A preliminary randomised control trial of the effects of Dru yoga on psychological well-being in Northern Irish first time mothers.

Deirdre Timlin [(a)] and Ellen Elizabeth Anne Simpson [(b)]

(a) School of Psychology, Ulster University, Northern Ireland, UK.
Tel. 02870123207
E-mail: Timlin-D@ulster.ac.uk

(b) Psychology Research Institute, Ulster University, Northern Ireland, UK.

Tel: 02870123207

E-mail: eea.simpson@ulster.ac.uk

Corresponding author: Dr Ellen Simpson, Ulster University, School of Psychology, Cromore Road, Coleraine, County Londonderry, Northern Ireland, UK BT521SA. Tel: 02870123207, E-mail: eea.simpson@ulster.ac.uk

Abstract

Background: The transition to motherhood can be stressful, especially for first time mothers. Recent research has shown that yoga can be effective for enhancing psychological well-being.

Objectives: The purpose of this study was to establish if a postpartum Dru yoga intervention improves psychological well-being in first time mothers.

Design: A randomised controlled study was conducted.

Setting and participants: First time mothers were recruited from a Sure Start Community Centre and included in the study if they had a baby aged between 6 weeks to one-year-old. Exclusion criteria were the presence of sciatica, bulging discs, heart disease or whiplash and if they already practiced yoga.

Methods: Participants were randomised into a Dru yoga group (n=16) who received a one-hour yoga session each week for 4 weeks and a 20-minute DVD for practice at home. The control group (n=16) who did not receive an intervention. Baseline and follow up measures of perceived stress, mood and coping were assessed in each group.

Results: A repeated measures factorial Analysis of Variance showed that in comparison to the control group, the Dru yoga intervention group had improved psychological well-being as indicated by reductions in stress, negative affect, and dysfunctional coping and increases in problem focused coping at follow up ($P < 0.05$).

Conclusion: The current study shows that Dru yoga is beneficial for the psychological well-being of first time mothers. Further research is needed using large scale replication studies with a longer follow up period and including multiparous women. This study extends the support for yoga with postpartum mothers.

Keywords: Coping, mood, postpartum, stress, yoga

1. Introduction.

The transition to motherhood, for a first time mother, although exciting, can also be a stressful time. There are dramatic changes in the postpartum period that require adjustments, such as learning new parenting skills, lack of sleep, unpredictability of baby schedule, which may make women more vulnerable to postpartum stress (Hung, 2004; 2006) and also ongoing fatigue which can further impact on psychological well-being (Ashrafinia et al., 2015; Everson and Simon, 2005; Jung and Yoo, 2014). These stressors may influence how a mother interacts and engages with their baby (Bernard-Bonnin, 2004). Research shows that first time mothers are at a higher risk of postnatal mood disorders than multiparous mothers (Munk-Olsen et al., 2006). Up to 60-80% of all new mothers' experience postnatal blues which are characterised by mood swings, crying, anxiety and loneliness. However, medication is rarely required and changes in mood usually subside with support and education. Also, a mother's social relationships may be restricted in the first few months after birth, this may lead to reduced social support and increased depressive mood (Parade et al., 2014).

The postpartum period has implications for physical health too. In Western countries, maternal health issues are increasing such as third degree perineal tears (Dahlen et al., 2013), eclampsia (Thornton et al., 2013), caesarean sections and the rate of post-partum hemorrhage (Callaghan et al., 2010). Such outcomes have been attributed to more women becoming pregnant with chronic health issues, including diabetes, heart disease and obesity (Lewis, 2011). Other widespread maternal morbidities include back problems, tiredness, breast problems and incontinence (Woolhouse et al., 2014). Some of these physical health problems are made worse by

co-morbidities such as mental health and social problems (Woolhouse et al., 2014). Despite postnatal guidance reported by the National Institute for Health and Clinical Guidance (NICE, 2013), care quality standards appear to be decreasing (Bhavnani and Newburn, 2010). In the UK there is an increase in the birth rate and alongside resource constraints, this is having an effect on the service provision for postnatal women (Care Quality Commission, 2013), furthermore, a lot of maternal morbidity remains unseen or appears months after birth (Schmied et al., 2013). Postnatal care is vital to the well-being of mothers (Schmied et al., 2013) and more interventions are needed to promote this.

One intervention that is of increasing interest is Yoga, meaning “to yoke or join together”. The essence of yoga is the coming together of mind, body and spirit. Its combination of postures, controlled breathing and meditation can promote relaxation and a sense of fulfilment. It is viewed as a way “to maintain a healthy mind and body” (Babbar et al., 2012). Research suggests that yoga can be effective for reducing stress and enhancing psychological well-being, in the postpartum, when taken up and practiced antenatal. The use of yoga during pregnancy is considerable, with prevalence rates reported between 20% and 60% (Adams et al., 2009). The reasons for this pattern of use has been linked to attempts to minimise obstetric interventions (Lane, 2008) and to promote psychological well-being and prevention of stress and depression in the postpartum in women at risk (Kinser and Masho, 2015; Swain et al., 2008). Yoga has been shown to reduce postpartum stress (Jalilian et al., 2014) and depressive symptoms (Bershadsky et al., 2014; Ko et al., 2013). Practitioners providing antenatal yoga classes claim women who practice antenatal yoga have a more positive pregnancy and birth

experience and are more equipped to cope with the challenges of labour and beyond (Swann, 2004).

Fewer studies have looked at yoga taken up in the postpartum, and in a recent review by Babbar et al. (2012), they suggested that more randomised controlled trials are needed to fully evaluate the effectiveness of yoga on psychological well-being in the postpartum. One recent study showed that yoga improved depressive symptoms, anxiety, and health related quality of life in depressed postpartum women (Buttner et al., 2015). Another study showed that yoga was effective in reducing postpartum stress (Jalilain et al., 2014). However, neither of these studies distinguished between primiparous and multiparous mothers, and relied on women at risk of mood disorders to take part in the interventions. The aim of this study is to employ a randomised controlled design to assess the effect of a short postpartum Dru yoga based programme on perceived stress, psychological well-being and coping in first time mothers. To our knowledge, this is the first study to examine the benefits of postpartum yoga on these variables in a sample of healthy, non-depressed Northern Irish first time mothers.

2. Method

2.1 Design

This study employed a prospective randomised control intervention design to examine the effects of Dru yoga on psychological well-being. Participants were randomly allocated to an intervention group where participants attended a one-hour Dru yoga class once a week for four weeks and offered a 20 minutes' Dru yoga DVD to take home and

practice twice a week or a control group where participants did not take part in any intervention but were offered the Dru yoga DVD after completion of the study. Dru yoga has its roots in Hatha yoga and includes classical yoga postures, pranayama (science of breath), mudra (hand gestures) and positive affirmations, empowering visualisations and sequences which are performed in a flowing, gentle style. Dru yoga is particularly known for its Energy Block Release sequences which are flowing movements which help to release tension physically, mentally and emotionally.

Outcome measures for perceived stress, psychological well-being (positive and negative mood) and coping strategies were recorded for both the control (n=16) and intervention (n=16) at baseline and follow up. Recruitment and data collection took place between 11th February 2015 and 15th April 2015.

2.2 Participants

The software program G*Power 3 (Faul et al., 2007) was used to conduct a power analyses to determine our sample size. The effect size chosen was small-medium (f2 = .33, see Cohen, 1988, p. 410) and based on previous research looking at yoga and well-being (Harder et al., 2012). With power set at .95, and alpha = .05, G*Power indicated that a sample size of 32 was required. This study was conducted in a rural area of Co. Tyrone Northern Ireland, the inclusion criteria for participants were as follows: (1) first time mother attending baby groups and Sure Start activities; (2) have a baby between the ages of 6 weeks and one-year-old; (3) does not currently practice yoga. Exclusion criteria included: (1) sciatica; (2) bulging discs; (3) heart disease; (4) whiplash. The inclusion and exclusion criteria questions were asked in the personal details form and the Physical

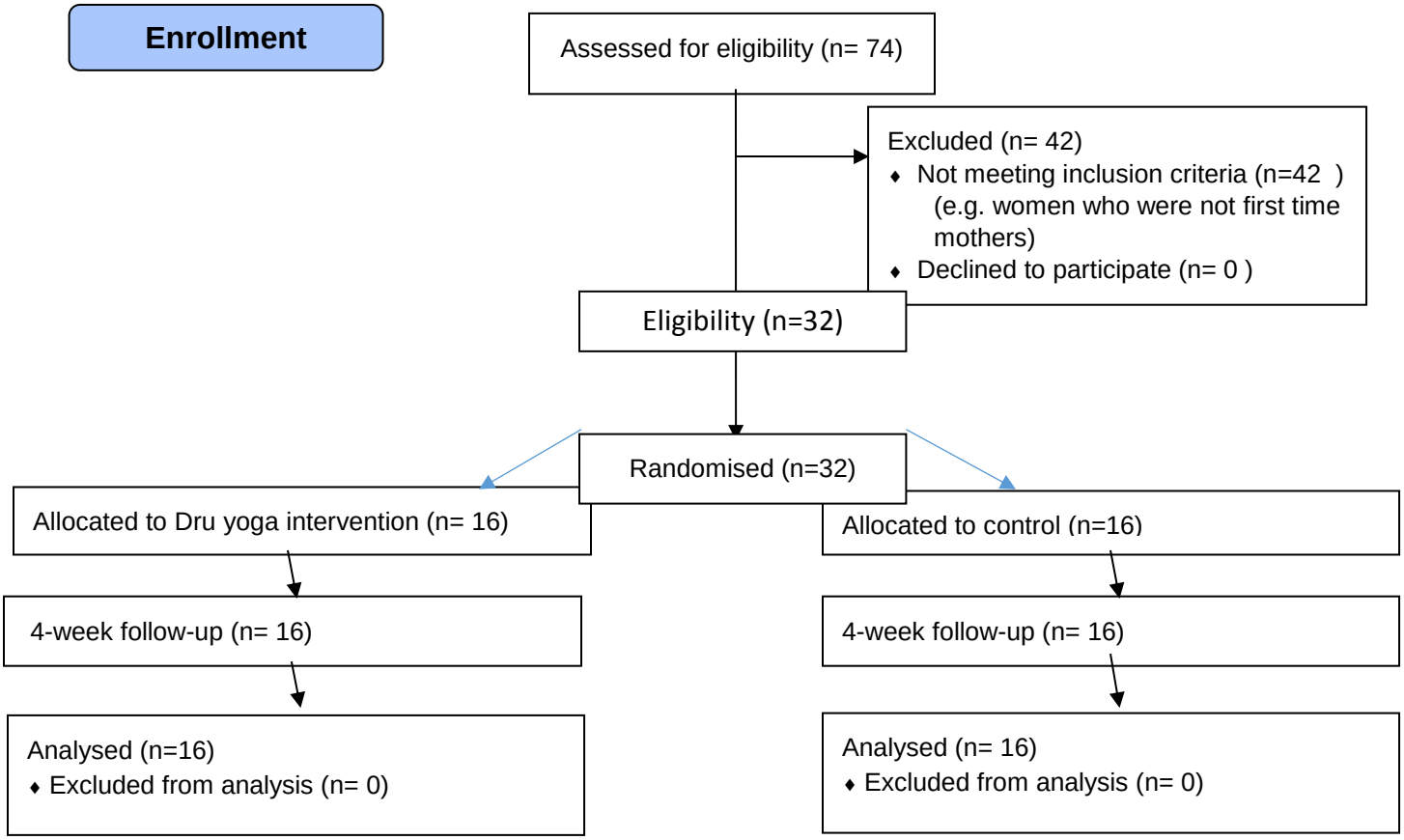
Activity Readiness Questionnaire (PAR-Q), if participants answered yes to any of the questions in the PAR-Q, they were excluded. The researcher recruited through baby groups and those attending Sure Start community activities. A total of 74 women underwent screening; only 32 were eligible according to the inclusion criteria. These 32 participants signed consent forms and were randomly allocated to either the intervention (n=16) or the control group (n=16) by a JavaScript random number allocation performed

2.3 Intervention

The participants in the intervention group attended for a one-hour Dru yoga session, once a week, for 4 weeks. One of the authors (DT), a trained Dru yoga teacher, taught the yoga classes to participants. The Dru yoga programme consisted of four parts and was designed to meet the needs of postpartum women. Firstly, activations were performed, which is a warm up exercise to prepare the body for the movements to follow. Followed by Energy Block Release (EBR) Sequence, which is a sequence of slow movements that work with the muscles and joints in a subtle way, releasing energy from the joints and allowing it to flow back out into the external world. Next a range of Dru yoga postures were performed, including the cat, which is performed on all fours, gently arching the back and then hallowing the base of the back, continuing this movement in a wavelike motion slowly for a few minutes. The warrior, which is performed standing with your feet shoulders width apart and turning the right foot 45 degrees to the right, bending the right knee until it is above the ankle and hold in that position for a few moments. Sitting forward bend is performed in the sitting position on the floor with legs straight out, bending

forwards at the hip, moving your abdomen towards your thighs and hands towards your feet. Lastly, the sitting twist, which is performed sitting on the floor with legs straight out, crossing the right leg over the left, putting the sole of the foot on the ground and gently twisting to the right side and ending the session with a relaxation to relax the body and help heal all layers of the body's energy system. The intervention group were also offered a 20-minute Dru yoga DVD to take home and practice at least twice a week. Participants were asked to keep a diary and write in it each week how many times they completed the DVD. The control group did not take part in any intervention, however, they were offered the DVD on completion of the study, and participants in the control group were asked not to practice yoga during the intervention period. Six participants, from the intervention group, took part in a focus group one week after the intervention ended to evaluate and explore their likes and dislikes about the Dru yoga program.

Figure 1: Participant flow chart assessing eligibility for study.



Note: Out of 74 women assessed for eligibility, 42 were excluded as they were not first time mothers. Of the 32 women eligible to take part in the study, 16 were randomly allocated to the Dru yoga intervention and 16 to the control group. All 32 participants were included in the analyses.

2.4 Materials

Participants completed a personal details form which included socio-demographic variables and the Physical Activity Readiness Questionnaire (PAR-Q) (Chisholm et al., 1975) prior to the intervention. Participants were included or excluded based on the information given on the PAR-Q such as heart disease, whiplash, sciatica or bulging discs and personal details form such as currently practicing yoga and if they were a first time mother. Participants also completed three questionnaires to evaluate pre and post intervention scores of perceived stress, mood and coping.

2.4.1 Sociodemographic variables

Socio-demographic variables were compiled by the researchers into a personal details form asking about employment status, marital status, weeks postpartum and if they currently practice yoga.

2.4.2 Physical Activity Readiness.

Physical activity readiness was assessed using the Physical Activity Readiness Questionnaire (PAR-Q) (Chisholm et al., 1975). PAR-Q has seven questions and has been designed to identify if physical activity is inappropriate for some adults, or those who should have medical advice concerning the type of activity most suitable for them. Respondents were required to answer yes or no to each of the seven questions, assessing health problems such as high blood pressure and dizziness. Participants answering yes to any of the questions on this scale were excluded. This scale is shown

to be reliable and valid (Cardinal et al., 1996) and has been used in postnatal mothers (Gilinsky et al., 2012).

2.4.3 Perceived Stress

Stress was measured using the 14-item Perceived Stress Scale (Cohen et al., 1983). This scale measures the degree to which a person perceives situations in everyday as stressful. Responses are given on a Likert scale ranging from 0 (never) to 4 (very often), with a possible score of 56, a higher score reflects greater perceived stress. Reliability and validity of this scale has been shown to be substantial with an alpha reliability of 0.85 (Cohen et al., 1983), and has been used previously in first time mothers (Osman et al., 2014).

2.4.4 Mood

State mood was measured using the Positive and Negative Affect Schedules (PANAS), (Watson et al., 1988), which includes two 10-item mood scales assessing negative affect and positive affect. The scales have good reliability and validity, (Crawford and Henry, 2004), with Cronbach's alpha for positive affect ranging from 0.86-0.90 and for negative affect 0.84-0.87. This scale has been used previously with first time mothers (Strathearn et al., 2012).

2.4.5 Coping.

Coping was assessed by the Brief Cope (Carver, 1997), which can be used to assess 14 coping styles, comprising of 2 items each. Responses are given on a Likert-

type scale from 1 (“I’ve not done this at all”) to 4 (“I’ve been doing this a lot”), and higher scores indicate increased utilization of that specific coping strategy. This scale can also be used to provide a measure of emotion, problem and dysfunctional forms of coping, by combining the coping styles, with good internal reliability (Cooper et al., 2008) and this is how it was used in the current study, shown to be valid and have internal reliability with values exceeding the minimum of 0.5 This scale has been used with first time mothers (Kemplar et al., 2012).

2.5 Procedure

Ethical approval was obtained from the School of Psychology Postgraduate Ethics Filter Committee, which is in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Recruitment commenced and the researcher attended Rhythm and Rhyme, Baby Yoga and Baby Massage in the local community centre and provided an overview of the study to mothers. Anyone who was interested in taking part in the study, completed a consent form and a participant’s information sheet. All participants were asked to complete the PAR-Q and from this, participants were excluded if they had a health risk, which could be sciatica, bulging discs in the back, heart disease, or whiplash. The reason for exclusion with these conditions, is the risk of further injury due to movement. Following successful screening, participants were asked to complete the PSS, PANAS the Brief Cope questionnaire and the personal details form and randomly allocated to either the intervention or control group by a JavaScript random number allocation.

The intervention group were offered a 4 week Dru yoga programme which lasted one hour per week. Participants in the yoga group were offered a short DVD to take home to practice twice a week. The control group received no intervention during the 4-week period and asked not to practice any yoga during the intervention period. At the end of the 4-week period, all participants in the control and intervention group were asked to complete the 3 questionnaires again (PSS, PANAS, Brief Cope).

As a brief evaluation, 6 participants from the intervention group, who volunteered to take part in a focus group to discuss how they felt about the Dru yoga sessions. The selected participants were invited to a neutral venue one week after the intervention had ended to take part in an informal discussion which lasted 30 minutes and asked to reflect on what they liked and disliked about the Dru yoga programme.

2.6 Data analyses

Prior to analyses, the data was checked for normality by first examining statistics for skewness, kurtosis and to check that the scores are normally distributed, the scores for perceived stress, mood and coping fall within the normal range. A series of independent t-tests were conducted to look at baseline differences in psychological stress, coping and well-being between the control and intervention group. In order to determine the effect of the Dru yoga intervention on the measures of psychological well-being, a 2(group: control vs yoga) X 2 (time: baseline and 4 week follow up) repeated measures ANOVA was used. Sphericity was checked and if it was supported, sphericity

assumed was reported and if Box's M was significant, Greenhouse-Geisser was reported (Tabachnick and Fidell, 2007).

3. Results

From the sample of 32, all women were first time first mothers, no-one had practiced yoga in the past and they were invited to attend a 4 week Dru yoga programme (n=16) or followed up in a control group (n=16).

3.1 Participants Characteristics.

The mean age of all participants was 28. 62% of all participants were either employed or on maternity leave and 38% were unemployed. 40 % of all participants were married, 35% co-habiting and 30% were single. The mean weeks postpartum for all participants was 23 weeks. (See Table 1).

Table 1: *Baseline characteristics of study participants*.

Demographic information	**Yoga group (n=16)**	**Control group (n=16)**
Mean age (SD)	28.38(5.69)	28.00(4.90)
Employment status %		
Employed/maternity leave	28	35
Unemployed	22	16
Marital status %		
Married	22	19
Co-habiting	16	19
Single	13	13
Mean weeks postpartum	24	22.88

Note: Employed/maternity leave=working full or part time or currently on maternity leave.

3.2 Group differences at baseline on psychological measures.

Table 2 shows results from a series of independent t-tests to establish baseline differences between the groups for age, perceived stress, positive and negative affect, emotion, problem and dysfunctional focused coping. The groups did not differ on any of the measures, however, for problem and dysfunctional coping, were just outside the level of significance, (0.051) (0.063) respectively, the control group showed a trend for higher scores in problem focused coping and the intervention showed a trend for higher scores in dysfunctional focused coping.

Table 2: *The differences between Dru yoga and control group on age, stress, mood and coping at baseline.*

Domain	**Yoga n=16 Baseline Mean(SD)**	**Control n=16 Baseline Mean(SD)**	**t**	**Df**	***p***
Age	28.00 (4.90)	28.38 (5.69)	0.20	30	.843
PSSTOTAL	25.25(8.19)	20.13(8.07)	-1.78	30	.085
PA	30.25(10.14)	35.31(7.40)	1.61	30	.117
NA	15.13(5.49)	13.19(3.53)	-1.19	30	.244
Emotion	27.13(6.63)	28.00 (6.53)	0.38	30	.71
Problem	17.69(4.29)	20.63(3.88)	2.03	30	.051
Dysfunctional	25.06(5.05)	22.00(3.85)	-1.93	30	.063

Abbreviation: PSSTOTAL perceived stress total score, PA= positive affect total score, NA= negative affect total score, Emotion-emotion focused coping total score, Problem= problem focused coping total score, Dysfunctional= dysfunctional focused coping total score.

3.3 The impact of the intervention on psychological measures at 4 week follow up.

Thirty two first time mothers took part in the study and reported baseline and follow up scores for stress, mood and coping. Women ranged from 8-50 weeks postpartum. From the 32 participants, 16 took part in the Dru yoga intervention and attended one yoga

class per week lasting one hour for 4 weeks. Participants in the intervention, on average attended 3.75 classes over the 4 week period. Participants in the Dru yoga intervention group were also asked to partake in a 20 minute home yoga DVD twice per week over the 4 week period (8 sessions in total). 6 participants completed the home DVD programme, as instructed. **A t-test was carried out to see if there were any differences in stress, mood and coping between those in the intervention group who completed the home DVD programme and those who did not. The results showed that the scores for stress (*p*=.341), mood (PA: *p*= .144; NA: *p*= .104) and coping (Emotion: *p*=.836; Problem: *p*=.419; Dysfunctional: *p*=.683) did not differ significantly for those who completed the home yoga DVD and those who did not complete the home DVD programme. A one way ANOVA was carried out to see if there were any differences in stress, mood, coping and week's post-partum at baseline and following the intervention. The results showed that scores at baseline for stress (p=.336), mood (PA: P=.845; NA: P=.145), coping (Emotion: p=.969; Problem: p=.851; Dysfunctional: p=.763) and following intervention scores for stress (p-.871), mood (PA: p=.853; NA: p=.312), coping (Emotion: p=.910; Problem: p=.928; Dysfunctional: p=.225) did not differ significantly between those who were up to 3 months post-partum, 4-5 months postpartum and those who were 6-12 months postpartum.**

3.3.1 Effects of time, group and time by group interactions

In order to determine if there was a significant difference in mean scores on the psychological measures over time (baseline to follow-up), between the control and

intervention group and interactions between group and time, a 2 (control Vs yoga group) x 2 (baseline Vs follow up) repeated measure factorial analysis of variance was conducted. See Table 3 for results.

Table 3: *Differences over time for stress, mood and coping.*

Variable	Baseline Mean (SD)		Follow up Mean(SD)		Time	Group	Time x group Interaction
	Control	Intervention	Control	Intervention			
PSS	20.13 (8.07)	25.25 (8.19)	20.75 (6.87)	20.50 (6.82)	$F^{(1,30)} = 9.846$, $p =$ **.004** $\eta_p^2 = .247$	$F^{(1,30)} = .897$, $p = .351$ $\eta_p^2 = .358$	$F^{(1,30)} = 16.718$, $p =$ **0.001** $\eta_p^2 = .029$
PA	35.31 (7.40)	30.25 (10.14)	37.00 (11.20)	37.06 (6.75)	$F^{(1,30)} = 11.06$, $p =$ **.002** $\eta_p^2 = .269$	$F^{(1,30)} = 4.021$, $p = .402$ $\eta_p^2 = .118$	$F^{(1,30)} = .724$, $p = .054$ $\eta_p^2 = .024$
NA	13.19 (3.53)	15.13 (5.49)	13.69 (3.72)	11.06 (2.02)	$F^{(1,30)} = 9.204$, $p =$ **.005** $\eta_p^2 = .235$	$F^{(1,30)} = .077$, $p = .784$ $\eta_p^2 = .335$	$F^{(1,30)} = 15.096$, $p =$ **.001** $\eta_p^2 = .003$
Emotion	28.00 (6.53)	27.13 (6.63)	28.00 (6.60)	27.75 (6.36)	$F^{(1,30)} = 1.682$, $p = .205$ $\eta_p^2 = .209$	$F^{(1,30)} = .060$, $p = .808$ $\eta_p^2 = .297$	$F^{(1,30)} = 1.682$, $p = .205$ $\eta_p^2 = .002$
Problem	20.63 (3.88)	17.69 (4.29)	20.50 (3.76)	18.75 (3.87)	$F^{(1,30)} = 7.904$, $p =$ **.009** $\eta_p^2 = .209$	$F^{(1,30)} = 2.851$, $p = .102$ $\eta_p^2 = .297$	$F^{(1,30)} = 12.681$, $p =$ **.001** $\eta_p^2 = .087$
Dysfunction	22.00 (3.85)	25.06 (5.05)	22.00 (3.85)	23.75 (4.04)	$F^{(1,30)} = 4.522$, $p =$ **.042** $\eta_p^2 = .131$	$F^{(1,30)} = 2.708$, $p = .110$ $\eta_p^2 = .131$	$F^{(1,30)} = 4.522$, $p =$ **.042** $\eta_p^2 = .083$

Abbreviation: PSSTOTAL= perceived stress total score, PA= positive affect total score, NA= negative affect total score, Emotion- emotion focused coping total score, Problem= problem focused coping total score, Dysfunction= dysfunctional focused coping total score

3.3.1.1Time effects

There is a decrease in scores over time (baseline to follow-up) for stress, negative affect and dysfunctional coping, and an increase in scores for positive affect and problem focused coping. With no change in emotion focused coping.

3.3.1.2 Group effects

There are no group effects for any of the measures used in the study.

3.3.1.3 Time by group interaction

There are significant interaction effects for time by group for stress, negative affect, problem and dysfunctional focused coping. This shows that compared to the control group, the yoga group at the completion of the intervention showed a reduction in stress, a decline in negative affect and dysfunctional coping, and an increase in problem focused coping. A series of graphs were plotted to show the time by group interaction effects, see Figure 2.

Figure 2 A-*F Interaction for time and group for stress, mood and coping at baseline and follow-up for the control and intervention groups.*

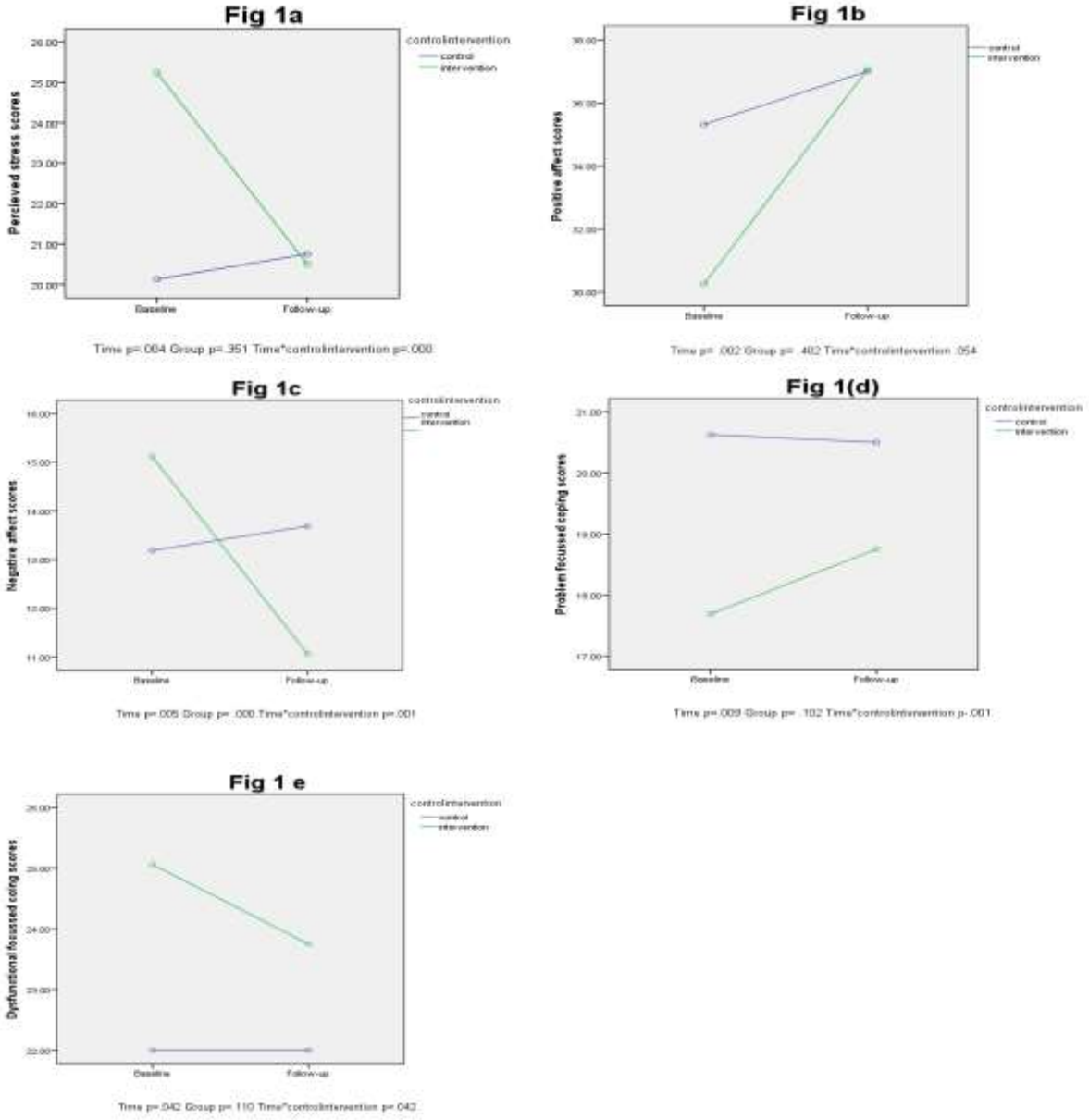


Fig 2 A-F shows that there is no change in the control group for stress, mood or coping however, in the intervention group, there is a decrease in stress, negative affect and dysfunctional focused coping, an increase in positive focused coping and while there is a trend towards an increase for positive affect, it is just outside the level of significance.

4. Discussion

To our knowledge this is the first randomised control trial looking at the effect of postpartum yoga on psychological well-being in healthy first time mothers. The Dru yoga programme significantly reduced stress, negative affect and dysfunctional focused coping, and increased problem focused coping with no change in levels of emotion focused coping and positive affect. These findings are consistent with previous research showing yoga to be effective at improving well-being in a range of populations (Saxton, 2011).

In agreement with previous research, the current study found a positive reduction in stress levels (Hartfield et al., 2011; Hartfield et al., 2012; Jailian et al., 2014; Michalsen et al., 2005). This suggests that yoga may be beneficial in reducing stress not only in those who are particularly highly stressed (Michalsen et al., 2005) or suffering with a anxiety disorders (Jindani et al., 2015), but may also be beneficial to those dealing with everyday stressors. The current findings are contradictory to previous research which did not find a reduction in stress for a yoga intervention compared to relaxation (Smith et al., 2007) or a stretching intervention (Corey et al., 2014), in women with high stress levels and metabolic syndrome. Neither of these studies included a control/wait out group.

The Dru yoga intervention in the current study was found to have reduced state negative affect, similar to previous studies (Bershadsky et al., 2014; Gaskins et al., 2014; Yoshihara et al., 2014) but contradictory to the findings of Haden et al. (2014). They found that in a sample of children, negative affect increased after a 12 week yoga programme in comparison to a physical education programme. The current findings are interesting

as previous research suggests negative affect doesn't tend to change much throughout the day, unless disrupted by major life events (Watson, 2000; Simpson et al., 2008). However, in this study, state mood was assessed after the fourth yoga session, whereas the Haden et al study mood was assessed one week after the intervention. It is possible that the effects of yoga are time limited with any change in affect occurring immediately after the intervention. Yoga had no impact on state positive mood, in keeping with some of the research (Bershadsky et al., 2014; Haden et al., 2014; West et al., 2004) and contradictory to others (MacKensie et al., 2013; McDermott et al., 2014; Streeter et al., 2010; Vadiraja et al., 2009). The mean scores for positive affect at baseline, in the current study, were comparable to other studies looking at mood in the postpartum period (Bei et al., 2010; Buttner et al., 2012). It is possible that the differential findings between the studies may be due to the varied samples included in studies, with some participants having severe mood disturbances at baseline (e.g.McKensie et al., 2013 that looked at cancer patients).

The Dru yoga intervention had a differential effect on coping, by increasing problem focused coping, decreasing the use of dysfunctional coping and not influencing emotion focused coping, lending support to previous research (Mahajan, 2010; Mehrabi et al., 2012). Dale et al. (2011) conducted a study with a sample of participants with a history of abuse and found that yoga did not predict problem focused coping but did predict improvements in the use of dysfunctional coping styles. Mahajan (2010) and Schell et al. (1993) reported no change in emotion focused coping following a yoga intervention in their studies of healthy women and students, both studies used similar sample sizes and intervention duration as the current study. This is in contrast to previous

research that found increases in emotion focused coping with yoga (Kang and Oh, 2012); Mehrabi et al., 2013; Nejati et al., 2015). The findings are interesting as coping style is usually stable over time and across different situations (Shikai et al., 2014).

The current study used a randomised control design that allowed for an objective examination of the effects of a 4 week Dru yoga intervention on perceived stress, mood and coping. However, there are several limitations of this study, the small sample size, although it is within power more research is needed with larger samples to determine if these results can be replicated. All of the participants were first time mothers which limits the generalisability of the findings to all mothers. Also, there were no restrictions placed on participants in relation to engaging with other forms of physical activity during the intervention and this may have influenced the results. Future research needs to take this into account or ask participants not to engage in any other activities during the intervention. Also, there is no way to know if participants engaged with the home yoga DVD, therefore it may be more beneficial for the Dru yoga programme to run several taught classes during the week rather than relying on participants to complete a home DVD programme, as shown in Buttner et al. (2015) and Jalilian et al. (2014). A four week Dru yoga programme is quite short, making it difficult to evaluate the long term benefits or indeed the sustainability of yoga, as a way to maintain psychological well-being. Monthly follow-up sessions to monitor on-going home practice could be implemented to measure the longer term effects of yoga for improving psychological well-being in first time mothers.

The evaluation of an intervention is normally done by an independent researcher, however, as this is a preliminary study, the researchers carried out a small evaluation. Participants reported enhanced psychological well-being and physical health benefits which is supported in the literature (Smith et al., 2007; Wurz et al., 2014). Other reported benefits are changes in appearance and physical performance (Grubbs and Carter, 2002; Stutts, 2002). The main barriers to attending yoga in this sample, were that the class was too long, difficulty relaxing, an unfriendly instructor and tiredness, similar to previous studies (Doran and Hornibrook, 2013), an initial experience of yoga may help people overcome such barriers (Atkinson and Permuth-Levine, 2009). Facilitators to attending the yoga classes, were convenience (time of day and location) and motivation, similar to previous research with chronic back pain sufferers (Comb and Thorn, 2014).

6. Conclusion and recommendations

The current research represents the first study of yoga for the psychological well-being of first time Northern Irish mothers and extends the support for yoga with postnatal women. To date, there has been no review in the literature that has identified an appropriate intervention in the perinatal stage that could be recommended in clinical practice (Allderdice et al., 2013). The current study addresses this gap and the results show that Dru yoga may be an effective intervention to improve maternal well-being in the perinatal and postnatal period. Therefore, midwives and health visitors could include yoga when discussing holistic and effective behaviours that can 1) enhance psychological well-being 2) help build physical strength recovering from giving birth and 3) provide social

support to first time mothers. Further research is needed with larger samples, longer duration for the intervention and inclusion of all new mothers.

Conflicts of interest

None declared

Funding

No external funding

Ethical approval

Ethical approval was obtained for Ulster University's school of Psychology ethical committee.

References.

Adams, J., Lui, C.W., Sibbritt, D., Broom, A., Wardle, J., Homer, C., Beck, S. 2009. Women's use of complementary and alternative medicine during pregnancy: a critical review of the literature, Birth, 36, 237–245.

Alderdice, F., McNeill, J., Lynn, F. 2013. A systematic review of systematic review of interventions to improve maternal health and well-being, *Midwifery, 29*, 389-399

Ashrafina, F., Mirmohammadali, M., Rajabi, H., Kazemnejad, A., Hagnighi, K.S. and Amelralizadeh, M. (2015). Effect of Pilate's exercises on postpartum maternal fatigue, *Singapore Medical Journal, 56*(3), 169-173

Atkinson, N.L. and Permuth-Levine, R. (2009). Benefits, barriers and cues to actions of yoga practice – a focus group approach. *American Journal of Health Behaviour, 33*(1), 3-14

Babbar, S., Parks-Savage, A.C., and Chauhan, S.P. (2012). Yoga during pregnancy. A Review. *American Journal of Perinatal, 29*(6), 459-64

Bei, B., Milgrom, J., Erickson, J. and Trinder, J. (2010). Subjective perception of sleep but not its objective quality is associated with immediate postpartum mood disturbances in healthy women, *Sleep, 33*(4), 531-538

Bernard-Bonnin, A.C. (2004). Maternal depression and child development, *Paediatrics & Child Health, 9*(8), 575-583

Bershadsky, S., Trumpfheller, L., Kimble, H.B., Pipaloff, D. and Yim, I.S. (2014). The effect of pre- natal hatha yoga on affect, cortisol and depressive symptoms. *Complementary Therapies in Clinical Practice, 20(2),* 106-13

Bhavnani, V. and Newburn, M., (2010). Left to Your Own Devices. The Postnatal Experiences of 1260 First-Time Mothers. London NCT.

Buttner, M.M., O'Hara, M.W. and Watson, D. (2012). The structure of women's mood in early postpartum, *Assessment, 19*(2), 247-256

Buttner, M.M., Brock, R.L., O'Hara, M.W. and Stuart, S. (2015). Efficacy of yoga for depressed postpartum women. A randomised control trial. *Complementary Therapies in Clinical Practice, 21(2),* 94-100

Callaghan, W.M., Kuklina, E.V. and Breg, C.J. (2010).Trends in postpartum hemorrhage: United States 1994–2006. *American Journal of Obstetrics and Gynecology, 202* (4), 353-e1

Cardinal, B.J., Esther, J. and Cardinal, M.K. (1996). Evaluation of the revised physical activity readiness questionnaire in older people. *Medical and Science in Sport and Exercise*, *28*(4), 468-472

Care Quality Commission (2013). National Findings from the 2013 Survey of Women's Experiences of Maternity Care. HealthCare Commission, London.

Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioural Medicine, 4*(1) 92-100

Chisholm, D.M., Collis, M.L., Kulak, L.L., Davenport, W. and Gruber, N. (1975). Physical activity readiness. *British Columbia Medical Journal, 17(2), 375*–378.

Cohen, J. (1988). *Statistical power analysis for behavioural science* (2nd ed) hillside, N.J. Lawrence Earlbaum Associates.

Cohen, S., Kamarck, T. and Mermelstein, R. A. (1983). A global measure of perceived stress. *Journal of Health Social Behaviour, 24,* 385–396.

Combs, M.A. and Thorn, B.E. (2014). Barriers and facilitators to yoga in a population of individuals with self-reported chronic low back pain – a qualitative approach, *Complimentary Therapies in Clinical Practice, 20*(4), 268-275

Cooper, C., Katona, C. and Livingstone, G. (2008). Validity and reliability of the brief COPE in carers of people with dementia: the LASER-AD Study, *Journal of Nervous and Mental Diseases, 196*(11), 838-43

Corey, S.M., Epel, E., Schembri, M., Pawlowsky, S.B., Cole, R.J., Araneta, M.R.G., Barrett-Connor, E. and Kanaya, A.M., 2014. Effect of restorative yoga vs. stretching on diurnal cortisol dynamics and psychosocial outcomes in individuals with the metabolic syndrome: The PRYSMS randomised controlled trial. Psychoneuroendocrinology, 49, 260-271.

Crawford, J. R. and Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *43*(3), 245-265

Dahlen, H., Priddis, H., Schmied, V., Sheddon, A., Kettle, C., Brown, C. and Thornton, C. (2013). Trends and risk factors for severe perineal trauma during childbirth in New South Wales between 2000 and 2008: a population-based data study. *BMJ Open, 3*(5), e002824

Dale, L.P., Carroll, L.E., Galen, G.C., Scheln, R., Bliss, A., Mittison, A. and Neace, W.P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's

self-concept & dysfunctional coping. *Journal of aggression, Maltreatment & Trauma, 20(1),* 90-102

Doran, F. and Hornibrook, J. (2013). Women's experience of participation in pregnancy and postnatal group incorporating yoga and facilitating group discussion: A qualitative evaluation. *Women and Birth, 26(1),* 82-86

Everson, R.J. and Simon, R. (2005). Clarifying the relationship between parenthood and depression. *Journal of Health and Social Behavior, 46*(4), 341–358.

Faul, F., Erdfelder, E., Lang, A.G. and Buchner, A., 2007. G* Power 3: A flexible statistical power analysis program for the social, behavioural, and biomedical sciences. Behaviour Research Methods, 39(2), 175-191.

Gaskins, R., Jennings, E., Thind, H., Becker, B. and Bock, B. (2014). Acute and cumulative effects of Vinyasa yoga on affect and stress among college students participating in an eight week yoga program: A pilot study. *International Journal of Yoga Therapy, 24*(1), 63-70

Gilinsky, A.S., Hughes, A.R. and McInnes, R.J. (2012). More active mums in Stirling (MAMMIS). A physical activity intervention for postnatal women. Study protocol for a randomised control trial*, Trials, 13*(1), 1

Grubbs, L. and Carter, J. (2002). The relationship between perceived benefits and barriers to reported exercise behaviours in college undergraduates. *Family, Community and Health, 25*(2), 76-84

Kang, G. and Oh, S. (2012). Effects of mindfulness meditation program on perceived stress, ways of coping and stress response in breast cancer patients. *Journal of Korean Academy of Nursing , 42*(2), 161-170

Haden, S.C., Daly, L. and Hagin, M. (2014). A randomised control trial comparing the impact of yoga and physical education on the emotional and behavioural functioning of middle school children. *Focus on Alternative and Complementary Therapies, 19*(3), 148-155

Harder, H., Parlour, L. and Jenkins, V. (2012). Randomised controlled trials of yoga interventions for women with breast cancer: A systematic review. *Support Care Cancer, 20*(12), 3055-3064

Hartfield, N., Burton, J., Rycroft-Malone, J., Clarke, G., Havenhand, J., Khalsa, S.B. and Edwards, R.T. (2012). Yoga for reducing perceived stress and back pain at work. *Occupational Medicine Advance Access, 62(8), 606-612*

Hartfield, N., Havenhand, J., Khalsa, S.B., Clarke, G. and Krayer, A. (2011). The effectiveness of yoga for the well-being and resilience to stress in the workplace. *Scandinavian Journal of Work, Environment and Health*, 70-6

Hung, C.H. (2004). Predictors of postpartum women's health status. *Journal of Nursing Scholarship, 36*(4), 345–51.

Hung, C.H. (2006). Correlates of first time mother's postpartum stress*. The Kaohsiung Journal of Medical Sciences, 22*(10), 500-7

Jalilian, N., Moradmo'meni, K., Zabet, A., Zabet, M. and Pour, S.Z. (2014). The effects of yoga on reduction of post-partum stress symptoms. *Journal of Science and Today's World, 3(*5), 164-167

Jindani, F., Turner, N. and Khalsa, S. (2015). A yoga intervention for post-traumatic stress: A preliminary randomised control trial. *Evidence Based Complementary and Alternative Medicine,* doi: 10.1155/2015/351746

Jung, H.E. and Yoo, P.J. (2014) Impact of having a first child on maternal symptoms. Does the effect of a mothers first baby increase symptoms of depression in the mother*. Asian Social Work and Policy Review, 8*, 156-169

Kemplar, L., Sharpe, L. and Bartlett, D. (2012). Sleep education during pregnancy for new mothers. *BMC Pregnancy and Childbirth, 12*(1), 155

Kinser, P. and Masho, S. (2015). "Yoga Was My Saving Grace". The Experience of Women Who Practice Prenatal Yoga, *Journal of American Psychiatric Nurses Association, 21*(5), 319-26

Ko, Y.L., Yang, C.L., Fang, C.L., Lee, M.Y. and Lin, P.C. (2013). Community-based postpartum exercise program*, Journal of Clinical Nursing, 22*(15-16), 2122-2131

Lane, K. (2008). 'Latent and 'realised' 'risk cultures': Women-centered midwifery and CAM. In J. Adams & P. Tovey (Eds.) Complementary and Alternative Medicine in Nursing and Midwifery; Towards a Critical Social Science. Routledge, London, England, 137-157

Lewis, G.H., 2011. Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–08. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. BJOG: an International Journal of Obstetrics and Gynaecology, 118(Suppl. 1).

MacKensie, M.J., Carlson, L.E., Ekkekakis, P., Paskerich, D.M. and Culos-Reed, S.N. (2013). Affect and mindfulness as predictors of change in mood disturbances, stress symptoms and quality of life in a community based yoga programme for cancer survivors. *Evidence-based Complementary and Alternative Medicine*.

Mahajan, A. (2010). The effectiveness of yoga on the student. *International Journal of Yoga Practice, 2,* 56-62

McDermott, K.A., Rao, M.K., Nagarathna, K., Murphy, E.J., Burke, A., Negendra, R.H. and Hecht, F.M. (2014). A yoga intervention for type 2 diabetes risk reduction: a pilot randomised controlled trial, *BMC Complementary & Alternative Medicine, 14*(1), 1

Mehrabi, T., Azadi, F., Pahlavanzadeh, S. and Meghdadi, N. (2012). The effect of yoga on coping strategies among intensive care unit nurses. *Iran Journal of Nursing Midwifery Research, 17*(6), 421-424

Michalsen, A., Grossman, P., Acil, A., Langhorst, J., Ludtke, R., Esch, T., Stefano, G. and Dobos, G. (2005). Rapid stress reduction and anxiolysis among stressed women as a consequence of a three month intervention programme. *Medical Science Monitor, 11*(12), CR555-561

Munk-Olsen, T., Laursen, T.M., Pedersen, C.B., Mors, O. and Mortensen, P.B. (2006). New parents and mental disorders: a population-based register study. *Journal of American Medical Association, 296*(21), 2582-2589

National Institute for Health and Clinical Excellence (NICE), 2013. Postnatal Care, Quality Standard QS37. National Institute for Health and Clinical Excellence, London.

Nejati, S., Zahiroddin. A., Afrookhteh, G., Rahmani, S. and Hoveida, S. (2015). Effect of group mindfulness based stress reduction program and conscious yoga on lifestyle, coping strategies and systolic and diastolic blood pressure in patients with hypertension. *Journal of Tehran University Heart Centre, 10*(3), 140-148

Osman, H., Saliba, M., Chaaya, M. and Nassan, G. (2014). Interventions to reduce postpartum stress in first time mothers. A randomised control trial. *BMC Women's health, 14*(1), 1

Parade, S.H., Blankson, A.N., Leerkes, E.M., Crockenberg, S. and Faldowski, R. (2014). Close relationship predict curvilinear trajectories of maternal depressive symptoms over the transition to parenthood. *Family Relations. 63*(2), 206-218

Saxton, J.M. (2011). *The Health Benefits of Yoga. A Review of the Scientific Literature*, Norwich: *Unpublished Paper*, University of East Anglia.

Schell, F.J., Allolio, B. and Schonecke, O.W., 1993. Physiological and psychological effects of Hatha-Yoga exercise in healthy women. International Journal of Psychosomatics: official publication of the International Psychosomatics Institute, 41(1-4), 46-52.

Schmeid, V., Johnson, M., Naidoo, N., Austin, M.P., Matthey, S., Kemp, L., Mills, A., Meade, T., and Yeo, T. (2013). Maternal mental health in Australia and New Zealand; A review of longitudinal studies. *Women and Birth, 26*(3), 167-178

Shikai, N., Nagata, T. and Kitamura, T. (2014). Do people cope with situations as they say? Relationships between perceived coping style and actual coping response. *Psychiatry and Clinical Neurosciences, 68*(2), 154-159

Simpson E.E.A., McConville C., Rae G., O'Connor J.M., Stewart-Knox B.J., Coudray C., and Strain J.J. (2008). Salivary cortisol, stress and mood in healthy older adults: the Zenith Study. *Biological Psychology*, 78(1), 1-9.

Smith, C., Hancock, H., Blake-Mortimor J. and Eckert, K. (2007). A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. *Complementary Therapies in Medicine, 15(2),* 77-83

Strathearn, L., Lyengar, U., Fonaghy, P. and Kim, S. (2012). Maternal oxytocin response during infant mother interaction association with adult temperament. *Hormones and Behaviour, 61*(3) 429-435

Streeter, C.C., Whitfield, T.H., Owen, L., Rein, T., Karri, S.K., Yakhkind, A., Perlmutter, R., Prescot, A., Renshaw, P.F., Ciraulo, D.A. and Jensen, J.E., 2010. Effects of yoga versus walking on mood, anxiety, and brain GABA levels: a randomised controlled MRS study. The Journal of Alternative and Complementary Medicine, 16(11), 1145-1152.

Stutts, W.C. (2002). Physical activity determinants in adults. Perceived benefits, barriers and self-efficacy*. American Association of Occupational Health Nursing, 50* (11), 499-507

Swain, J.E., Tasgin, E., Mayes, L.C., Feldman, R., Todd Constable, R. and Leckman, J.F. (2008). Maternal brain response to own baby cry is affected by caesarean section delivery, *Journal of Child Psychology and Psychiatry, 49*(10) 1042-52

Swann, S., 2004. Yoga for pregnancy. Available from: 〈http://www.yogababy.com.au 556〉

Tabachnick, B. & Fiddell, L. (2007). Multivariate analysis of variance and covariance. *Using multivariate statistics, 3,* 402-407

Thornton, C., Dahlen, H., Korda, A. and Hennessy, A., (2013). The incidence of preeclampsia and eclampsia and associated maternal mortality in Australia

from population- linked datasets: 2000–2008. *American Journal of Obstetrics Gynecology, 208*(6), 476-e1

Vadiraja, H.S., Rao, M.R., Nagarathna, R., Nagendra, H.R., Rekha, M., Vanitha, N., Gopinath, K.S., Srinath, B.S., Vishweshwara, M.S., Madhavi, Y.S. and Ajaikumar, B.S. (2009). Effects of yoga program on quality of life and affect in early breast cancer patients undergoing adjuvant radiotherapy: a randomised controlled trial. *Complementary therapies in medicine*, *17*(5), 274-280.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063-1070.

Watson, D. (2000). The rhythms of everyday experience: patterned cyclicity in mood. In: Watson, D. (Ed). Mood and Temperament, 104-143

West, J., Otte, C., Geher, K., Johnson, J. and Mohr, D.C. (2004). Effects of hatha yoga and African dance on perceived stress, affect and salivary cortisol. *Annals Behavioural Medicine, 28(*2), 114-118

Woolhouse, H., Gartland, D., Perlen, S., Donath, S. and Brown, S.J. (2014). Physical health after child birth and maternal depression in the first 12 months postpartum: results of an Australian nulliparous pregnancy cohort study, *Midwifery 30*(3), 378–384.

Wurz, A., Chamorro-Vina, C., Guilcher, G.M., Schulte, F. and Culos-Reed, S.N. (2014). The feasibility and benefits of a 12 week yoga intervention for paediatric cancer outpatients. *Paediatric Blood & Cancer Care, 61*(10), 1828-1834

Yoshihara, K., Hiramoto, T., Oka, T., Kubo, C. and Sudo, N. (2014). Effect of a 12 week yoga training on the somatisation, psychological symptoms and stress related biomarkers of healthy women. *BioPsychosocial Medicine, 8*(1), 1