whom it may concern

My name is Siobhan Dunleavy and I am a Trainee Clinical Psychologist at the University of Sheffield (United Kingdom) and have personal experience of POI, having been diagnosed at the age of 32. Myself and my supervisor Dr Fuschia Sirois are currently conducting a doctoral research project investigating the role of online positive psychology programmes for women with POI and we would really appreciate your participation. Participation is voluntary and you may withdraw at any time. Research of this type can help raise the profile of POI and increase our understanding of how best to help those of us who have the diagnosis. The programme is a pilot of an online psychological intervention which previous research has been shown to be of benefit to some who are experiencing other chronic health conditions. This means that alongside trying out the intervention for yourself we will also be asking questions about how you found it. Gathering your views will be of great help to us in identifying what is most helpful. For further details on the programme please click on the link below, we would love to hear from you.

Link to information sheet on Qualtrics [ ]

Thank you for your consideration.

Siobhan Dunleavy (Trainee Clinical Psychologist) & Dr Fuschia Sirois (Health and Well-being Researcher at the University of Sheffield, UK).

Appendix D: Information Sheet

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A study on well-being in POI

This study is a pilot of an online psychological intervention which previous research has been shown to be of benefit to people who are experiencing other chronic health conditions. Our aim is to discover if this type of intervention is suitable for women with POI. This means that alongside trying out the intervention for yourself we will also be asking questions about how you found it. Your honest opinion will be of great help to us in identifying what is most helpful for those of us with POI.

What do I have to do?

As part of the study you will be asked to complete an online survey which will be emailed to you. The survey should take no longer than 15 minutes and will ask you questions about your health and current well-being. The day after completion of the initial survey we will email you at 18.00 and ask you to do a short online exercise to record the events of the day. We will ask you to complete this exercise every 2 days over the course of two weeks, so 7 times in total. This exercise should take no longer than 8 minutes in total, but you can spend longer if you wish and can be done at a time that suits you. At the end of the 2 weeks you will be asked to complete the first online survey again and answer a few additional questions about how you found the programme. Six weeks later we will contact you again with one final survey to see how you are getting on. If you do not complete the surveys within 2 days of having been emailed them we will presume that you no longer wish to continue with the programme and you will not be sent any further emails asking you to take part. We will send you an email to ask your reasons for not continuing as this will help us to understand how best to run the programme in the future.

As a thank you for taking part in this research we will enter you into a prize draw for

£50 (or currency equivalent) of Amazon vouchers. There will be 2 prize draws: the first will take place after the two-week exercise has finished and the second will take place 6 weeks later. You will be eligible for the draw if you completed all of the exercises every two days and the surveys. The prize draws will take place after the study is closed and the winner will be contacted by email. If you win the prize draw for this study, then you will be asked to sign a form confirming that you have received the prize. This form will be kept securely in a locked cabinet or as a digital copy for 7 years after the end of the study. It will be accessible to University finance and administrative staff for reference in the event of a financial audit.

Are there any benefits or risks?

There are no risks except the time taken to complete online tasks and it is unlikely that you will be distressed by any aspect of the study. However, if you are upset following the completion of this study, please do contact your GP/medic or a mental health professional as appropriate. If you need more immediate assistance, please contact emergency services who will be able to support you further. Alternatively, if you live in the UK you can call the Samaritans for free on **116 123**. If you live in the US, you can call the Samaritans on **(877) 870-4673.** If you live anywhere else in the world, please visit http://www.befrienders.org/ to find a local support line. Your participation in this study is voluntary, and you have the right to withdraw at any point during the study if you so wish and up until the final prize draw as we will need email addresses to notify the winner. Within one week after the final prize draw your information will be anonymised and identifiable only by a number. At this point you will not be able to withdraw. If you would like to withdraw at any time up to this point please do email myself (sdunleavy1@sheffield.ac.uk) or Dr Sirois (f.sirois@sheffield.ac.uk) directly. Choosing to withdraw will not affect your statutory rights in any way.

What will we do with your data?

Any personal information you provide will be kept anonymous and safe in a secure university network and will be accessible by the research team only. The University of Sheffield will be the data controller for this research. Your email address will only ever be used by the researchers. The numerical data that you provide will be aggregated with that of other respondents, to give the researcher an idea about general trends, rather than individuals. The anonymised data will not be destroyed and it is possible that it will be used by researchers for subsequent studies, or by other researchers or alongside any scientific publications that arise from the data. However, if the data is used in this way, your response will always remain anonymous. According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general. If you have any questions about the study, please contact me, Siobhan Dunleavy (sdunleavy1@sheffield.ac.uk). This study is part of a Doctoral thesis which forms part of my clinical psychology training and may be written up for publication in a peer reviewed journal. All data will be anonymous so individual data will not be able to be identified. If you have any complaints about the study, please contact myself (Siobhan Dunleavy:sdunleavy1@sheffield.ac.uk) or my supervisor (Dr Fuschia Sirois: f.sirois@sheffield.ac.uk) in the first instance. If you feel your complaint has not been handled to your satisfaction following this, you can contact Amrit Sinha (a.sinha@sheffield.ac.uk) - Clinical Psychology Unit, Psychology Department, University of Sheffield.

We will be recruiting for participants up until the end of 2019. If you are happy with the information provided, are aged 18 or over, have a diagnosis of POI and would like to take part in this research please click on the link below. Thank you for taking the time to consider this invitation.

Take part in the study: [Link to Qualtrics screening questionnaire]
Siobhan Dunleavy (Trainee Clinical Psychologist) & Dr Fuschia Sirois, PhD

Appendix E: Screening Questions

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- Have you been diagnosed with premature ovarian insufficiency (POI) by a doctor or physician using the internationally recognised criteria of two (one month apart) serum FSH (follicle stimulating hormone) levels in the menopausal range and at least 4 months of amenorrhea or menstrual irregularity? (Yes/No)
- Were you aged 40 or below when you received your diagnosis? (Yes/No)
- Are you currently undergoing fertility treatment? (Yes/No)
- Have you ever been diagnosed with a serious and enduring mental illness such as schizophrenia, psychosis or bi-polar disorder? (Yes/No).

Appendix F: Non-eligible Participant Information

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Thank you for your interest in taking part in our research. We really appreciate your consideration and taking the time to complete the screening questions. For this particular piece of research the responses you provided on our screening questionnaire indicate that you are not eligible for this particular study. We would like to explain why this is case. When designing a programme that is going to be tested on people we have to look at evidence from previous research to decide what type of programme would be suitable to use. The research that has been conducted on the psychological impact of having POI is limited at the moment. For example, there is no existing research that can tell us how having a long-term mental health condition, such as bi-polar disorder or schizophrenia can impact the experience of having POI. In addition, we know that undergoing IVF treatment can cause significant psychological distress but we do not know how much having POI contributes to that distress. Therefore, we have had to limit our own sample in this research to be as similar as possible to those already targeted in previous studies. Our hope is that our research will help to expand the existing evidence base and that future research will look at these and other factors. If you would like to know more about the study please do not hesitate to contact myself Siobhan Dunleavy (sdunleavy1@sheffield.ac.uk) or my supervisor Dr Fuschia Sirois (f.sirois@sheffield.ac.uk). If would like the opportunity to try the programme out for yourself let us know and we will happily send you a link so that you can try the programme out for yourself. Thank you for your interest in this research.

Appendix G: Consent Form

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Consent

By selecting the box below, you are agreeing to the following:

- I have read the information page and understand its contents.
- I confirm that I am 18 years of age or over.
- I note my data will be anonymous.
- I understand I have a right to withdraw from the research at any time.
- I understand that if I withdraw from the research any data included in the results will be removed where possible (I understand that once anonymous data has been collated into other data sets it may not be possible to remove that data).
- I understand that my data will be kept securely and anonymised and agree to my data being used for future reports or publications.
- I confirm I am willing to be a participant in the above research study.
- I agree to being contacted again by email in just over 2 weeks and then again six weeks after the study has finished to see how I am getting on.

If you have any questions regarding this study, its purpose or procedures, please feel free to contact Dr Fuschia Sirois (f.sirois@sheffield.ac.uk) or Siobhan Dunleavy (sdunleavy1@sheffield.ac.uk). Please enter your email address and select
the box below to indicate your consent to take part in this research:
Email address: [ ]
I agree to act as a participant in this survey [tick box]

Appendix H: Demographic Questions

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- How many years ago were you diagnosed with POI?
- What is your current age?
- Are you currently taking Hormone Replacement Therapy (HRT)?
- Do you have children?
- Are you currently in a long-term relationship with a partner?
- Is the cause of your POI known?
- What is your highest level of education?
- Do you have religious or spiritual beliefs?
- What is your country of residence?
- What is your ethnicity?
- Do you have a diagnosed mental health condition? If so, please state diagnosis.

Appendix I: Existing health conditions questionnaire

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Brief Health History

Acute or Transitory Health Problems

Please indicate which ones you are currently experiencing or can remember experiencing within the past 3 months. Please click all that apply.

	Back problems		Insomnia		Allergies
	Sprains or muscle strains		Infections		Skin problems/rashes
	Headache		Flu, cold or fever		Reproductive/menstrual problems
	Acute digestive problems (constipation, heartburn etc.		Dental problems		Other acute problems: please specify e.g. bone fractures etc.

Chronic or Recurring Health Problems

Please indicate which of the following health issues you have been diagnosed with – check all that apply under ‘YES”. For those problems you do have please indicate how much this problem or its symptoms has bothered you in the past 3 months by clicking the appropriate box.

No	**Yes**		**Mildly bothered**	**Moderately bothered**	**Very bothered**	**Extremely bothered**
		Chronic migraines or headaches				
		Heart disease (cardiovascular disease)				
		High blood pressure (hypertension)				
		Asthma				

		Diabetes				
		Cancer				
		Arthritis				
		Fibromyalgia				
		Inflammatory Bowel Disease (Crohn’s, colitis)				
		Multiple sclerosis				
		Chronic fatigue syndrome				
		Irritable Bowel Syndrome (IBS)				
		Liver disease				
		Lung disease/COPD				
		Kidney disease				
		Chronic back problems				
		Other chronic condition. Please specify, e.g. sickle cell disease, psioriasis etc.				

Appendix J: Pre-, post-intervention & 6-week follow-up outcome measures

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Symptom severity

Menopause Rating Scale (MRS)					
Which of the following symptoms apply to you at this time? Please, mark the appropriate box for each symptom. For symptoms that do not apply, please mark ‘none’.					
	None	**Mild**	**Moderate**	**Severe**	**Very severe**
Hot flushes, sweating (episodes of sweating)					
Heart discomfort (unusual awareness of heartbeat, heart skipping, heart racing, tightness)					
Sleep problems (difficulty in falling asleep,difficulty in sleeping through,waking up early)					
Depressive mood (feeling down, sad, on theverge of tears, lack of drive, mood swings)					
Irritability (feeling nervous, inner tension,feeling aggressive)					
Anxiety (inner restlessness, feeling panicky)					
Physical and mental exhaustion (generalised decrease in performance, impaired memory, decrease in concentration,forgetfulness)					
Sexual problems (change in sexual desire, in sexual activity and satisfaction)					
Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence)					
Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse)					
Joint and muscular discomfort (pain					

in the joints, rheumatoid complaints)						

Depression & Anxiety (HADS removed due to copyright)

Trait gratitude

Gratitude Questionnaire (GQ-6)						
Using the scale below as a guide, write a number beside each statement to indicate how much you agree with it.						
1 strongly disagree	2 disagree	3 slightly disagree	4 neutral	5 slightly agree	6 agree	7 strongly agree
I have had so much in life to be thankful for						
If I had to list everything that I felt grateful for, it would be a very long list						
When I look at the world, I don't see much to be grateful for						
I am grateful to a wide variety of people						
As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history						
Long amounts of time can go by before I feel grateful to something or someone						

State Gratitude (embedded within the PANAS)

Positive Affect and Negative Affect Schedule (PANAS) Gratitude Adjectives Checklist (GAC) in bold					
This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below (i.e. using 1 – 5) next to each word. Indicate to what extent you feel this way right now, that is, at the present moment.					
	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	1	2	3	4	5
Appreciative	1	2	3	4	5
Distressed	1	2	3	4	5
Excited	1	2	3	4	5
Upset	1	2	3	4	5
Thankful	1	2	3	4	5
Guilty	1	2	3	4	5
Scared	1	2	3	4	5
Hostile	1	2	3	4	5
Enthusiastic	1	2	3	4	5
Proud	1	2	3	4	5
Irritable	1	2	3	4	5
Alert	1	2	3	4	5
Ashamed	1	2	3	4	5
Inspired	1	2	3	4	5

Nervous	1	2	3	4	5
Determined	1	2	3	4	5
Attentive	1	2	3	4	5
Grateful	1	2	3	4	5
Jittery	1	2	3	4	5
Active	1	2	3	4	5
Afraid	1	2	3	4	5
Strong	1	2	3	4	5

Chronic loneliness

UCL Chronic Loneliness Scale				
Indicate how often each of the statements below is descriptive of you. O = often, S = I sometimes feel this way. R indicates I rarely feel this way. N indicates I never feel this way.				
	I often feel this way	I sometimes feel this way	I rarely feel this way	I never feel this way
I am unhappy doing so many things alone	O	S	R	N
I have nobody to talk to	O	S	R	N
I cannot tolerate being so alone	O	S	R	N
I lack companionship	O	S	R	N
I feel as if nobody really understands me	O	S	R	N
I find myself waiting for people to call or write	O	S	R	N
There is no one I can turn to	O	S	R	N
I am no longer close to anyone	O	S	R	N
My interests and ideas are not shared by those around me	O	S	R	N
I feel left out	O	S	R	N
I feel completely alone	O	S	R	N
I am unable to reach out and communicate with those around me	O	S	R	N
My social relationships are superficial	O	S	R	N
I feel starved for company	O	S	R	N
No one really knows me well	O	S	R	N
I feel isolated from others	O	S	R	N
I am unhappy being so withdrawn	O	S	R	N
It is difficult for me to make friends	O	S	R	N
I feel shut out and excluded by others	O	S	R	N
People are around me but not	O	S	R	N

with me				

Social Support

Multi-dimensional Scale of Perceived Social Support (MSPSS)							
Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.							
	Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
There is a special person who is around when I am in need.	1	2	3	4	5	6	7
There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
My family really tries to help me.	1	2	3	4	5	6	7
I get the emotional help and support I need from my family.	1	2	3	4	5	6	7
I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
My friends really try to help me.	1	2	3	4	5	6	7
I can count on my friends when things go wrong.	1	2	3	4	5	6	7
I can talk about my problems with my family.	1	2	3	4	5	6	7
I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
My family is willing to help me make decisions.	1	2	3	4	5	6	7
I can talk about my problems with my friends.	1	2	3	4	5	6	7

Self Esteem

Rosenberg Self-Esteem Scale (RSES)				
Below is a list of statements dealing with your generalised feelings about yourself. Please indicate how strongly you agree or disagree with each statement.				
	Strongly agree	Agree	Disagree	Disagree Strongly
On the whole, I am satisfied with myself				
At times I think I am no good at all				

I feel that I have a number of good qualities				
I am able to do things as well as most other people				
I feel I do not have much to be proud of				
I certainly feel useless at times				
I feel that I'm a person of worth, at least on an equal plane with others				
I wish I could have more respect for myself				
All in all, I am inclined to feel that I am a failure				
I take a positive attitude toward myself.				

Appendix K: Group instructions

Generalised gratitude group

There are many things in our lives, both large and small, that we might be grateful about. Think back over the course of the last couple of days and write down in the space below three things in your life that you are grateful or thankful for. If you would like to you can include why you are grateful for each thing:
e.g. *"I'm grateful for the sun because it's warmth feels good on my skin"*

Benefit-triggered gratitude group

There are many things that others do for us, both large and small, that we might feel grateful for. Think back over the course of the day and write down in the space below three things that someone has done for you that you feel thankful for and has benefitted you. If you would like to you can include why you are grateful for each thing:
e.g. *"I'm was grateful that when I stumbled whilst out walking a passer-by stopped to help me and ask if I was OK, this reminded me how kind people can be even to people they don't even know".*

Control group

There are many things in our lives, both large and small, that might happen to use as we go through our week. Think back over the course of the last couple of days and write down in the space below three things that have happened.
e.g. *"I walked to the bus stop today"*

Appendix L: Process measure

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Positive & Negative Affect & State Gratitude

Positive and Negative Affect Schedule – short (PANAS-10)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Distressed					
Excited					
Appreciative*					
Upset					
Scared					
Enthusiastic					
Thankful*					
Alert					
Nervous					
Determined					
Grateful*					
Afraid					
Inspired					

*State gratitude items (GAC)

Appendix M: Post-intervention Questionnaire

The University Of Sheffield.

Thank you for taking part in this study investigating well-being in those with POI. We really appreciate you taking the time to do so. The survey should take no longer than 20 minutes to complete. You will be asked to enter your email address so that we can match your responses. We would also be most grateful if you could answer the questions listed below. Your responses to these questions will help us to fine tune the programme. After completion of the survey and the questionnaire below you will be automatically entered into a prize draw to win a £50 (or currency equivalent) Amazon voucher. The prize draw will take place in March 2020 and the winners will be contacted by email. Thank you for your participation.

1. Do you think this type of online exercise is helpful for those with POI? (Yes/No). Please tell us more about why? (text box).
2. If you did not find the exercise helpful and you stopped doing it please could you tell us why as your opinions are valuable to us and will help in the design of future programmes (text box).
3. Was completing the exercise every other day was too much or too little? (too much/too little). What would be your preference, e.g. daily, weekly etc? (text box).
4. Would you have preferred the programme length to be longer or shorter than 2 weeks? (longer/shorter). What would be the ideal length for you? (text box).
5. Was it difficult to think of things to write? (Yes/No).
6. Was the timing of the emails (18:00) local time acceptable? (Yes/No). What time would be ideal for you to receive the emails? (text box).
7. Were the instructions provided clear or would more information have been

beneficial? (would prefer more instruction/happy with the information given).

8. Did the online format function well, or were there complications/glitches when completing diary entries or filling in questionnaires? (Yes/No).
9. Would you have preferred a choice of ways to keep your diary? (Yes/No). What would your preferred format be, e.g. pen and paper diary, an App? (text box).
10. Did you feel that doing the exercises improved your relationships with others? (Yes/No). If yes, could you say in what way? (text box).
11. How did you find completing the questionnaires after each diary entry? (text box).
12. Was the Amazon voucher a useful incentive or did it make no difference to whether you participated or not? (Made a difference 0 Didn't make a difference 0).
13. Now that the trial is over, do you intend to continue to practice the exercise? (Yes/No).

We will contact you again in 6-weeks and ask you to complete the survey for the last time. At the end, you will again be entered into a prize draw to prize draw to win of a £50 Amazon voucher (or currency equivalent).

Appendix N: 6-week Follow-up Questionnaire

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Thank you for taking in both parts of this study investigating well-being in those with POI. As we promised 6 weeks ago, we are contacting you again to complete the survey for the last time. It should take no longer than 20 minutes to complete. We would also appreciate your responses to the questions below. Your responses will help us to gauge the long-term impact of the programme. After completion of the survey and the questions below you will automatically be entered into the prize draw for £50 (or currency equivalent) of Amazon vouchers as a thank you for your participation. You will be asked to enter your email address so that we can match your responses. The prize draw will take place in March 2020 and the winner will be notified by email. Thank you for your participation.

1. Did you continue to practice the exercise after completing the 2-week programme finished? (Yes/No).
2. If yes, to what extent did you continue to practice the exercises? Please tick.

Less than once a week or never	One day a week	2 – 3 days a week	4 – 5 days a week	Every day of the week	More than once a day

3. If you stopped, how many days after your participation in the study did you stop? (#of days).

Thank you for your participation in this research study, we really appreciate you taking the time to complete it and we wish you all the very best for your future.
Siobhan Dunleavy & Dr Fuschia Sirois, PhD

Appendix O: Debrief

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We would like to thank you for participating in this research. Your time and thoughtful responses are greatly appreciated. Evidence suggests that those who are naturally high in gratitude experience better well-being than those who are not. In addition, gratitude exercises have been developed to help people develop a more grateful outlook. Research has found that generally, such intervention can help people better adjust and cope with a number of different challenging circumstances and health conditions. Our research aimed to look at whether a simple online exercise might be beneficial for those with POI.

When you agreed to participate in the study you were randomly allocated to one of 3 groups. One group was asked to note 3 general things they felt grateful for. Another group did a slightly different version which asked them to focus upon 3 good things that another person had done for them. The neutral or control group was asked to note 3 things that had happened to them that day. Having a control group allowed us to compare if any benefits to well-being seen in the gratitude groups were greater than those in the control group and enabled us to draw more confident conclusions about the usefulness of the gratitude interventions for those with POI.

If any of the control group participants would like to do either (or both) of the gratitude interventions please do email me Siobhan Dunleavy (sdunleavy1@sheffield.ac.uk) and I will happily send you the weblink to participate. Many thanks again for your participation in this research, without you it would not be possible.

Siobhan Dunleavy & Dr Fuschia Sirois, PhD

Department of Psychology, University of Sheffield, UK

Appendix P: Non-completers questionnaire

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Thank you for considering taking part in this research investigating well-being in those with POI. We really appreciate you taking the time to do so. As you decided to not complete the programme we would be most grateful if you could answer the questions listed below. Your responses will help us to understand how best to help those with POI. You will be asked to enter your email address so that we can match your responses.

1. Do you think this type of online exercise is helpful for those with POI? (Yes/No).
2. Please could you tell us why you stopped doing the exercises? Your opinions are valuable to us and will help us understand what would be helpful for those with POI (text box).
3. Was completing the exercise every other day too much or too little? (too much/too little). What would be your preference, e.g. daily, weekly etc? (text box).
4. Was it difficult to think of things to write? (Yes/No).
5. Was the timing of the emails (18:00) local time acceptable? (Yes/No). What time would be ideal for you to receive the emails? (text box).
6. Were the instructions provided clear or would more information have been beneficial? (would prefer more instruction/happy with the information given).
7. Did the online format function well (Yes/No), or were there complications/glitches when completing diary entries or filling in questionnaires? (Yes/No).
8. Would you have preferred a choice of ways to keep your diary? (Yes/No). What would your preferred format be, e.g. pen and paper diary, an App? (text box).
9. How did you find completing the questionnaires regarding your well-being

after each exercise? (text box).

Please enter your email address: [ ]

(please note that your email address will only be accessible to the researchers)