

Impact Of Gratitude Journal Writing Intervention On Depression, Anxiety, Stress, Self Criticism And Self Compassion In Women With PCOS

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Abstract

Background: It is relatively unknown about the experience and impact of self criticism specifically in the context of PCOS in women. Polycystic Ovary Syndrome (PCOS) is a prevalent hormonal condition that impacts women in their reproductive age and is connected to physical and emotional strain. Although there are many studies done on Psychological distress like Depression, Anxiety and Stress, to the best of our knowledge this is the first study that measured the variable Self Criticism on PCOS women. This research also measured self compassion level, and attempted to give a simple, yet powerful method of gratitude journal writing. This study also aims to investigate if Gratitude Journal Writing, which is a simple yet powerful method, can improve self compassion and bring down self criticism along with other psychological distress factors like depression, anxiety, stress in women with PCOS. Studies have found lower mental well-being among PCOS women than in the Non-PCOS women. Positive psycho-logical interventions provide fruitful ways of enhancing the mental well-being, but little is known about whether Gratitude Journal writing could mitigate Psychological distress and self criticism and increase self compassion in PCOS women

Methods: This study aimed to investigate the effect of Gratitude Journal Writing in decreasing self-criticism, depression, anxiety, stress and increasing self-compassion in women with PCOS. Twenty-eight women with PCOS was randomly assigned to either a gratitude journal writing intervention group or a control group. Participants in the intervention group engaged in six weeks of gratitude journal writing, while the control group received no intervention. Depression, Anxiety, Stress, Self-criticism and self-compassion were measured using validated self-report measures of DASS-21, FSCRS and SCS (26 items) scale at baseline and after the intervention.

Results: The results were evaluated and the gratitude journal writing in the experimental group had significantly decreased depression ($p < 0.001$), anxiety ($p < 0.001$), stress ($p < 0.001$) and self-criticism ($p < 0.001$) and increased self-compassion ($p < 0.001$). On the other hand, the control group did not have altered results.

Conclusion: These findings suggest that gratitude journal writing is an effective intervention for decreasing depression, anxiety, stress and self criticism, and improving self-compassion in women with PCOS. Gratitude Journal Writing could be incorporated into treatment plans for PCOS-related psychological distress, which could help them to improve their mental health. Nonetheless, it is recommended to increase the sample size in order to validate these findings. Additional investigation is required to ascertain the enduring practices, habits, and impacts of maintaining a gratitude journal within this particular group.

Keywords: PCOS, mental health, Self-criticism, self-compassion, gratitude journal writing. Psychological distress, Anxiety, Depression, Stress.

Introduction

Polycystic ovary syndrome (PCOS) is a subject of great importance in contemporary discussions. PCOS is currently recognized as the most common endocrine disorder in women of reproductive age, with a worldwide prevalence ranging from 6 to 21%, depending on the diagnostic criteria (Bozdag et al. 2016). It is a leading cause of infertility in reproductive aged women (Devin et al. 2020).

To clinically diagnose PCOS, the widely accepted guidelines necessitate the presence of at least two out of the three primary features: physical or biochemical indications of androgen excess, ovulatory dysfunction, and polycystic ovarian morphology (Guarnotta et al. 2020).

Ehrmann (2005) says that PCOS disorder exhibits variety of symptoms include oligomenorrhoea, infertility, hirsutism - excessive growth of coarse facial and body hair, male pattern of baldness, acne, obesity. Women with PCOS are not only the sufferers of the physical disturbance and ailments but also are at high risk of getting affected with mental disorders like depression, bipolar disorder, stress, body dissatisfaction, sexual dissatisfaction, Health related Quality of life (Melissa et al. 2006, Kerchner et al. 2009, Açmaz et al. 2013, Rowlands et al. 2016). Barry et al. in 2011, conducted a systematic review and meta-analysis and reported women diagnosed with Polycystic Ovary Syndrome (PCOS) generally exhibit slightly higher levels of anxiety and depression compared to women who do not have PCOS. Given the current rise in global cases of PCOS, particularly among adolescents, and the significant presence of symptoms like depression during this stage, it is crucial to bring attention to this condition. (Sadeeqa et al. 2018). Most of the earlier studies have

identified that anxiety and depression are higher in women with PCOS as compared to women without the condition (**Månsson et. al. 2008, Jedel et. al. 2010**). A cross sectional study conducted by **Tay et. al. (2019)** revealed that women with PCOS reported a significantly higher prevalence of psychiatric disorder than women without PCOS. A study published in the Journal of Affective Disorders by **Asdaq et al. (2020)** revealed that individuals with PCOS exhibited higher levels of stress, depression, and anxiety when compared to the control group. Previous studies have mostly focused on Depression, Anxiety and Stress. Therefore, this study is also aimed and the first study to measure self criticism among women with PCOS along with depression, anxiety, stress and has attempted to give simple, but powerful gratitude journal writing intervention to these women.

Self-criticism has been characterised as a consolidated structure of convictions, feelings and perspectives that individuals may actuate towards them mostly in light of disappointments or difficulties (**Gilbert et. al. 2005, Whelton et. al. 2005**). Moreover, being critical with ourselves has been found to be associated with a variety of negative correlates, including higher levels of stress and symptoms of mental illness (**Kannan et. al. 2013**). Negative self-judgments are explicitly ensnared in the high paces of anxiety, , depression, and endeavoured self destruction discovered during this period(Harter et al. 1994). (**Longe et al,2010**) says Self-criticism is a powerful stimulator of threat processing in the brain. Low levels of self and body compassion were found in women with polycystic ovary syndrome (**Van Niekerk et. al. 2022**). Self-criticism has been found to be strongly related to lower levels of self-compassion (**Gilbert et. al. 2004**). Very few studies have discussed self criticism in women with PCOS.

Self Compassion

The role of self-compassion is increasingly being investigated as a protective mechanism in the context of psychological and health conditions(**Muris et. al. 2017**). Self-compassion, which refers to showing kindness to oneself when facing suffering, is an effective approach to dealing with distressing thoughts and emotions. It promotes overall mental and physical well-being (**Neff 2023**). Self-compassion is important for individuals' well-being(**Zessin et. al. 2015**). Self-compassion is a potentially important, measurable quality that offers a conceptual alternative to Western, more egocentric concepts of self-related processes and feelings(**Neff et. al. 2007**).However Self Compassion is not studied in women with PCOS. Hence this study also aimed to measure the variable self compassion along with self criticism in detail.

The Journal of Frontiers in Psychology (**Austin et al., 2021**) and the Journal of Adolescent Research (**Bluth et al., 2018**) have both examined how interventions focused on compassion address self-criticism and promote self-compassion, leading to positive outcomes such as increased connection, acceptance of physical limitations, and reduced isolation. Additionally, research has found an inverse relationship between self-compassion and self-criticism (**Zhang et al., 2019**), with evidence supporting the association of self-compassion with psychological well-being, drawing from Buddhist teachings. This has led to an increase in research exploring the benefits of cultivating compassion (**Neff 2003, Neff et. al. 2005, Leary et. al. 2007, Hutcherson et. al. 2008, Lutz et. al. 2008, Gilbert 2014, Beaumont 2012**).

A recent study published in the Journal Scientific reports (**Patten et. al.2023**),stated that high Intensity Interval Training(HIIT) reduced the depression, anxiety and stress of women with PCOS.

According to **Scaruffi et al.'s (2014)** study published in the Journal of Psychosomatic Obstetrics &Gynaecology, approximately 45% of women with PCOS exhibited an exaggerated introspective behaviour that could become pathological self-criticism and ruminative thinking. This tendency towards negative self-image and poor body image was found to be more prevalent in women with PCOS than in controls. However there has not been any studies that measured self criticism in women with PCOS, hence this study is the first one to measure self criticism among these women. This is also the first quantitative study on intervention of Gratitude Journal writing in PCOS women.

Positive psychology provides additional interventions aimed at assisting individuals in experiencing an improved quality of life (**Parks &Titova 2016**). Compassion-focused therapy is an integrated therapy that draws from various fields, including Buddhist psychology, and is based on research and understanding of how our minds work, with outcome and process research being key to its future development (**Gilbert 2009**).

Interventions that emphasise gratitude are based on the theory and research surrounding the concept of gratitude, which involves recognizing and valuing the positive elements of our daily experiences (**Wood et al., 2010**). Gratitude is an “emotional signature”, a state of receiving” (**Dispenza 2014**).Gratitude is linked to improved cardiovascular and immune health, as supported by studies conducted by**Cousin et al. (2020)** and **Emmons et al. (2013)**. Additionally, higher levels of trait gratitude are associated with increased self-esteem, as found in research by **Anna et al. (2018)**. Gratitude has been depicted as a positive feeling, an attitude, an ethical virtue, mental state, personality trait, character strength or adapting reaction (**Elosua 2015, Emmons et. al. 2003**).

Schweitzer (1969) alluded to Gratitude as "the mystery of life" and guaranteed the most prominent thing in life is to "express thanks for everything.

It appears to be that gratitude adds a lot of difference to attribute absolution (dispositional pardoning or forgivingness). **Neto (2007)** in one experiment found gratitude as a critical factor, general propensity to pardon.

Gratitude interventions

To enhance the expression and experiencing of gratitude a number of interventions have been developed like customary pen and paper, gratitude journal writing. **(Davis et al., 2016)** concluded that besides the normal population there is a need to study the gratitude interventions among clinical samples with different psychological distress. Women diagnosed with breast cancer who took part in a two-week gratitude intervention by maintaining a daily diary experienced improvements in their psychological well-being, felt more supported, and adopted better coping strategies. It is noteworthy that a significant number of these women completed the intervention online **(Sztachńska et al., 2019)**. These positive responses are, in turn, associated with increased well-being **(Layous et al. 2013)**. Recent meta-analyses have discovered that interventions aimed at enhancing gratitude can have a positive impact on psychological well-being by reducing symptoms of depression and anxiety, even though the magnitude of these effects may be modest **(Cregg&Cheavens, 2021; Davis et al., 2016; Dickens, 2017)**. A different study discovered that a gratitude intervention lasting for six weeks, which mainly involved writing exercises, did not reduce distress but did enhance well-being when compared to a self-kindness or control group **(Bohlmeijer et al., 2021)**. While gratitude has been shown to have positive effects on psychological well-being in various cultures, individuals from collectivistic cultures may derive fewer benefits from gratitude interventions compared to individuals from individualistic cultures. Gratitude practice is self-administered, and cost-effective positive psychological intervention (PPI) **(Lyubomirsky et al. 2005)**. Gratitude is an experience of abundance, with awareness that one is the recipient of a good gift from a giver **(Watkins et al. 2009)**. The potential of enhancing individuals' daily psychological well-being through the cultivation of gratitude was initially investigated by **Emmons et al.(2004)** in three separate studies that differed in intervention intensity, measurement approaches, and participant samples. Surprisingly, even amidst traumatic experiences, certain individuals manage to discover advantages, and those who do are more capable of thriving **(Tennen& Affleck 2002)**.

The most prevalent of these techniques has been gratitude journals where participants are instructed to make written lists of things for which they are grateful, on regular occasions **(O'Connell et. al. 2018)**.

Fekete et. al.(2022) postulated that the gratitude writing helped maintain gratitude levels and decreased stress and negative affect. Based on the findings of **Komase et al. (2021)**, interventions focused on gratitude may have the potential to enhance mental health, although their impact on overall well-being is still uncertain.

According to **Layous et. al. (2013)**, writing gratitude letters might only work in certain cultures.

There has not yet been any study conducted to investigate if gratitude journal writing can reduce depression, anxiety, stress and self criticism and increase self compassion level in women with PCOS.

The Present Study

To begin with, the study builds upon existing literature by addressing the gap in knowledge regarding the impact of Gratitude journal writing practice on psychological well-being in women with PCOS. The propulsion of the present study was to assess the effectiveness of Gratitude journal writing on depression, anxiety, stress, self compassion and self criticism on women affected with PCOS. As we hypothesised that there could be significant differences between Pre and post of six week gratitude intervention, that have shown a decreased Depression, Anxiety, stress, self criticism and an increased self compassion. Moreover, women with PCOS expected to improve their mental health, further the gratitude intervention would increase self compassion and it would further help them to increase positive thinking in their day to day life.

Therefore, the aim of our study was to test the gratitude journal writing intervention on the level of self-criticism and self-compassion of the PCOS women.

To investigate the effect of gratitude journal writing on depression, anxiety and stress in women with PCOS

We adopted a six weeks gratitude journal writing method for the PCOS women in the experimental group.

Methodology

Study Design:

This study is a case control, experimental, pre and post random trial design.

This study was carried out from March 2022 to September 2022 in Srushti Fertility Centre and Women's Hospital - Chennai, India. Srushti has been academically sound attached to many universities from across India and few overseas hospitals with respect to continuous medical education. This centre has conducted many audits and studies in genetics and reproductive medicine. Women from different states of India visit here for treatment. It has four branches and has been serving patients from 55+countries. Hence the researcher selected Srushti hospital considering the do-ability of the PCOS women study. Ethical approval to conduct this study was obtained through Srushti hospital from SRI RAJA RAJESWARI INDEPENDENT ETHICS COMMITTEE-No.ECR/338/Indt/TN/2021 issued under New drugs and Clinical Trials Rules,2019

Participants

The participants of this study were selected through a purposive sampling technique. Inclusion criteria were women at reproductive age(18-45 years) and who were diagnosed with PCOS. The PCOS women were diagnosed by application of Rotterdam Criteria , which states that PCOS syndrome has any two of the three clinical features of PCOS; Oligo/Anovulation, Signs of Hyperandrogenism and polycystic ovaries on Ultrasonography with exception of related disorders (Rotterdam, 2004). Women at menopause, pregnant women, women who had history of existence of psychiatric disorder, those diagnosed with adrenal, pituitary disorders, any kind of adrenal neoplasms or women involved in any kind of psychological interventions were exempted from this study. The PCOS diagnosis was confirmed by the senior doctors from the outpatient department of Obstetrics & Gynaecology at Srushti hospitals.

Study protocol.

28 PCOS women were selected for this intervention study to participate in the 6 weeks Gratitude journal writing. All the 28 women completed the Pretest for DASS-21 (Lovibond&Lovibond 1995), FSCRS (Gilbert et. al. 2004) and Self Compassion scales (Neff 2003). A unique number was assigned to each participant in the pre test dataset. After the pretest, the participants were randomly distributed to experimental and control groups using simple randomization. Randomization was done by drawing slips of paper (code number) from a box by another person, ensuring that the assignment process was unbiased and truly random. Thus 14 subjects were allotted to the experimental group and 14 subjects to the control group. There was no significant difference in pretest p- values of experimental and control group

Procedure

Ethical Considerations:

The participants were fully informed about the aims and procedures of the study prior to their participation. They were also well informed about the voluntary and anonymous nature of their participation. Ethical approval was obtained through Srushti Hospital from SRI RAJARAJESWARI INDEPENDENT ETHICS COMMITTEE - No. ECR/338/Indt/TN/2021 issued under New drugs and Clinical Trials Rules,2019. Informed consent forms approved by the ethical committee were provided to the participants, detailing the researcher, topic, university affiliation, and the right to refuse, participate, or withdraw from the study at any time. Before taking part in the study, all participants granted their informed consent. Confidentiality of participant information and data was maintained throughout the study

Measures

The study questionnaire included DASS-21(Depression, Anxiety and Stress Scale): a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress (Lovibond&Lovibond 1995),

FSCRS (Forms of Self-Criticizing/Attacking & Self-Reassuring Scale): A scale consisting of items related to inadequate self, self-hatred, and self-reassurance (Gilbert et. al. 2004) and Self-Compassion Scale (SCS-26): A 26-item scale measuring self-kindness, self-judgment, mindfulness, common humanity, isolation, and overidentification (Neff 2003).Forms of Self criticizing/Attacking & Self Reassuring Scale (FSCRS) is a self reporting 22 statements scale with 3 sub divisions viz, is = inadequate self (9), rs = reassure self (8) and hs = hated self (5) Gilbert et al. (2004) found three factors in the standard FSCRS: Inadequate Self, Self-Hatred, and Self-Reassurance, comprising of nine, five, and eight items respectively. Participants respond to items on a 5- point Likert scale, ranging from 0 (Not at all like me) to 4 (Extremely like me). The scales have good internal consistency and reliability (Gilbert et. al. 2004, Baião et. al. 2015).

The Self-Compassion Scale (SCS-26) is a widely used self-report measure designed to assess an individual's level of self-compassion. It was developed by Kristin Neff (Neff 2003), a pioneering researcher in the field of self-compassion. The SCS-26 consists of 26 items that capture various aspects of self-compassion. The six subscales categorise these items. Self kindness items (5 statements), Self –Judgment items (reverses scored - 5), Common Humanity items (4), Isolation

items (Reverse scored – 4), Mindfulness items(4) & Over identified items (reverse scored – 4)Participants respond to each item on a Likert scale, typically ranging from 1 (almost never) to 5 (almost always), indicating how true each statement is for them. The scores on the different subscales are calculated separately, providing insight into the individual's level of self-compassion and specific components of self-compassion.

The researcher followed procedural methods and biases to handle research biases. All biases that were handled are reported here. The information was gathered through a survey in which participants answered a questionnaire on their own. This method plays an important role in high response rates, as it motivates the respondent to feel confident and complete the survey. Ambiguity can be resolved by following a self-report. If participants got stuck, they were guided with the explanation of the meaning of the question. Further, social desirability biases were addressed by maintaining privacy through keeping a fair distance while completing the questionnaire and assuring the respondents that they will remain anonymous and their data will be kept confidential. This further helped to increase the response rate.Common method bias was mitigated by keeping the questions and answer time between 25 and 35 minutes, and by maintaining the logical flow of the questions. The survey method was chosen as it was appropriate for testing the hypothesis of the research. Survey methods have been criticised for non-response bias, which can lead to significant differences in responses. Therefore, participants were encouraged to complete the forms with appropriate responses.

Gratitude Journal Writing

Intervention:

6 weeks Gratitude journal writing intervention was given to 14 PCOS women in the experimental group keeping 14 in the control group. Participants were trained to write 5 things they are grateful for every day with (imagination) feeling of gratitude. Imagine and visualise the blessings for 5 minutes and express gratitude. The researcher provided them with a book and pen to encourage. Participants were trained in person. Participants were encouraged to write the gratitude preferably in the morning or night before sleep every day for continuous six weeks. As they progressed they could write as much as gratefulness. A few google meets were also conducted to monitor and interact, most of the participants kept interaction with researcher either directly, through calls/WhatsApp chat. The researcher gave continuous motivation and encouragement to the participants. At the end of six weeks into gratitude Journal practise the members were requested to fill the post test questionnaire. Most of the participants expressed their gratitude for guiding them to feel positive and could bring a change in their attitude day to day life in a better and happier way and feeling worthy about themselves. The participants received gratitude from the researcher for their involvement in the study. Many women reported they could feel better in many ways. Since the sample size was 14, researcher could closely monitor them either in person or by messages/calls. This further motivated them. Participants expressed their interest in continuing the practice.

The control group remained without any special guidance and were asked to continue what they were already on. After6 weeks of gratitude journal writing intervention, a post-test was conducted for both the experimental and control groups. The same measures used in the pre test (DASS, FSCRS and SCS-26items) were administered to evaluate changes in depression, anxiety, stress, self-criticism and self-compassion. The researcher thanked the participants for taking part in the study in person. Upon seeing the positive changes and in consideration of ethical points, the researcher had decided to give the control group gratitude journal writing training.

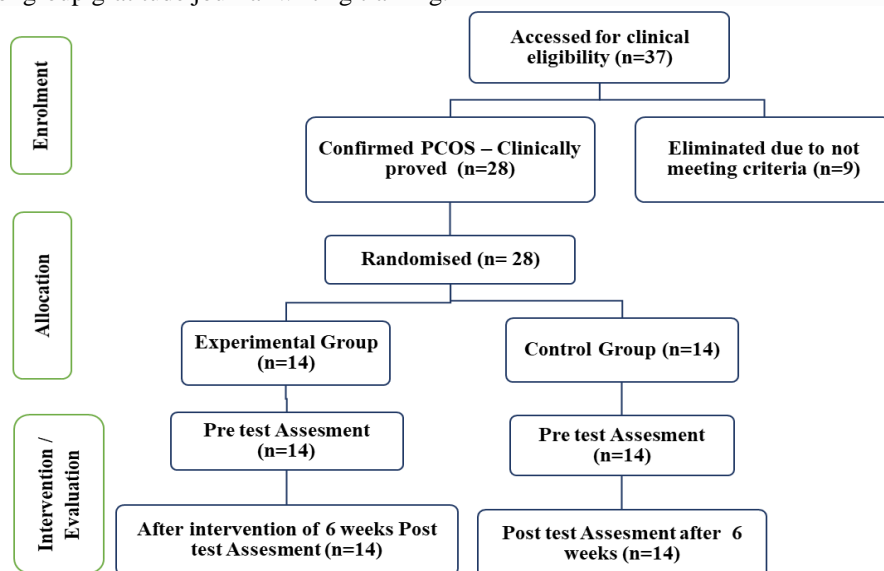


Fig 1. Flow chart for recruiting PCOS Patients for Gratitude Journal writing

Statistical analysis

Using a statistical software called Statistical Package for the Social Sciences (SPSS), the data were analysed. Descriptive statistics were calculated. The data were analysed by using SPSS version 23 for windows. In view of the sample size being 14, we have used Shapiro-Wilk's test to check the normality of differences of pre and post test data distribution. For the experimental group the DASS 21 scale variables depression ($P=.243$), anxiety ($P=.811$) and Stress ($P=.926$) satisfied the normality test. The Self-Compassion variable ($P=.135$) and Self Criticism variable of FSCRS (Forms of Self Criticising / Attacking & Reassuring) scale ($P=.053$) satisfied the normality test. For the control group the DASS 21 scale variables Depression ($P=.239$) satisfied the normality test whereas Anxiety ($P=.013$) and Stress ($P=.042$) did not satisfy the normality test in Shapiro-Wilk. A value of $P>0.05$ considered as significant for Shapiro-Wilk's test. Skewness for Anxiety is 0.961 and Kurtosis 0.066, Skewness for Stress is 1.169 and Kurtosis is 0.928. Both satisfy normality. Skewness and Kurtosis value between ± 2 is considered acceptable for normality. Paired sample t test carried out to find the mean difference and standard deviation and P value of the data. A value of $P<0.05$ is considered as significant.

Results:

Duration of this research study was from March 2022 till September 2022. A total of 37 women with PCOS were recruited, 7 of them declined and 2 of them not meeting criteria were excluded. Hence total eligible PCOS were 28. Mean age of the selected group ($n=28$) women with PCOS was 28.7 years. 24 women were married and 4 were unmarried. 22 women were graduates and above and 6 were non graduates. Baseline (pre-test) carried out for DASS 21, Self-Compassion Scale (SCS) and Forms of Self Criticising/Attacking & Self Reassuring Scale (FSCRS). Randomly allotted 14 subjects to the experimental and control group. Participants in the control group were asked to continue their routine practices of exercises and other regular activities.

Baseline (Pretest) comparison

Table 1 shows that there was no significant change in pretest of experimental and control group values. Pre test Depression level score in experimental group (mean =23.14, $SD=7.135$) and control group (Mean=21, $SD=5.588$), $t(26) =.885$, $P=.384$. Pre test Anxiety level score in experimental group (mean = 16.286, $SD=7.141$) and control group (Mean=17.429, $SD=6.297$), $t(26) =-.449$, $P=.657$. Pre test Stress level score in experimental group (mean = 23.857, $SD=5.736$) and control group (Mean=24.143, $SD=5.736$), $t(26) =-.132$, $P=.896$. Pre test Self Compassion level score in experimental group (mean = 2.80, $SD=.397$) and control group (Mean=2.775, $SD=.321$), $t(26) =.179$, $P=.86$. Pre test Self Criticism level score in experimental group (mean = 25.357, $SD=8.5$) and control group (Mean=28.07, $SD=11.848$), $t(26) =-.696$, $P=.492$. A value of $P>0.05$ meets the assumption of Levene's test for homogeneity of variances of the groups. Hence, there is no significant difference exists between experimental and control groups.

Table 1: Gratitude Journal writing Pre test comparison Experimental group vs Control group for Depression, Anxiety, Stress, Self Compassion and Self Criticism on women with PCOS.

Scales Used	Experimental Group		Control Group		t-test for Equality of Means		
	Pre test (N=14) Mean	SD	Pre test (N=14) Mean	SD	t	df	P
DASS 21							
Depression	23.14	7.135	21	5.588	0.885	26	0.384
Anxiety	16.286	7.1407	17.43	6.297	0.449	26	0.657
Stress	23.857	5.7359	24.14	5.736	0.132	26	0.896
Self Compassion (SCS)	2.800	0.397	2.776	0.321	0.179	26	0.86
FSCRS - Self Criticism (is+hs)	25.357	8.4998	28.07	11.848	0.696	26	0.492

Intervention: Participants in the experimental group (n=14) were given detailed training to write Gratitude Journal writing which was to be practiced for 6 weeks. Training was provided through direct, Google meet as well as using WhatsApp. Participants were monitored, encouraged, motivated regularly for practicing the Gratitude Journal writing, in person, using WhatsApp, mobile phone calls. Upon completion of Gratitude Journal writing for 6 weeks, each of the participants were asked to fill the questionnaires namely DASS 21, Self-Compassion Scale (SCS) and FSCRS scale. Participants in the Control group who were continuing their routine activities were also asked to fill the Questionnaires after six weeks.

Mental Health outcome of DASS 21 Scale: Pre and Post test scores were compared for the five variables which are tabulated in the tables 2 below. After the intervention, Depression level (Mean=23.14) significantly reduced (Mean=8.0 and P<.001). In the case of Anxiety (Mean=16.29) significantly reduced (Mean=7.429 and P<.001). Stress level (Mean=23.86) significantly reduced (Mean=9.143 and P<.001).

Depression level in the Control group is found un changed (Pre test Mean=21.0, Post test Mean=20.29 ; P=.292). Anxiety level in the Control group (Pre test Mean 17.43, Post test mean = 18.29; P=.234) found with no difference. Stress level in the Control group (Pre test Mean=24.14, Post test Mean=23.14; P=.439) established no significant change.

Table 2: Gratitude Journal writing out come on Depression, Anxiety & Stress on women with PCOS before intervention and after intervention in comparison to Control group. Significant values are in bold and *

DASS 21 Scale	Experimental Group					Control Group				
	Pre test (N=14)		Post test (N=14)		p	Pre test (N=14)		Post test (N=14)		p
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Depression	23.14	7.135	8	3.922	<.001 *	21	5.588	20.29	6.219	0.292
Anxiety	16.29	7.141	7.429	4.108	<.001 *	17.43	6.297	18.29	6.318	0.234
Stress	23.86	5.736	9.143	4.818	<.001 *	24.14	5.736	23.14	5.246	0.439

Mental health outcome of SCS scale and FSCRS Scale: After the interventions, the experimental group’s Self Compassion level score was compared which is given in table 3. Self-Compassion level score before intervention (Mean=2.80) is significantly increased after the intervention (Mean=3.745 and P<.001). Self-Criticism level before intervention (Mean=25.357) is significantly reduced (Mean=6.543 and P<.001).

Self-Compassion level score in the Control group was unchanged (Pre-test Mean=2.776, Post-test Mean=2.763; P=.737). Self-criticism level in the Control group (Pre-test Mean=28.070, Post-test Mean 29.21; P=.168) found without much significant difference.

Table 3: Gratitude Journal writing out come on Self Compassion and Self Criticism on women with PCOS before intervention and after intervention in comparison to Control group. Significant values are in bold and *. FSCRS - Forms of Self Criticising/Attacking and Self Reassuring Scale. IS - Inadequate self, HS - Hated self.

Scales used	Experimental Group					Control Group				
	Pre test (N=14)		Post test (N=14)		p	Pre test (N=14)		Post test (N=14)		p
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Self Compassion (SCS)	2.800	0.397	3.745	0.466	<.001 *	2.776	0.321	2.763	0.364	0.737
FSCRS - Self Criticism (is+hs)	25.357	8.500	6.643	4.584	<.001 *	28.070	11.848	29.210	10.260	0.168

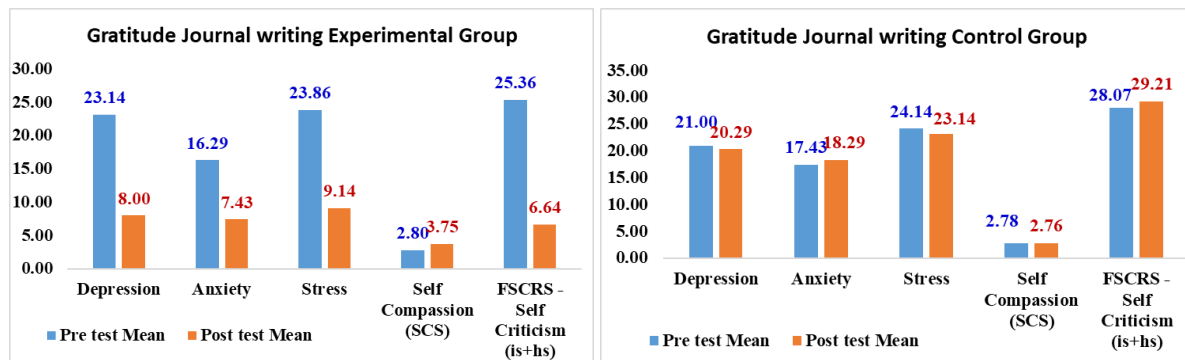


Fig 2: Pre and Post test comparison of mean for Experimental and Control Groups

Discussions

This study establishes the fact that a well supervised practice of 6 weeks of Gratitude Journal writing intervention reduces depression, anxiety, and stress scores in women with Polycystic Ovary Syndrome (PCOS). Similar results obtained from the Self Compassion levels also. Self-Compassion levels were significantly increased in the participants when they practised Gratitude journal writing. Those practising the Gratitude journal writing experienced considerable reduction in their Self Criticism level as well. The subjects in the control group who were left to practise their normal regular routine activities did not demonstrate any significant change in their mental conditions. This research study has provided some insightful observations about the impact of gratitude journal writing on mental health indicators such as depression, anxiety, stress, and self-criticism in women diagnosed with Polycystic Ovary Syndrome (PCOS). Simultaneously, it evaluated the effect of this intervention on self-compassion, which is a critical aspect of mental well-being.

The findings of the research demonstrate significant improvement in the experimental group post-intervention. The p value for depression ($p < 0.001$), anxiety ($p < 0.001$), stress ($p < 0.001$) and self-criticism ($p < 0.001$) indicates the potential effectiveness of gratitude journaling as an intervention tool. The self compassion ($p < 0.001$) increased after the gratitude journal writing intervention. On the contrary, there were no significant changes in the control group depression ($p = 0.292$), anxiety ($p = 0.234$), stress ($p = 0.439$), self criticism ($p = 0.737$) and self compassion ($p = 0.168$) are further validating the impact of the gratitude journal writing.

Interestingly, our study offers valuable insight into an under-researched area, highlighting the efficacy of gratitude journal writing in a specific demographic, women with PCOS.

Indeed, PCOS is a physical condition with potential mental health implications. With its multifaceted repercussions on a woman's body, including irregular menstrual cycles, obesity, infertility, and hirsutism, it can profoundly affect the psychological well-being of those affected (Cinar et al., 2011). Consequently, simple yet effective tools like gratitude journaling can prove beneficial in dealing with the mental distress associated with PCOS.

In our study, gratitude journal writing also positively impacted the levels of self-compassion in the experimental group. This outcome aligns with the findings of Fekete et al. (2022) who postulated that the gratitude writing helped maintain gratitude levels and decreased stress and negative affect. Our study aligns with the findings of the study published in Journal of frontiers in Psychology (Austin et al. 2021) and another study published in Journal of adolescent Research (Lathren et al., 2018) which stated that most compassion-based interventions target both self criticism and self-compassion, and experienced benefits of less isolation/more connection and more acceptance toward physical limitations have been reported post-intervention. In contrast, the findings of our study do not fully align with the findings of Komase et al. (2021), who stated that the effects of gratitude intervention on wellbeing is unclear. Our study shows that gratitude journal writing can improve self compassion and reduce self criticism, thereby improving wellbeing.

Our findings are showing different results when comparing the cultural context mentioned (Layous et al. (2013) Writing gratitude letters might only work in certain cultures, where it has also quoted countries like India may not benefit fully (Fekete et al. 2022). Gratitude writing worked with our participants in this research who are from India. Another study published in the Journal of Happiness Studies (Bohlmeijer et al., 2021) found a six week gratitude intervention consisting primarily of writing exercises did not decrease distress but showed an improvement in well-being when compared to a condition involving self-kindness or a control group. However, this study had the results of positivity in both in reduction of stress and increased well-being. The difference in result in our study when compared with the above said studies may be due to the respondents being from a fertility centre and the daily motivation provided by the researcher and committed participants who tried to bring a change in them.

A study published in the journal *Frontiers of Psychology* (Sztachañska et. al. 2019) reported that women with breast cancer who participated in a two-week daily diary gratitude intervention showed increases in daily psychological functioning, greater perceptions of support, and increased use of adaptive coping strategies. Significantly, a substantial number of these women participated in the intervention through online means. Our results are aligning with the above study. Some of the comments put by the participants were like -feeling happy and confident, thinking has totally changed, it helps to relieve stress and overthinking, have added as a part of daily routine, feel good and nice, stress free and relaxed mind. Interestingly, the intervention's efficacy was observed over a relatively short duration (six weeks), implying that the benefits of gratitude journaling can be accrued over a brief period. This method makes it a practical and cost-effective intervention tool that can be easily incorporated into daily routines in women with PCOS.

These findings further support the notion that Gratitude journal writing can be a beneficial tool for promoting self-compassion and a decrease in self criticism, depression, anxiety and stress across diverse populations.

The practical implications of the study are noteworthy. Gratitude journal writing is simple, cost-effective intervention that can be easily implemented for women with PCOS. By incorporating Gratitude journal writing into their daily lives, women with PCOS may experience reduced levels of depression, anxiety, stress, and self-criticism, and an increase in self compassion, thus enhancing their overall psychological well-being. The findings of this study might open the windows for further research, with more studies on psychological variable self criticism in PCOS women and its various management.

From a theoretical perspective, the study contributes to the growing body of literature on gratitude journal writing to increase self-compassion and to increase mental well-being. Furthermore, conducting randomised controlled trials with larger sample sizes and diverse populations would enhance the robustness of the findings. The findings suggest that Gratitude journal writing can be an effective intervention for increasing self-compassion and reducing depression, anxiety, stress, and self-criticism in this population. However, further research is needed to replicate and expand upon these findings,

Overall, the study contributes to our understanding of the potential benefits of gratitude journal writing practice in promoting self-compassion and addressing psychological symptoms in women with PCOS. These findings have implications for clinical practice, emphasising the importance of incorporating positive psychological interventions into the holistic care of individuals with PCOS, ultimately promoting their overall well-being and quality of life.

Regarding the psychological variables measured, the experimental group demonstrated a significant decrease in depression, anxiety, stress, and self-criticism, along with a significant increase in self-compassion. These findings suggest that gratitude journal writing can be a beneficial intervention for women with PCOS, as it positively impacts various aspects of their psychological well-being. Furthermore, the significant decrease in self-criticism scores suggests that Gratitude journaling interventions may help alleviate self-critical tendencies in women with PCOS. Reducing self-criticism is essential, as it has been linked to increased psychological distress and decreased well-being.

Moreover, the significant increase in self-compassion scores indicates that gratitude journal writing intervention may enhance self-compassion levels among women with PCOS. Increased self-compassion has been associated with improved psychological well-being and resilience, suggesting its potential importance in supporting women with PCOS in coping with the challenges they face.

The lack of significant changes in the control group further strengthens the evidence for the effectiveness of Gratitude journal writing as an intervention for enhancing psychological well-being in women with PCOS.

Limitations

However, this study is not without its limitations. Firstly, the sample size was relatively small, potentially affecting the generalizability of the findings. Secondly, the study was conducted in a specific clinical setting, namely the Srushti Fertility Centre and Women's Hospital in Chennai, India. Furthermore, the research's cultural context, India, with its distinct societal and familial pressures, might have influenced the outcomes, making it crucial to carry out similar research in different cultural settings. Thirdly, moreover, we adopted a self-report method for measuring depression, anxiety, stress, and self-criticism and self compassion levels. Despite its widespread use, self-reporting can be subjective, prone to bias, and dependent on the individual's honesty and self-perception. Fourthly, recall bias and inclusion of only one hospital. Whether the results change, if the respondents change

In conclusion,

This study contributes significantly to the understanding of mental health among women with PCOS especially highlighting the variable self criticism and self compassion. The findings also have important clinical implications. It also highlights the potential role of gratitude journal writing in promoting mental well-being of women with PCOS, in this demographic. It underscores the importance of incorporating psychological interventions in the holistic treatment of PCOS, considering the significant mind-body interactions in health outcomes. Future research should aim at conducting longitudinal studies with larger sample sizes and diverse cultural backgrounds to further validate the findings and add to the understanding of PCOS-related mental health. The findings of this study suggest that gratitude journal writing interventions have the potential to positively impact the psychological well-being of women with PCOS.

Future research with larger and more diverse samples is needed to enhance the external validity of the results. The cultural context and treatment-seeking population may influence the outcomes, thus warranting caution when extrapolating the findings to other settings. Further research is needed to replicate and expand upon these findings, address the study's limitations, if the respondents change. Further research is needed to replicate and expand upon these findings, address the study's limitations, and determine whether the values would change if the respondents were different. Further research could also explore the long-term habits and effects of gratitude journal writing on psychological well-being and self-compassion in women with PCOS. Furthermore, conducting randomised controlled trials with larger sample sizes and diverse populations would enhance the robustness of the findings.

Overall, the study contributes to our understanding of the potential benefits of gratitude journal writing practice in promoting self-compassion and addressing psychological symptoms in women with PCOS. These findings have implications for clinical practice, emphasising the importance of incorporating self-compassion interventions into the holistic care of individuals with PCOS, ultimately promoting their overall well-being and quality of life.

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Conflict of interest

The authors declare no conflicts of interests.

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References

1. Açmaz G, Albayrak E, Acmaz B, Başer M, Soyak M, Zararsız G and İpekMüderriş İ (2013) Level of anxiety, depression, self-esteem, social anxiety, and quality of life among the women with polycystic ovary syndrome. *The Scientific World Journal* 2013, 1–7
2. Anna Alkozei, Ryan Smith & William D.S. Killgore (2018): Implicit self-esteem is associated with higher levels of trait gratitude in women but not men, *The Journal of Positive Psychology*, DOI: 10.1080/17439760.2018.1497691
3. Asdaq, S. M. B., & Yasmin, F. (2020). Risk of psychological burden in polycystic ovary syndrome: A case control study in Riyadh, Saudi Arabia. *Journal of affective disorders*, 274, 205-209.
4. Austin, J., Drossaert, C. H., Sanderman, R., Schroevers, M. J., & Bohlmeijer, E. T. (2021). Experiences of self-criticism and self-compassion in people diagnosed with cancer: a multimethod qualitative study. *Frontiers in psychology*, 12, 737725.
5. Baião, R., Gilbert, P., McEwan, K., & Carvalho, S. (2015). Forms of self-criticising/attacking & self-reassuring scale: Psychometric properties and normative study. *Psychology and Psychotherapy: Theory, Research and Practice*, 88(4), 438-452.
6. Beaumont, E., Galpin, A., & Jenkins, P. (2012). 'Being kinder to myself': A prospective comparative study, exploring post-trauma therapy outcome measures, for two groups of clients, receiving either Cognitive Behaviour Therapy or Cognitive Behaviour Therapy and Compassionate Mind Training. *Counselling Psychology Review*.

7. Bluth, K., Mullarkey, M., & Lathren, C. (2018). Self-compassion: A potential path to adolescent resilience and positive exploration. *Journal of child and family studies*, 27, 3037-3047.
8. Bohlmeijer, E. T., Kraiss, J. T., Watkins, P., & Schotanus-Dijkstra, M. (2021). Promoting gratitude as a resource for sustainable mental health: Results of a 3-armed randomized controlled trial up to 6 months follow-up. *Journal of happiness studies*, 22, 1011-1032.
9. Cinar, N., Kizilarslanoglu, M. C., Harmanci, A., Aksoy, D. Y., Bozdog, G., Demir, B., & Yildiz, B. O. (2011). Depression, anxiety and cardiometabolic risk in polycystic ovary syndrome. *Human Reproduction*, 26(12), 3339-3345.
10. Cousin, L., Redwine, L., Bricker, C., Kip, K., & Buck, H. (2020). Effect of gratitude on cardiovascular health outcomes: A state-of-the-science review. *The Journal of Positive Psychology*. <https://doi.org/10.1080/17439760.2020.1716054>
11. Cregg, D. R., & Cheavens, J. S. (2021). Gratitude interventions: Effective self-help? A meta-analysis of the impact on symptoms of depression and anxiety. *Journal of Happiness Studies*, 22, 413-445.
12. Davis, D. E., Choe, E., Meyers, J., Wade, N., Varjas, K., Gifford, A., Quinn, A., Hook, J. N., Van Tongeren, D. R., Griffin, B. J., & Worthington, E. L., Jr. (2016). Thankful for the little things: A meta-analysis of gratitude interventions. *Journal of Counseling Psychology*, 63(1), 20–31. <https://doi.org/10.1037/cou0000107>
13. Dickens, L. R. (2017). Using gratitude to promote positive change: A series of meta-analyses investigating the effectiveness of gratitude interventions. *Basic and Applied Social Psychology*, 39(4), 193-208.
14. Ehrmann DA. Polycystic ovary syndrome. *N Engl J Med*. 2005;352(12): 1223–1236
15. Elosua, M. R. (2015). The influence of gratitude in physical, psychological, and spiritual well-being. *Journal of Spirituality in Mental Health*, 17(2), 110–118. <https://doi.org/10.1080/19349637.2015.957610>
16. Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, 84(2), 377–389. <https://doi.org/10.1037/0022-3514.84.2.377>
17. Emmons, R. A., & McCullough, M. E. (2004). *The psychology of gratitude*. Oxford University Press.
18. Emmons, R. A., & Stern, R. (2013). Gratitude as a psychotherapeutic intervention. *Journal of Clinical Psychology*, 69(8), 846–855. <https://doi.org/10.1002/jclp.22020>
19. Fekete, E. M., & Deichert, N. T. (2022). A brief gratitude writing intervention decreased stress and negative affect during the COVID-19 pandemic. *Journal of Happiness Studies*, 23(6), 2427-2448.
20. Gilbert, P. (2009). Introducing compassion-focused therapy. *Advances in psychiatric treatment*, 15(3), 199-208.
21. Gilbert, P. (2014). The origins and nature of compassion focused therapy. *British Journal of Clinical Psychology*, 53(1), 6-41.
22. Gilbert, P., & Irons, C. (2005). Focused therapies and compassionate mind training for shame and self-attacking.
23. Gilbert, P., Clarke, M., Hempel, S., Miles, J. N., & Irons, C. (2004). Criticizing and reassuring oneself: An exploration of forms, styles and reasons in female students. *British Journal of Clinical Psychology*, 43(1), 31-50.
24. Guarnotta, V., Niceta, M., Bono, M., Marchese, S., Fabiano, C., Indelicato, S., ... & Giordano, C. (2020). Clinical and hormonal characteristics in heterozygote carriers of congenital adrenal hyperplasia. *The Journal of Steroid Biochemistry and Molecular Biology*, 198, 105554.
25. Harter, S., & Marold, D. (1994). Psychological risk factors contributing to adolescent suicidal ideation. *New Directions for Child Development*, 64, 71–91.
26. Hutcherson, C.A., Seppala, E.M., Gross, J.J., 2008. Loving kindness meditation increases social connectedness. *Emotion*, 8, 720–724.
27. Jedel E, Waern M, Gustafson D, Landén M, Eriksson E, Holm G, et al Anxiety and depression symptoms in women with polycystic ovary syndrome compared with controls matched for body mass index *Hum Reprod* 2010 25 450–6
28. Kannan, D., & Levitt, H. M. (2013). A review of client self-criticism in psychotherapy. *Journal of Psychotherapy Integration*, 23(2), 166.
29. Kerchner A, Lester W, Stuart SP and Dokras A (2009) Risk of depression and other mental health disorders in women with polycystic ovary syndrome: a longitudinal study. *Fertility and Sterility* 91, 207–212.
30. Komase, Y., Watanabe, K., Hori, D., Nozawa, K., Hidaka, Y., Iida, M., ... & Kawakami, N. (2021). Effects of gratitude intervention on mental health and well-being among workers: A systematic review. *Journal of Occupational Health*, 63(1), e12290.
31. Leary MR, Tate EB, Adams CE, Allen AB, Hancock J. Self-compassion and reactions to unpleasant self-relevant events: the implications of treating oneself kindly. *J Pers Soc Psychol*. 2007 May;92(5):887-904. doi: 10.1037/0022-3514.92.5.887. PMID: 17484611.
32. Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy*, 33(3), 335-343.
33. Lutz, A., Brefczynski-Lewis, J., Johnstone, T., Davidson, R.J., 2008. Regulation of the neural circuitry of emotion by compassion meditation: Effects of meditative expertise. *PloS one*, 3, e1897.
34. Mansson M, Holte J, Landin-Wilhelmsen K, Dahlgren E, Johansson A, Landén M, et al Women with polycystic ovary syndrome are often depressed or anxious –A case control study *Psychoneuroendocrinology* 2008 33 1132–8

35. Melissa J. Himelein and Samuel S. Thatcher. (2006). Polycystic Ovary Syndrome and Mental Health: A Review, Obstetrical and Gynecological Survey, Lippincott Williams & Wilkins, Volume 61, Number 11:723-732.
36. Muris P, Petrocchi N. Protection or vulnerability? A meta-analysis of the relations between the positive and negative components of self-compassion and psychopathology. *ClinPsycholPsychother*2017;24:373–383.
37. Neff, K. D. (2023). Self-compassion: Theory, method, research, and intervention. *Annual Review of Psychology*, 74, 193-218.
38. Neff, K.D., 2003. The development and validation of a scale to measure selfcompassion. *Self and Identity*, 2, 223-250.
39. Neff, K.D., Hsieh, Y, Dejitterat, K., 2005. Self-compassion, achievement goals, and coping with academic failure. *Self and Identity*, 4, 263-287.
40. Neff, K.D., Kirkpatrick, K.L., & Rude, S.S. (2007). Self-compassion and adaptive psychological functioning. *Journal of Research in Personality*, 41, 139-154.
41. Neto, F. (2007). Forgiveness, personality and gratitude. *Personality and Individual Differences*, 43(8), 2313–2323. <https://doi.org/10.1016/j.paid.2007.07.010>
42. O’Connell, B. H., O’Shea, D., & Gallagher, S. (2018). Examining psychosocial pathways underlying gratitude interventions: A randomized controlled trial. *Journal of Happiness Studies*, 19, 2421-2444.
43. Olivia Longe, Frances A. Maratos, Paul Gilbert, Gaynor Evans, Faye Volker, Helen Rockliff, Gina Rippon, Having a word with yourself: Neural correlates of self-criticism and self-reassurance, *NeuroImage* 49 (2010) 1849–1856
44. Parks, A. C., & Titova, L. (2016). Positive psychological interventions: An overview. *The Wiley handbook of positive clinical psychology*, 305-320.
45. Patten, R. K., McIlvenna, L. C., Moreno-Asso, A., Hiam, D., Stepto, N. K., Rosenbaum, S., & Parker, A. G. (2023). Efficacy of high-intensity interval training for improving mental health and health-related quality of life in women with polycystic ovary syndrome. *Scientific Reports*, 13(1), 3025.
46. Rowlands I, Teede H, Lucke J, Dobson A and Mishra G (2016) Young women’s psychological distress after a diagnosis of polycystic ovary syndrome or endometriosis. *Human Reproduction* 31, 2072–2081
47. Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). *Hum Reprod* 2004; 19(1): 41–7.
48. Sadeeqa, S., Mustafa, T., & Latif, S. (2018). Polycystic Ovarian Syndrome–Related Depression in Adolescent Girls: A Review. *Journal of Pharmacy & Bioallied Sciences*, 10, 55 - 59.
49. Schweitzer, A. (1969). *Reverence for life* (R. H. Fuller Trans.). Harper & Row
50. Sztachañska, J., Krejtz, I., & Nezelek, J. B. (2019). Using a gratitude intervention to improve the lives of women with breast cancer: A daily diary study. *Frontiers in Psychology*, 10, 1365.
51. Tennen, H., & Affleck, G. (2002). Benefit-finding and benefit-reminding. *Handbook of positive psychology*, 1, 584-597.
52. Van Niekerk, L. M., Bromfield, H., & Matthewson, M. (2022). Physical and psychological correlates of self and body compassion in women with polycystic ovary syndrome. *Journal of health psychology*, 27(11), 2566-2580.
53. Watkins, P. C., Van Gelder, M., & Frias, A. (2009). 41 Furthering the Science of Gratitude. *Oxford handbook of positive psychology*, 437.
54. Whelton, W. J., & Greenberg, L. S. (2005). Emotion in self-criticism. *Personality and Individual Differences*, 38, 1583–1595. doi:10.1016/j.paid.2004.09.024
55. Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical psychology review*, 30(7), 890-905.
56. Zessin, U., Dickhäuser, O., & Garbade, S. F. (2015). The Relationship Between Self-Compassion and Well-Being: A Meta-Analysis. *Applied psychology. Health and well-being*, 7(3), 340-364.
57. Zhang, H., Watson-Singleton, N. N., Pollard, S. E., Pittman, D. M., Lamis, D. A., Fischer, N. L., ... & Kaslow, N. J. (2019). Self-criticism and depressive symptoms: Mediating role of self-compassion. *OMEGA-Journal of Death and Dying*, 80(2), 202-223.
58. Scaruffi, E., Gambineri, A., Cattaneo, S., Turra, J., Vettor, R., & Mioni, R. (2014). Personality and psychiatric disorders in women affected by polycystic ovary syndrome. *Frontiers in endocrinology*, 5, 185.
59. Layous, K., Lee, H., Choi, I., & Lyubomirsky, S. (2013). Culture matters when designing a successful happiness-increasing activity: A comparison of the United States and South Korea. *Journal of Cross-Cultural Psychology*, 44(8), 1294-1303.
60. Bozdog, G., Mumusoglu, S., Zengin, D., Karabulut, E., & Yildiz, B. O. (2016). The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. *Human reproduction*, 31(12), 2841-2855.
61. Devin, J. K., Nian, H., Celedonio, J. E., Wright, P., & Brown, N. J. (2020). Sitagliptin decreases visceral fat and blood glucose in women with polycystic ovarian syndrome. *The Journal of Clinical Endocrinology & Metabolism*, 105(1), 136-151.
62. Barry, J. A., Kuczmierczyk, A. R., & Hardiman, P. J. (2011). Anxiety and depression in polycystic ovary syndrome: a systematic review and meta-analysis. *Human reproduction*, 26(9), 2442-2451.

63. Tay, C. T., Teede, H. J., Boyle, J. A., Kulkarni, J., Loxton, D., & Joham, A. E. (2019). Perinatal mental health in women with polycystic ovary syndrome: a cross-sectional analysis of an Australian population-based cohort. *Journal of Clinical Medicine*, 8(12), 2070.
64. Dispenza, J. (2014). *You are the placebo: Making your mind matter*. Hay House Incorporated.
65. Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology*, 9, 111–131