Investigating relationships between women's moods and their menstrual cycles – a multi-method study

by

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Abstract

A multi-method study was conducted to investigate the relationships between a woman's menstrual-cycle and her moods. Twenty eight participants were recruited using convenience sampling. Each participant provided data for two full menstrual cycles by taking part in a pre and post-study in-depth interview; answering a structured daily self-report diary utilising a Likert scale and completing three established research instruments – the Brunel Scale of Moods, the Menstrual Distress Questionnaire and the Born-Steiner Irritability Questionnaire, weekly. Interviews were conducted in person and quantitative data were collected electronically via e-mail. The mixed-methods methodology resulted in quantitative data that were analysed using STATA statistical software and the ecological multivariate data analysis software package known as PRIMER. Results from the statistical software were represented graphically and indicated that there is a relationship between menstrual cycle days and moods, with individual women's correlations differing from each other to some extent. The data confirmed that there are groups of women who follow a very similar mood pattern and that educational level, vocation, exercise and participation in volunteer work or hobbies defines these groups to some degree. The qualitative data supported these findings and indicated the impact of menstrual cycle related moods on women's daily functioning. The study concludes that menstrual cycle related moods play a role in overall life satisfaction and that psycho education and awareness can improve overall quality of life.

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Acronyms and abbreviations

ACOG - The American Congress of Obstetricians and Gynaecologists

AIAQ - The Anger, Irritability, Assault Questionnaire

AMRS - Altman Self-Rating Mania Scale

ANDR - Androstadienone

ANOSIM - analysis of similarities

ANOVA - standard analysis of variance

APA - American Psychiatric Association

Apps - smart phone applications

AQ - Aggression Questionnaire

BDHI - The Buss–Durkee Hostility Inventory

BDI - The Beck Depression Inventory Fast Screen

BEST – Bio-env + Stepwise

BIQ - Born-Steiner irritability self-rating scale

BMI - body mass index

BRUMS - Brunel Scale of Moods

CANTAB - The Cambridge Neuropsychological Test Automated Battery

CAR - cortisol awakening response

CBT - cognitive-behavioural therapy

CD - The Cyclicity Diagnose scale

CNPDI - Child Nurse Practice Development Initiative

COPE - Calendar of Premenstrual Experiences

Cycle events - Psychological or physiological events associated with the menstrual cycle

DALY - Global Burden of Disease model to calculate years of disability

DC - The Diagnostic Criteria for PMTS

DERS - Difficulties in Emotion Regulation Scale

DHEA - dehydro-epiandrosterone

DHEA - S - dehydro-epiandrosterone sulfate

DSM - Diagnostic and statistical manual of mental disorders

EDI-3 - Eating Disorders Inventory

FHS - Faculty of Health Sciences

FSDS-R - the Female Sexual Distress Scale-Revised

FSFI - the Female Sexual Function Index

FT - free testosterone

GABA - gamma-Aminobutyric Acid

GnRH - Gonadotropin-releasing hormone

GP – general practitioner

GPS - global positioning systems

GSH - Grootte Schuur Hospital

HPCSA - Health Professions Council of South Africa

HREC - Human Research and Ethics Council

HT - hormone therapy

ISPMD - International Society for Premenstrual Disorders

KSP - The Karolinska Scales of Personality

LH - luteneizing hormone

MACL - The Lord-McNair

MCA - Multiple correspondence analysis

MDQ - Menstrual Distress Questionnaire

MDQ - The Mood Disorder Questionnaire (MDQ)

M-Health - the use of smart phone applications and other digital tools in health

MWW - Wilcoxon Mann–Whitney U test (also called the Mann-Whitney-Wilcoxon)

NIMH - National Institutes of Mental Health

NRF - National Research Fund

PANAS-X - The Positive and Negative Affect Scale – Expanded version

PG Dip - Post Graduate Diploma

PGWB-S - The Psychological General Well-Being Index

PMDD - Premenstrual Dysphoric Disorder

PMRS - The Self-Rating Scale for PMTS

PMS - premenstrual syndrome

PMT - premenstrual tension

PMTS - Premenstrual tension syndrome

PND - post natal depression

POMS - Profile of Mood States

PROMs - Patient-reported outcome measures

PSS - Psychiatric Status Schedule

PSST - Premenstrual Symptoms Screening Tool

RAVLT - Rey-Auditory Verbal Learning Test

RCI - University of Cape Town's Research Contracts and Innovation Unit

REML - Restricted Maximum Likelihood estimation

REP - Women's Reproductive Experiences Questionnaire

ROLE - The Review of Life Experience

SADS - The Schedule for Affective Disorders and Schizophrenia (SADS) – including: Lifetime version (SADS-L) and the version for measuring change (SADS-C)

SANDF – South African National Defence Force

SBS - Somatic-Behavioral-Sexual Symptom Profile

SFA - self-focussed attention

SHBG - sex hormone binding globulin

SIMPER - similarity percentages

Sms – Short message service

SRD - Self Report Diary

SSAL - Social-Sexual Activities Log

SSAl - The Social Sexual Activities Log

SSP - Swedish universities Scales of Personality

STAXI - State-Trait Anxiety Inventory

ST-DACL - State-Trait Depression Adjective Check List

UCT - University of Cape Town

UWIST-MACL - The University of Wales Institute of Science and Technology - Mood Adjective Checklist

VAS - Visual analogue scale

WMA - World Medical Association

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1 Introduction

Anne was a thirty six year old, married woman with two children, aged eight and ten. She worked part-time as a bookkeeper at a local firm. She described her relationship to her husband as 'good' and was fairly satisfied with their sex life. Anne took the family's two Labradors for regular walks and did some volunteering at her children's school. She was a moderate tempered person, with intermittent bouts of mild depression and anxiety. Yet Anne confessed that there were times when she 'just didn't feel herself' and described physical sensations of discomfort in her own skin as well as behavioural issues such as outbursts towards her children. At some stage she thought her moods might be related to her menstrual cycle, but neither her general practitioner (GP) nor her gynaecologist could find anything amiss.

Anne is a composite of the participants who took part in this study, and like all women, her endocrine[1] system was designed to release just the right mixture of hormones, mainly comprised of progesterone, estrogen, testosterone, luteneizing hormone (LH) and sex hormone binding globulin (SHBG), at particular times in the month to affect her 28-day fertility cycle (Section 2.1).

It was my assumption as researcher that hormones, steroids, neurotransmitters and glands (referred to in short as 'hormones'), which produce surges for physiological reasons (for example, to release an egg or prepare a uterus for implantation) would have a woman experience concomitant emotional experiences. This assumption rests on the point that the same hormones that stimulate physiological events are also associated with emotions (Dantzer, 2012). For example, serotonin release, uptake or the inhibition of uptake are closely linked to a person's perception of depression and many post-1988 psychiatric medications

[1] The word endocrinology has its roots in the Latinized Greek form of krinein (to secrete) and endo (internally), so literally – to secrete internally, which is how hormones are released into the body. One could not be blamed for wondering whether 'crino' also refers to 'chrono'; making endocrinology an 'internal clock'.

for managing depression inhibit serotonin re-uptake (for example, fluoxetine, venlafaxine and sertraline) (Ferguson, 2001).

An example of how physiological and emotional events are best understood when viewed holistically can be seen in the effect of food on the brain. We need to eat to survive, but the foods we eat do not serve only the purpose of giving us nutrition, they also affect how we feel. Sugar and chocolate stimulate endorphins through a chain-effect starting with tryptophan. Without necessarily understanding the science behind it, everyone understands the term 'comfort food' (both in the sense of food prepared by someone who loves us as food that has in and of itself, a chemical 'feel good' reaction). The body experiences chemical processes on an on-going basis and functions both as a self-contained unit with a lot going on at any moment internally (breathing, heartbeat, digestion), and as a contextual entity that is continually influenced by the environment and how it interacts with that environment. Our interaction with food, while serving a survival need, is at the same time giving us something else too – messages about how we feel emotionally. Simple examples are fatigue and hunger, and so we find that emotion is a biopsychosocial construct - a complex interplay of what we think; what physiological processes are at play and our experiences and environmental factors. Seen from this perspective it is very difficult to pin-point how we would feel at any given moment without all these influences.

Following this path of reasoning, it is fair to assume that the constant hormonal flux in the triangle between the endocrine system, brain and organs are busy not only fulfilling a physiological (in this case reproductive) function, but is simultaneously triggering responses which are experienced by us as emotional feelings. The system that controls the fertility cycle is the same system that houses our emotions, with each hormone within that system manifesting sensations which are experienced by us as emotions. During a woman's normal monthly menstrual cycle, there are cycle phases (which are differently defined depending on the text) each of which is accompanied by a change in hormones that can trigger a shift in her mood state. These cycle phases are discussed in more detail in section 2.2 (Kruger and Botha, 2011).

A study of women's emotions as they move through their monthly menstrual cycles has to consider the physiology and emotions as described above, but it also needs to take into consideration the social constructs which have been intrinsically woven into our experience of cycle-moods. Although it is not the explicit focus of this study, some cognisance will be taken of how women view menstruation as a result of the social conditioning that happens within society. Both the physiological and social contexts of women's experiences will be viewed through a systems theory lens which positions each individual as a whole system within in an ever-widening map of systems including other individuals and groups as well as the woman's living and non-living environment. Her non-living environment will include her built environment (home/ work-place/ children's school) as well as her wider physical environment such as shopping facilities and recreational areas.

The following section outlines the three research questions which will be addressed throughout the study and is followed by the study's explicit aims and motivation as it examines cycle-moods. Chapter one concludes with an outline of the dissertation.

1.1 Research questions

The central research question is therefore whether there is a relationship between the menstrual cycle and a woman's moods. I further postulated that the data might indicate the existence of different groups of women who could be defined by the moods and behaviours they would experience during certain cycle days and differentiated from the other groups by factors isolated from the Menstrual Mood Study Questionnaire (MMSQ).

The three research questions addressed in this study are:

- Research Question 1:

How do women feel and act during the different days of their menstrual cycles?

- Research Question 2:

If you group women together who feel and act similarly on the different days of their cycles, what will the groups look like?

- Research Question 3:

How could women benefit from understanding the feelings and behaviours that they associate with their different cycle days?

This study philosophised that a large and distinct group of the female population experience moods that correlate with specific cycle days. As stated by Graham and Bancroft (1993, p.13), "…whatever the cause, some women do regard cyclical mood change as a significant problem which interferes with their social or occupational functioning." These experiences can have a negative impact on women and influence their overall life satisfaction (Bertone-Johnson et al., 2010). It was equally important to try and discover whether some women do not experience their menstrual cycle related moods as negative, or if they did, why not to any great extent? What would differentiate such a group of women who were able to view cycle related moods as benign, from those who did not? Would the first group have better coping strategies and if so, what would these be? Could I learn from these examples and use them to help women who struggled with their cycle related moods?

It was felt that the three research questions would adequately address all of these uncertainties and provide enough data to result in findings which are valid and valuable for later clinical application.

1.2 Study motivation and aims

The aim of this study was to investigate whether or not there is a relationship between the menstrual cycle and women's moods and, furthermore, whether all women share the same relationship with their menstrual cycle moods. If so, are there groups of women who have similar experiences of their menstrual cycles and what differentiates them from other groups of women? The study further explores whether women could benefit from understanding the relationship they have with their menstrual cycle.

This study was undertaken because I observed that women's moods and behaviour fluctuated over time and were cyclical. The participants of this study often drew correlations between negative moods such as irritability, and the premenstrual period, but my observations indicated that moods shifted during other times in a woman's cycle. I wanted to monitor the entire menstrual cycle and a wide range of moods, both positive and negative, to ascertain whether my observations were my own biased assumptions or whether women in general would be found to share this experience. My reading of the literature as discussed in the Literature Review section indicated that my own observations might be validated. Should such findings be made, I further wanted to explore whether understanding the relationship between menstrual cycle and mood would benefit women and more specifically, whether therapeutic intervention would benefit women who experience negative cyclical moods. As a psychologist in private practice (at the time) I felt that, should both these approximations prove to be valid, monitoring female clients' cycle related moods could be an invaluable tool in individual specific clinical application.

1.3 Dissertation outline

The Literature Review begins by tracking the history of the research that has centred on women's monthly menstrual cycles and Premenstrual Syndrome (PMS). It is recognised that much has been written on this topic and acknowledgement is given to the work of scientists who have made significant contributions to the field. Literature about the development of research methods relevant to this study are outlined next and then the review moves on to shifting paradigms within menstrual cycle research. The Literature Review concludes with a look at more recent research, where it explores the specific focus of current topics in this study area.

In Chapter Three, the theoretical framework is reviewed, starting with the philosophical underpinning of the study and follows with a methodology section which addresses the disciplinary scope of the research; the multi-methods approach and a discussion of systems theory.

In Chapter Four the research design itself is outlined by defining the research population and recruitment of the research participants before discussing the research instruments and data gathering methods. The chapter then moves to clinical data and electronic data collection before considering the analysis methods for the quantitative (4.5.1; 4.5.2; 4.5.3 and 4.5.4) and qualitative data before looking at ethics and concluding with an examination of the limitations and challenges of the study methodology.

In Chapter Five the quantitative results of the menstrual mood study questionnaire (MMSQ) are presented before data collected using each of the four research instruments are provided by first describing the instruments and data and then presenting composite data, individual mood patterns and broad groupings based on mood profiles. This quantitative section of the thesis draws to a close with a look at a combination of the data from the research instruments in terms of individual and group profiles.

In Chapter Six, qualitative data from open-ended questions and the in-depth interviews are then thematically analysed to identify principle themes. These themes are outlined and described before a short synopsis is given in the conclusion of the chapter.

Chapter Seven is the discussion that follows from the findings and their contribution towards answering the three research questions underlying the study. The chapter begins with a discussion of the endocrine context, followed by a look at the philosophical landscape. Hereafter the quantitative findings are explored at the hand of the Menstrual Mood Study Questionnaire (MMSQ); the Self Report Diary (SRD); the Brunel Scale of Moods (BRUMS); the Menstrual Distress Questionnaire (MDQ) and the Born-Steiner Irritability Questionnaire (BIQ). The discussion contemplates the value of analysing individual cycle-mood relationships before examining broad groupings based on mood profiles. The second half of the chapter discusses the qualitative findings, after which the implications of the study findings are contemplated. The therapeutic space, as suggested from the findings, is

examined and finally the chapter concludes with the limitations of the study and the lessons learnt.

Chapter Eight draws the dissertation to a close with conclusions drawn from the findings and discussion as represented in chapters Five, Six and Seven. Some attention is focussed on the difficulties faced in conducting studies of a holistic nature, especially within the domain of the human body which has been largely studied from a biomedical perspective.

2 Literature Review

This Literature Review has been divided into four sections: 1.) A background on menstrual cycle phases and PMS; 2.) Literature about the development of research methods relevant to this study; 3.) Shifting paradigms within menstrual cycle research; and 4.) An update on recent research in the field. In the first section, I will outline the menstrual cycle and its concomitant phases as guided by expert interviews and texts from the fields of gynaecology and endocrinology. The inquiry in this study is very much about the psychological experiences of menstruating women, but I felt that a short description of the physiology of the menstrual cycle would provide a context for readers to better relate to the methods of inquiry and data that follow later. PMS is the most well-known mood associated construct of menstruation and as such is discussed here in terms of its description, diagnosis, prevalence, causes and most likely group of women who report experiencing PMS. Following this synopsis of PMS, is a chronological review of literature focussing on the relationship between the menstrual cycle and mood, specifically on research studies whose methods informed or support those of the current study. As most of these studies were, however, from the biomedical paradigm, the next section in this Literature Review will address menstrual cycle and mood related research from alternative paradigms, mainly concentrating on constructivism, but noting some studies from, especially, the feminist paradigm. In conclusion, the last section of the review looks at recent research conducted within this field with a view to indicating exciting new developments and a widening of the field of interest within cycle-mood related research.

2.1 A background on menstrual cycle phases and PMS

This section gives an overview of the endocrine and gynaecological processes which underlie the monthly menstrual cycle[2]. It was constructed with guidance from Dr

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[2] The term ‘menstrual cycle’ could refer to a woman’s monthly cycle or to the cycle of menstruation throughout her life-time, starting with the onset at menarche and culminating in menopause. This study deals with the monthly menstrual cycle and the term ‘monthly’ is therefore inserted for clarity whenever reference is made to ‘menstrual cycle’.

Malika Patel (Patel, 2014) and the gynaecology textbook currently in use during the MBChB curriculum in the Faculty of Health Sciences at the University of Cape Town (UCT), namely Clinical Gynaecology (Kruger and Botha, 2011).

A woman's monthly menstrual cycle is a combination of continuous parallel processes in the ovary and the uterus. The development of an egg for implantation and its journey to the uterus is referred to as folliculogenesis (Brizendine, 2007). At the same time that the egg is being developed and set in motion, the uterus is being prepared for implantation. There is a great deal that is not known about folliculogenesis but, in broad terms, the hypothalamus, pituitary gland, gonadal steroids and neurotransmitters combine in an intricate mechanism to stimulate the female reproductive system (Kruger and Botha, 2011).

A description of this intricate inter-play is provided by Kruger and Botha (2011; p. 69): "The LH surge begins 28-32 hours before ovulation and its peak precedes ovulation by 10 -12 hours. LH and oestradiol interact to stimulate the production of progesterone by the luteinised outer layer of granulosa cells. This results in the pre-ovulatory rise in progesterone levels that serves to augment the LH surge and stimulate the mid-cycle FSH surge… The combined LH and FSH surges synchronize the final follicular events that lead up to ovulation." It is, however, the ovaries that control the actual monthly menstrual cycle (length and nature of) and that determine the events in the uterus (endometrial) (Alagna and Hamilton, 1986). While menstruation is easily observable to a woman, her follicular events are less so, even though they occur continuously in the following order: antral development (which takes 120 days); pre-ovulatory phase; ovulatory phase; early luteal phase; late luteal phase and finally, luteolysis or luteal rescue. "The initiation of follicle growth is a continuous process that is independent of gonadotropins and remains uninterrupted by childhood, pregnancy and lactation." (Kruger and Botha, 2011, p. 67). Table 2.1 describes the synopsis provided above, indicating the hormonal fluctuations during the five phases of the menstrual cycle (Kruger and Botha, 2011).

Table 2.1 A description of the hormonal fluctuations during the five phases of the menstrual cycle (Kruger and Botha, 2011)

What happens hormonally during the five phases of the monthly menstrual cycle?	
Menstrual Phase	Luteolysis leads to a fall in the levels of progesterone and estrogens which results in an increase in FSH and LH levels. (Kruger and Botha, 2011, p. 68)
Mid-follicular Phase	The selection of the dominant follicle occurs between days 5 and 7 of the cycle and the continued increase of oestradiol and the peptide, inhibin, further suppress FSH secretion. One to two hour gonadotropin pulses occur. The LH surge begins 28-32 hours before ovulation and its peak precedes ovulation by 10 -12 hours. The positive feedback effect on LH secretion requires critical plasma oestradiol concentration for at least 48 hours. LH and oestradiol interact resulting in the pre-ovulatory rise in progesterone levels that serves to augment the LH surge and stimulate the mid-cycle FSH surge. The LH surge promotes follicular rupture and the FSH surge causes the oocyte to float freely in the follicular fluid prior to ovulation. (Kruger and Botha, 2011, p. 69; 74)
Ovulatory Phase	Pulsatile gonadotropin secretion is controlled by a classical negative feedback action of oestradiol on the hypothalamopituitary axis, except at mid-cycle when a positive feedback effect occurs and gonadotropin surges are elicited. Changes in the early secretory phase are regulated by estrogen and progesterone acting on the estrogen-primed endometrium. Epithelial proliferation ceases three days after ovulation, triggered by progesterone down-regulation of estrogen receptors. The mid-secretory changes in the endometrium are now mainly brought about by progesterone. (Kruger and Botha, 2011, p. 71; 73; 75)
Early Luteal Phase	During the luteal phase, increasing amounts of progesterone and estrogen are produced by the corpus luteum until the mid-luteal phase. On the sixth day after ovulation, secretion reaches a maximum. Ovarian steroids and glycoproteins have profound feedback effects on circulating gonadotropin levels through the classical long feedback loop. These effects are mainly inhibitory except at the mid-cycle when gonadotropin surges are elicited. Following follicular rupture, the residual parts of the follicle within the ovary collapses. Changes also occur in the endometrial stroma in response to progesterone. (Kruger and Botha, 2011, p. 74; 75; 76)
Late Luteal Phase	In the absence of fertilisation and implantation of the ovum, the corpus luteum inevitably undergoes luteolysis within 12 – 16 days after ovulation. Progesterone and estrogen levels drop sharply and their withdrawal is reflected in endometrial breakdown and the onset of menstruation. After the mid-luteal phase, beginning about 7 – 8 days after ovulation, if implantation has not occurred, the rates of progesterone and estrogen secretion in the corpus luteum begin to decline progressively before menstruation. These changes reach a maximum during the mid-luteal phase, usually between the 22nd and 23rd day of the cycle. (Kruger and Botha, 2011, p. 70; 74; 76)

Figure 2.1 captures the ebb and flow of the three main hormones during this cycle – estrogen (pink); progesterone (blue) and testosterone (green) (adjusted from Brizendine, 2007). To ascertain whether this figure accurately represents women's hormone patterns, bloods from five of the participants were tested and analysed

for the level of the five hormones: Estradiol, Progesterone, FT, LH and SHBG. The analysis of the blood results was conducted in consultation with a registered endocrinologist. Results indicated that all samples taken are consistent with Brizendine's description of a normal cycle pattern (none of the participants' blood tested in the abnormal range). However encouraging, the results of five women's blood tests do not constitute a big enough percentage to be extrapolated to the whole sample group.

As a result, this study cannot accurately identify which hormone (for example, estradiol) or which exact cycle phase (for example, late luteal) any of the participants are experiencing at a given measuring moment. For this reason, the place in her cycle where a participant finds herself is depicted in terms of her cycle day/s, as determined by onset of menses (described as day one of each cycle).

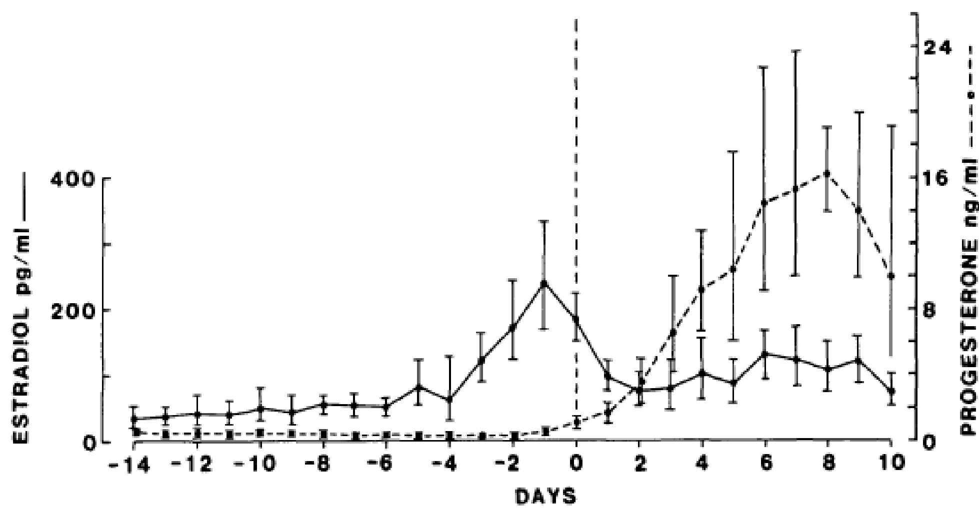

Figure 2.1 Estradiol and progesterone concentrations during the normal menstrual cycle. Data were normalized around the day of the LH surge (---). The data are expressed as the geometric mean and 67% confidence limits with between four and six observations per point. The factors for conversion of values to Systeme International (SI) units are: estradiol, pg/ml x 3.671 = pmol/L, progesterone, ng/mL x 3.180 = nmol/L (McLachlan et al, 1987).

This study set out to investigate the relationship between women's moods and their menstrual cycles and as such, determined to describe the experiences of 'most' women. In other words, the participants selected as a representative sample group were defined by parameters which were identified as average or nominal for the majority of the (menstruating) population. In specific terms, these parameters align with the inclusion criteria outlined in Table 4.1. Women were defined as 'normally menstruating' if they: still had their uterus and ovaries and had not experienced any gynaecological difficulties impacting adversely on their monthly menstrual cycles and menstruated monthly in a fairly regular pattern (Landgren et al., 1980). The term 'regular cycle' refers to a monthly recurring menstruation that lasts between two and eight days and recurs every 21 to 35 days (Li et al., 2014).

This section on the endocrine system underlying the monthly menstrual cycle was given as a brief background description of the dominant physiological system (the others being the gonadal organs and the brain) that drives the changes in a woman's body during her monthly menstrual cycle; to define the usage of days in cycle as descriptor throughout the thesis and to describe the term 'normally menstruating woman' and 'regular cycle'. This section also contextualised the hormone testing that five of the participants participated in.

A description of Premenstrual Syndrome (PMS)

PMS has been a recognised clinical entity for many years, but there is still tremendous controversy regarding its epidemiology, definition, diagnosis, pathophysiology and treatment (Craner et al., 2016). In the words of Anne Walker (1995, p.793), "Premenstrual Syndrome (PMS) is a controversial and ill-defined phenomenon". As PMS is such a dominant construct in menstrual cycle related cogitation, an attempt is made here to provide some basic definitions and descriptions of this construct and to touch on some of the debate and views of it from different paradigmatic viewpoints.

Diagnosing PMS:

In 1994, the American Psychiatric Association (APA) classified severe PMS as Premenstrual Dysphoric Disorder (PMDD) (American Psychiatric Association, 2013), which can be diagnosed if a woman experiences five out of the eleven symptoms[3] listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V-TR, 5th ed.), five days pre- versus five days post menstruation (APA, 2013). The term PMS is therefore primarily reserved for milder physical cycle events and minor mood changes (Alagna and Hamilton, 1986). It is a cluster of predictable physical, psychological and behavioural manifestations that recur regularly and specifically during the luteal phase of the menstrual cycle, resolving with the onset of, or during, menstruation (Batra and Harper, 2003). For either diagnosis it is important to document the presence of cycle events in at least two consecutive cycles, however, retrospective recall may amplify severity and frequency of the cycle events, and has been shown to correlate with prospective daily ratings in only 50% of cases (Kruger and Botha, 2011, p. 246;251).

There is no unanimous set of diagnostic criteria for PMS, even though the following bodies have attempted definitions: the APA; The American College of Obstetricians and Gynaecologists (ACOG) and the National Institutes of Mental Health (NIMH) (APA, 2013; ACOG, 2017; Northrup, 1994). There seems to be consensus that PMS may be diagnosed if a woman experiences at least one cycle event severe enough to disrupt daily functioning (Kruger and Botha, 2011).

Only a few of the over 200 cycle events associated with PMS are confined to the menstrual cycle, with most cycle events overlapping with those seen commonly in stress and even hangovers, these include emotional, behavioural and physical symptoms that disrupt family and personal relationships, and impaired work and social activities, with the cardinal cycle event for PMS being irritability (Moos, 1968; Born and Steiner, 1999). Other common psychological cycle events are aggression, anxiety, crying bouts, depression, loss of concentration and tension (Kruger and

[3] The word ‘symptom’ is used throughout the thesis only when the cycle events described are defined directly in a medical context such as this section with its references to the APA definitions. The term ‘cycle event/s’ is otherwise utilised to refer to physiological or psychological events associated with the menstrual cycle.

Botha, 2011). Key physical cycle events include bloatedness, which may be perceived rather than actual (Kruger and Botha, 2011), breast swelling, breast tenderness, clumsiness, headache, premenstrual dysmenorrhoea and perceived or actual weight increase (Moos, 1968). Further affective cycle events are mood swings and sleep disorders, often combined with other cycle events including: food cravings, exacerbation of migraine/ asthma/ epilepsy and loss of self-control. Further physical cycle events include headaches, aches and pains and swelling of the limbs (Bobel, 2016).

Prevalence of PMS:

Estimates are that up to 90%[4] of menstruating women experience at least one mild cycle event before menstruation without significant disruption to their daily activities. Twenty to forty percent of women have symptoms that are severe enough to impair daily functioning thereby qualifying them as experiencing PMS (Kruger and Botha, 2011).

Causes of PMS:

While gonadal steroid levels are similar in PMS and control groups, women with PMS have been shown to have lower serotonin, gamma-Aminobutyric Acid (GABA) and melatonin levels (Kruger and Botha, 2011). The experience of PMS could thus be due to an increased sensitivity to normally-circulating hormones, with one hypothesis presuming that the fall in gonadal steroids leads to a withdrawal syndrome (Kruger and Botha, 2011). Another hypothesis postulates that women with PMS have deficits in serotonin, endorphins and other neurotransmitters such as ß endorphins (Anisman et al., 1998). Whereas endorphin activity and withdrawal of opiate activity gave rise to the narcotic withdrawal theory, other theories in the pathophysiology of PMS and PMDD postulate about the roles of hormones such as thyroid hormone, melatonin, cortisol, prolactin and others that are not sex steroids (Anisman et al., 1998). Hoffman et al. (2016) postulated that molecular

[4] Percentages and statistics relating to (especially) the prevalence of medically defined ‘symptoms’ of PMS and PMDD, vary widely between texts. They have been referenced throughout to indicate where the figures were obtained from.

mechanisms may underlie a woman's susceptibility to PMDD and that women who have a particular gene network are far more likely to experience PMDD or severe PMS, than women who do not. Other theories investigated nutritional deficiencies, especially of vitamin B6, magnesium and calcium which can alter circadian rhythms, and lastly psycho-social factors have been explored as causal for PMS and PMDD (Bäckström et al., 1983; Kruger and Botha, 2011).

Women most likely to report experiencing PMS:

Sebitloane (in Kruger, 2011) states that PMS is considered a "disorder of middle-class articulate women" but goes on to clarify that "it is probable that this is the group of women who report their symptoms, while other groups experience equally severe problems, not recognizing them as such" (p. 248). This brief statement and clarification surmises many decades of speculation and assumption about those who experience PMS. As will be seen in section 2.2, research on PMS is happening all around the globe and it is therefore safe to say that PMS is experienced by women everywhere, even if, as Sigmon (2000) states, it may come in varied cultural guises.

PMS is traditionally thought to affect women who have had more than one child and are in their mid to late thirties, the cycle events arriving for the first time soon after the birth of the firstborn. However, this may be a pseudo-correlation arising from the fact that most women who seek treatment for PMS are in their 30's and 40's (Kruger and Botha, 2011).

Patients usually seek help when they experience cycle events that frighten them, such as suicidal thoughts, violent behaviour or the loss of a relationship or job. Genetic factors are also thought to play a role (Chin and Nambiar, 2017). Research appears to show a higher prevalence of neurosis in PMS patients, as well as an elevated lifetime prevalence of major depressive disorder and postpartum depression in women with PMDD. The exact aetiology of PMS is unknown, but believed to be multifactorial, involving mainly an interaction between sex steroid hormones and neurobiological susceptibility, with a sensitivity towards ovarian

steroids – particularly progesterone (or deficiency of progesterone in relation to estradiol) (Halbreich and Kahn, 2001). Symptoms remit during any interruption in the ovulatory cycle (Kruger and Botha, 2011). As can be deduced, there is a close inter-play between women who suffer from depressive or anxiety disorders, and those who experience post-natal depression (PND) or PMS. It is safe to postulate that women who have a genetic predisposition to not coping psychologically and who furthermore find themselves in unsupportive environments, are at high risk for PND, PMS and even PMDD.

PMS – fact or fallacy?

Over the centuries, any issue with the female reproductive system seems to have been heavily cloaked in cultural beliefs and biases, with Monokwane (in Kruger, 2011) saying that "previously dysmenorrhoea was ascribed to emotional and psychological problems due to a "faulty outlook on sex and menstruation" (p. 222). Recently the physical and emotional pain associated with female sexual organs and functioning has been studied more scientifically and findings have become less judgmental and, hopefully, more helpful (Northrup, 1994). Monokwane goes on to say, for example, that "it has been shown that high levels of stress, anxiety or depression and disruption of social support networks have been associated with menstrual pain" (p. 222).

As can be seen from the brief outline above, the syndrome described as PMS in fact covers a very wide array of both psychological and physiological cycle events which have been shown to be exacerbated in women in unsupportive environments. The feminist perspectives on PMS are also wide ranging but what is of interest here, is that this paradigm holds forth that the syndrome is a social construct arising from patriarchal and oppressive origins with the political aim of positioning women as the weaker sex (Ussher, 2006). Feminists go on to say that menstruation as a whole has been positioned to shame women and objectify them to the point of madness, with women being labelled 'hysterical' and historically branded as witches (Ussher, 1997; Johnston-Robledo and Chrisler, 2013; Roberts, 2014). The relevance of this rhetoric to the current study is to create awareness in the reader that PMS is addressed because of its prevalence in literature relating to the menstrual cycle

and resulting in the research participants' familiarity with the construct of experiencing discomfort in the days leading up to menstruation.

Drawing to a close this section on PMS, let us consider the words of Lee and Sasser-Coen, "As a result, to avoid the untenable position of not being able to say much about anything, we negotiate between our empiricist tendencies and our poststructuralist theoretical leanings…" (p.9, 1996) and so, with this study being a multi-method investigation, the reader should attempt to hold the data resulting from quantitative inquiry where PMS is a biomedical construct alongside the constructivist-interpretivist view that PMS is probably at least partially socially constructed and that the views of the participants on PMS have to be considered at the intersect of physiological experience and socially constructed understandings. Anne Walker maybe put it best when she said, "Biopsychosocial models of PMS may integrate a variety of approaches and improve our understanding of individual experiences but are unlikely to offer new insights into the phenomenon of PMS. These are more likely to emerge from anthropological and sociological studies which question the cultural and individual meaning of PMS." (Walker, 1995, p. 793).

The next section explores the literature encountered and utilised for the development of the methodology for this study.

2.2 22)Literature about the development of research methods relevant to this study

This section chronologically outlines the progression of studies which feature an interrogation of the interplay between the menstrual cycle and moods. It also explores those studies which utilised methods adopted for this study by following the thread of emerging research methods as they developed, specifically with regards to: expanding the research focus from premenstrual to whole-cycle observation; combining endocrine and behavioural testing; utilising concurrent measures in testing such as self-report diaries; investigating the possibility of groups of women who feel similar during the same phases of their cycles and including irritability as a prominent menstrual cycle related mood.

This study was in large part undertaken due to the paucity of research related specifically to cycle moods, in South Africa. For the bulk of the past nine decades, research on the menstrual cycle has largely been defined by studies that examine premenstrual syndrome, although this trend is gradually changing, as reflected in the diverse topics discussed at the June 2017 conference of the Society for Menstrual Cycle Research (Personal correspondence Chrisler, Feb 2018). PMS, or premenstrual tension (PMT), is the experience of physical, emotional and behavioural manifestations (hereafter referred to as 'cycle events') which some women perceive as negative and which are associated with the time shortly before the onset of menstruation (Budeiri, et al., 1994). PMDD is an extreme form of PMS/PMT that is classified by the APA as a mood disorder (American Psychiatric Publishing, 2013; Gehlert and Hertlage, 1997). Both the terms PMS and PMDD have recently been explored extensively by social theorists, especially in the context of the medicalization of women's issues and the terms' socially constructed meanings (Chrisler and Caplan, 2002). Although these issues are very important, the debate around how semantics and rhetoric (social/ political/ medical) have impacted on women, is a study area that does not fall within the direct scope of this thesis and the terms PMS and PMDD will be used as the common current nomenclature.

In 1847, Dr Ernst F. von Feuchtersleben wrote: "The menses in sensitive women is almost always attended by mental uneasiness, irritability and sadness" (Rubinow and Schmidt, 1995; cited in Connoly, 2001), but it took nearly 40 years before the term 'premenstrual tension' was discussed by the psycho-analyst Karen Horney in 1931 and attributed to R. T. Frank in the same year (Connoly, 2001; Westkott, 1986) and the term 'pre-menstrual syndrome' was first used by Greene and Dalton in 1953 (Connoly, 2001). From 1774 to 1993, several seminal works on menstrual psychosis originated from mostly Germany (Kirkland, 1774; Mendel, 1881; Wolleneberg, 1891; Stuttgart, 1902; Ewald, 1922) and Japan (Yamada, 1980, Yamashita, 1993) but, almost without fail, Frank's work is seen as the root paper for menstrual research publication (Brockington, 2017).

Franks' (1931) work is the first study that addressed the female reproductive cycle as it pertains to psychological welfare and it sparked extensive research in the field of the psychoneuroendocrinology of the monthly menstrual cycle (the study of how hormones interact with brain function and the effect this has on a person's psychological make-up) (Connoly, 2001). Before then, endocrinology, neurology and biology were studied apart from emotions in the same way that psychology was being studied without taking biology into account (Mehta and Josephs, 2011).

Frank (1931) and others focussed almost exclusively on PMS, and did not address cycle events outside of the premenstrual phase (Connoly, 2001). This was probably because of the paucity of clinical research in female endocrinology at the time. Willard Myron Allen only discovered progesterone in 1933 and in-depth research into the monthly menstrual cycle and its links with mood only started as late as 1968 with Moos' work on the Menstrual Distress Questionnaire, followed by Abplanalp et al.'s (1979a) study of women's psychological experience of the menstrual cycle (Allen in Archive, University of Rochester, 2016). Abplanalp et al. (1979a) used blood tests to assess hormone levels and behavioural tests to assess mood, namely the Social-Sexual Activities Log (SSAL); Moos' Menstrual Distress Questionnaire (MDQ) (Moos, 1968)] and the Profile of Mood States (POMS) (McNair et al. 1971). See section 4.2.1 and 4.2.2 for a summary of these research instruments. In her second study (Abplanalp et al. 1979b), her team expanded the blood tests to cover all five hormone phases in the monthly menstrual cycle and extended the testing period to two cycles using the same instruments as in the first study. Although, Abplanalp et al.'s (1979b) focus was still mainly on the premenstrual phase, their work opened up the possibilities for research into the rest of the cycle and, more importantly, set a trend for combining the gathering of endocrine data with behavioural and emotive data. Later researchers pointed out the shortcomings of using retrospective self-assessment in monthly menstrual cycle related studies, which led to concurrent self-assessments becoming the norm as they provided more reliable data (for example, Bäckström et al., 1983; Bancroft et al., 1983).

"In the late 1970s, the topic of irritability resurfaced in the medical literature. Articles on its definition and measurement appeared, followed in the 1990s by articles on its heritability. The 1990s also saw the introduction of a mood disturbance, specific to women, called premenstrual dysphoric disorder (PMDD)" (Born and Steiner, 1999, p.153).

In the early eighties, the work of Sanders et al. (1983), Bäckström et al. (1983) and Bancroft et al. (1983) continued along similar lines as that of Abplanalp (1979), but shifted the focus more to women's experience of their sexuality, in particular, libido. Essentially, this work combined the endocrine testing (androgens) and blood flow to the vagina with measures of behaviours such as the frequency of masturbation and sexual interaction with a partner.

In fact, in the article 'Premenstrual tension syndrome: diagnostic criteria and selection of research subjects', Haskett and Abplanalp (1983, p.125) showed a frustration with the lack of progress in the field: "Despite increased attention, PMS remains poorly understood". Their study is one of the first that investigated mood changes throughout the ovulatory phase using concurrent self-report assessments. The emphasis in this research was on identifying the difference between mild and severe PMS, rather than the relationship between hormones and mood per se, and found the methods they utilised such as concurrent testing and self-report questionnaires, produced more reliable data (Feuerstein and Shaw, 2002; Rubinow, 2015).

In 1985, Collins et al. explored the introduction of a second variable, namely an induced stressor, and recorded the responses of women during different phases of their monthly menstrual cycle over a two month period. The stressor was in the form of cognitive challenges, such as cognitive conflict tasks; mental arithmetic and computer games. Their results indicated that the stress responses of participants varied significantly across the monthly menstrual cycle and that their ability to perform tasks followed a similar pattern, with performance poorest during the luteal phase. However, the validity of these conclusions was slightly restricted by

the habituation effect of repeating the same stress scenarios with the research participants throughout the study period (Collins et al., 1985).

Van Goozen et al. published the first article that relates specifically to this present study, in 1997: ‘Psychoendocrinological assessment of the menstrual cycle: The relationship between hormones, sexuality, and mood’. Her team tested 21 women, and used endocrine testing together with behavioural questionnaires. Participants were tested approximately every second day for the levels of estradiol, progesterone, testosterone, androstenedione (ANDR), dehydro-epiandrosterone sulfate (DHEA-S), cortisol, and SHBG in their blood. The behavioural questionnaires comprised a shortened version of the POMS (McNair et al., 1992), and a self-constructed daily report questionnaire. The researcher also elicited descriptive data when research participants reported sexual behaviour. Van Goozen et al. (1997) looked at the whole monthly cycle and reported specific behaviours and emotions linked to each phase of the hormone cycle, as opposed to just during the premenstrual phase. They also found that women who reported PMS symptoms had distinctly different experiences to ovulation than women who did not report problems with PMS. For instance, women who reported PMS had a peak in sexual activity in the mid-follicular phase, whereas those who did not showed stronger sexual feelings in the late luteal phase.

Van Goozen et al.’s (1997) results seem to divide women into roughly two groups: those who have elevated positive moods during times in their monthly menstrual cycle when they experience a progesterone surge; and those who report elevated positive moods during times in the monthly menstrual cycle when they experience an estrogen surge (Bäckström et al., 1983). This finding has wide implications – for those women who decide to make use of hormone therapy (HT), the process of finding a combination and dosages that address their needs can be a fairly long and emotionally-difficult period, not unlike the process of finding a ‘fit’ with a psychiatric drug (Björn et al., 2006), whereas if a woman already knows her response to her monthly hormonal surges, it would be considerably easier to find a good fit. The Björn et al. study dealt with participants who were menopausal women on sequential cyclic estrogen and progestin, but the study is referenced

because it addresses methodological concerns; biopsychosocial factors; the delay between hormonal surge and associated mood events and adds to the list of cycle events that were observed and was considered for use in the SRD – all factors that align closely with concerns in this study.[5]

Van Goozen also explored why research results in this field had been so contradictory (Van Goozen et al., 1997). They concluded that the reasons for this were mainly methodological, for instance: different methodologies had been used to infer menstrual phases; there were inconsistent definitions of sexuality and the measures thereof, and participants varied widely in their gynaecological issues and associated mental health states. There were other reasons for these inconsistencies: in Van Goozen et al.'s (1997) study, women were monitored for only one month, which did not account for monthly variations even though Moos found that "In general, the correlations between [cycles] were statistically significant, indicating that women who report symptoms in one cycle also tend to report them in another." (Moos, 1968). Furthermore, both behaviour instruments used in the Van Goozen study utilised an odd-numbered Likert scale, which has been shown to create a bias in that participants tend towards choosing the middle number. An even numbered Likert scale on the other hand compels the participant to make a choice that is more indicative of an either/ or choice (Gardner and Martin, 2007).

Born and Steiner introduced an important new development in the field of women and mood by identifying that irritability is cycle-related and not limited to the premenstrual period (Born and Steiner, 1999). This led to the release of a female-specific irritability rating scale (Born et al., 2008), presented at the 2nd World Congress of Women's Mental Health in Washington in 2004. It is possible to speculate that Born and Steiner's work was sparked by an earlier study by Budeiri et al. (1994) who, after reviewing over 350 clinical trials, identified 199 PMS 'symptoms' and 65 questionnaires that had been used to diagnose these. The PMS

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[5] This study does not focus on menopause or HT's and I do not wish to take a pro or anti – stance to HT's as this is a completely different field of study. For research into the side-effects of HT's see Prior (1994) and Kirkham (1991).

‘symptoms’ included irritability; depression; easily tearful; anxiety and anger; comfort eating behaviours; lack of libido; confusion and a host of physical manifestations.

The study by Björn et al. (2006) addressed many of the earlier methodological concerns related to inconsistency of results. They tracked twelve physical and mental manifestations of 125 research participants on a daily basis for five months (Björn et al., 2006). Their study showed that women who reported the most intense negative moods during the progesterone phase (negative mood responders) reported more somatic anxiety; an aim to avoid monotony; a lower satisfaction with life or childhood and higher scores of indirect aggression and irritability. They came to the conclusion that “to better understand the link between cause and effect, more studies from a broad point of view, taking in account interacting factors such as the women’s current living conditions and their psychosexual well-being are needed” (Björn et al., 2006 p.295). Soares and Zitek (2008) and Steiner (2008), for example, highlighted the potential exacerbation of cycle events during hormonal fluctuations in women who are predisposed to depression. Steiner, in particular, stressed the impact of reproductive cycle depression on quality and length of life and life expectancy: “untreated depression in elderly women is associated with an almost four-fold increase in mortality” (Steiner, 2008, p. 289).

Symonds et al. (2004) extended the work of Collins et al. (1985) through their exploration of cognitive functioning during different phases of the menstrual cycle. They used the cortisol-DHEA ratio in relation to cognition and mood across the menstrual cycle in healthy women, and applied the Calendar of Premenstrual Experiences (COPE) to assess mood (Mortola et al., 1990). They found marked differences in behaviour in different phases of the menstrual cycle, for instance, neurocognitive functioning, such as eloquence, was impaired in the luteal phase, but found no significant difference in the levels of hormones in women who experience PMS compared to those who do not.

There is some concern in the field of psychoneuroendocrinology that the “understanding of organizational and activational effects of human gonadal

[reproductive] hormones on behaviour has depended on the study of endocrine disorders" (Weiner et al., 2004, p. 356). This touches on the idea that because the knowledge gained is based on the study of disorder, not normality, the research instruments used may not be sensitive enough to record the more subtle changes found within the normal range. Weiner et al. (2004) pointed out that the link between hormones and mood may not be a direct one. Hormones can alter the form or number of neurotransmitter receptors in the brain, which can change emotional sensitivity thereby provoking mood disorders. For instance, hormones affect neurotransmitters such as serotonin, a deficit of which is linked to feelings of depression (Weiner et al., 2004, p. 356). In addition, most studies post-1990 show that there is a delay between hormone levels and their linked emotional response (Björn et al., 2006; Collins et al., 2002; Symonds et al., 2004; Van Goozen et al. 1997).

Weiner et al. (2004) and several others (for example, Symonds et al., 2004) identify androgens, specifically free testosterone (FT), as linked directly to increased levels of anger, depression and hostility. Testosterone follows a bell curve during a woman's cycle, peaking during ovulation (Brizendine, 2007). Feelings of hostility during this time may account for why some women will spurn sexual interaction with their partners during ovulation - preferring masturbation (Bancroft et al., 1983). Interestingly, from a strictly reproductive perspective, ovulation is the period in the cycle when a woman would be expected to feel most aroused as it is only during these few days of her cycle that she can fall pregnant (Schreiner-Engel et al., 1981).

Soares and Zitek (2008) reviewed 46 studies on the hormonal effects of neurotransmitters and mood, dividing these into categories according to which hormones were studied: progesterone, testosterone, estrogen or DHEA and then describing the outcomes accordingly. The review is relevant because it highlighted not only broad correlations between hormones and mood, but also the interplay between hormones and neurotransmitters.

Mehta & Josephs (2011) reported strong links between testosterone, cortisol, progesterone and both temporary mood states and personality traits (Mehta and Josephs, 2011). For instance, elevated testosterone enhances status seeking motivation, and progesterone is linked with affiliation motivation. They underscored the lack of holistic inquiry between endocrinology and psychology, which they referred to as 'social endocrinology'. The delicate interplay between endocrinology, physiology and personality as well as changeable mood, is explored in depth (Mehta and Josephs, 2011). They concluded their chapter by saying, "Despite several decades in which the study of biology was largely ignored by social and personality psychology, biological research in the study of personality and social behaviour is now on the comeback" (Mehta and Josephs, 2011, p. 184).

As a result of this reviewed literature, the current study included daily self-reports incorporating an even-numbered Likert scale; made use of interviews to provide more in-depth consideration of participants' lived experiences; and selected a sample group from the wider population rather than women receiving medical attention.

The following literature indicates the extent of work that has been done in the field of cycle-moods and provides a clear indication that the body of work is growing and developing along a holistic front incorporating endocrinology, neurology, physiology, psychology, nutrition, chronobiology, sport science and others.

Mood and cognitive skill are not the only aspects of women's lives affected by their monthly cycles. Fridén (2004) found a positive correlation between a woman's monthly menstrual cycle and sport injury, and Racine et al. (2012) found a link between eating disorders and the monthly menstrual cycle. Shechter et al. (2012) found that women's sleep cycles were affected by their cycle phase, especially during the premenstrual part of their cycle. As sleep-deprivation plays a major role in depression and other affective disorders, this relationship is of import in the study of the relationship between the monthly menstrual cycle and mood, and

speaks to the indirect link between hormone levels and mood (Weiner et al., 2004).That the monthly menstrual cycle and its associated fluxes play a role in the emotional lives of women is indisputable. Statistics depicting the relationship between especially PMS and women's quality of life vary widely, yet even so, generally correlate at least to the extent where a notable relationship can be deduced. Sanders et al. (1983) found that the family life of all 55 women in their study was adversely affected by PMS; 75% reported an adverse effect on their social life and 55% on their ability to do their work. Gehlert and Hartlage (1997) report that 75% of women are estimated to experience some PMS 'symptoms', whereas as many as 50% experience diagnosable PMS and 3 to 5 % have PMDD (Halbreich et al., 2003).

Increasingly over time, researchers in the field of psychoneuroendocrinology have emphasised the pervasive influence of ovarian hormones on women's wellbeing; highlighted the dangers of mislabelling sensitivity to hormones as abnormal (for example, Berk and Stein, 2002) and the subtle, non-linear links between hormones and behaviour (Weiner et al., 2004; Shechter et al., 2012; O'Brien et al., 2011), and stressed that greater understanding is best achieved through integrating traditionally separate disciplines Abplanalp et al., 1979b; Mehta and Josephs, 2011; Racine et al., 2012;Shechter et al., 2012). Although the bulk of research still focusses on menstruation, or specifically, the period just before the onset of menstruation, possibly because medical science "concerns itself with disease, pain or discomfort of a physical nature" (Born and Steiner, 1999, p. 153), previously diverse fields are starting to relate to each other more holistically. As Mehta and Josephs pointed out: "Social endocrinology is an emerging interdisciplinary field that bridges behavioural endocrinology (the study of the interaction between hormones and behaviour) with social and personality psychology" (Mehta and Josephs, 2011, p.171).

The benefits of a greater understanding regarding the relationship between the monthly menstrual cycle and the experience of life are clear. If hormonal changes have a direct or indirect influence on, inter alia, mood (Weiner et al., 2004), sleeping (Shechter et al., 2012), eating patterns (Racine et al., 2012) and

performance in sport (Fridén, 2004), then an understanding of those links can lead to the development of innovative interventions for assisting women to best utilise these relationships (Shechter et al., 2012).

Undeniably, the implications extend far beyond the personal experience of the individual. In 1980, Sandie Craddock-Smith stabbed a colleague to death in London. Although she was found guilty, she was sentenced to only three years' probation because endocrinologist, Dr Katherina Dalton, found that Sandie had a long history of violent behaviour that occurred, without exception, on a 29 day cycle (Taylor and Dalton, 1983). Sandie was found to suffer from PMDD (Collins et al., 2002). This is not an isolated case (Grose, 1998). Christine English (murder – London) also received a relatively light sentence on the diagnosis of PMS (Collins et al., 2002; Grose, 1998; Meehan and MacRae, 1986). O'Brien (2000) writes in the Daily Mail, "For two weeks every month, Shelley Machin's life was 'sheer hell.' The mother of two crouched weeping on the sofa, unable to answer the door, make dinner or look after her baby son, Tom. Then her moods would swing so wildly that Shelley would scream and throw things at her husband Tony" (Marjoribanks et al., 2013)[6].

These examples indicate extreme cases of the extent to which the female hormone cycle can affect a woman's behaviour and it must be noted that PMDD has not been cited as a legal defence in recent years (Easteal, 1991, Chrisler, 2002). Even so, they have been included to note the intensity to which some women experience their monthly menstrual cycle related moods, as well as to point out the following: three things about Shelley Machin's narrative beg attention. Firstly, she was incapacitated for two weeks out of four. This is not a brief passing malady, this is half of her life. Secondly, the extent to which her life was affected. Shelley could not function as a caregiver for her son, was unable to work and could not maintain healthy personal relationships. Thirdly, her story is by no means unique. Welsh and Polus (2013) and others indicate that PMS 'symptoms' "exact an emotional as well

[6] In a well-researched article by Easteal (1991) published in the (Australian) Trends & issues in crime and criminal justice, the author outlines the history of the use of PMS (or, prior to 1953, menses) as a legal defence in the United Kingdom, Canada, United States and Australia.

as economic toll, accounting for much school absenteeism and sick leave for working women" (Batra and Harper, 2003, p.46; Welsh and Polus, 1999; Ekholm and Bäckström, 1994; Wilson Jr and Keye, 1989).

In 2011, just under 14 million women between the ages of 15 and 49 resided in South Africa, i.e., 26.8% of the total population (Statistics, 2011), and yet the literature search yielded no studies conducted in South Africa that were closely related to psychoneuroendocrinology[7] . Articles were found that investigated PMS in Ethiopia (Tenkir et al., 2003), Nigeria (Ehalaiye et al., 2009) and Saudi Arabia (Balaha et al., 2010). In all three instances, the researchers made use of between 242-404 research participants at local universities. Female students in the studies were shown to have a high prevalence of PMS relating mostly to physical manifestations, but some emotional experiences were noted. All three studies indicated a strong negative correlation between PMS 'symptoms' and normal day to day functioning, including studying. These studies also indicated a higher prevalence of PMS in older women who were better educated and originated from rural areas.

In conclusion, considering the potential emotional, financial and social impacts of mild to severe sensitivity to moods related to the monthly menstrual cycle, there is little doubt that the field merits considerable additional research and understanding as can be seen from both Nevatte et al. (2013) and Steiner's (2000) treatises on the treatment protocols for PMDD.

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[7] Use was made of The Department of Higher Education's website to find a listing of all peer-reviewed journals in South Africa, and then the University of Cape Town Library search engine was utilized as well as: Primo; Ebscohost; Sabinet; Questia and Google Scholar to search for articles. In a parallel search the portals of Africa Journal Online as well as Feminist Africa were used. The archives of the South African Journal of Gynecology and Obstetrics were searched specifically for any papers relating to this field of inquiry. The following search words and terms were used: female hormones and moods; female hormones; female moods; hormones; moods; psychoneuroendocrinology; women's cycle; PMS; irritability; emotions; women and moods. To make sure that no search terms or journals were inadvertently over-looked, Aosis – Open Journals was contacted and a response from the Title Operations Coordinator, Suzanne Taylor, was received confirming that no articles with the above search terms or words could be found for South Africa.

The next section looks at the shifting paradigms within menstrual cycle research, with an emphasis on the move away from biomedical to social constructivist research.

2.3 Shifting paradigms within menstrual cycle research

Most of the research outlined above was conducted with a focus on positivist research from a biomedical or cognitive psychological perspective. This choice was consciously made as the study is dominated by the results and findings from quantitative instruments and the studies discussed above were identified to highlight the progression of work in the field of menstrual cycle-mood research as it pertained to the methods I wanted to include in this study. The outcome of the search for studies which furthermore supported the need for both establishing a chronology of research development and a move towards holism at least in as far as interdisciplinarity is concerned, resulted in the body of work reviewed. However, as this study is conducted from the constructivist-interpretivist paradigm (this paradigm is contextualised and discussed in section 3.1) the following literature was reviewed to elucidate the role of this perspective in menstrual cycle and mood related research.

The work of Ussher, starting with the publication of, 'The psychology of the female body' (1989) and followed by her book, 'Women's Madness: misogyny or mental illness' (1991), represents a large body of work including peer reviewed articles, book chapters and books which has methodically and comprehensively explored women from a feminist perspective and using the lenses of social constructionism and especially material-discursive analysis. Ussher explores prevalent issues as they pertain to women, such as: child sexual abuse, cancer, sexual well-being, PMS/ PMDD, motherhood and others, confronting social stigmatization and interrogating the political meanings given to the semantics of common culture. Her rigour in unveiling the 'unseen' and 'unconsidered' terminology which she feels has objectified women, has resulted in the investigation of terms such as 'self-policing' and a reversal of societal beliefs such as that women should monitor their

behaviour for the sake of others, rather than monitoring their inhibitive practices to develop more empowering strategies for reducing their own distress (2004).

Ussher's work has been informed and informed the work of other feminists like Roberts (2004) who similarly addresses the social construction of the female body as an object and the attitudes of women who have internalised this objectification, towards their own bodies, especially as their perspectives relate to the menstruating body and found that these women feel shame and even disgust with themselves. In this later article, Roberts picks up on her (2002) study where she used feminist theory to show that participants in her study who were alerted to the current menstruation of research confederates, avoided contact with the confederates and reacted by objectifying women in general. The three key elements that re-emerge are that women have been objectified by society, starting with a patriarchal instigation which rapidly expanded to the creation of social constructs adopted by all of society, including women themselves. That women in general now have well-held beliefs around their bodies, especially their reproductive bodies, centring around menstruation, which consist mostly of shame and methods to suppress in an attempt to avoid shame and that these constructions are pervasive and detrimental to gender equality.

In 2006 Chrisler found that self-serving biases contribute to the maintenance of the cultural stereotype of the premenstrual woman and Johnston-Robledo and Chrisler support these views as well as those of Roberts, finding that there is a direct relation between women who find their bodies shameful, and menstrual suppression (2008). They believe that stigma and efforts to avoid it are detrimental to women's health, sexuality and well-being (2013). Uskul's research (2004) found an additional common thread of behaviour relating to menarche as a result of women's larger cultural, religious, and societal environment which can be viewed as evidence of objectification and negative gender stereotyping. In her study of fifty three women from 34 countries, she showed that secrecy was a defining feature of many women's narratives. As the story of menstruation is almost without exception passed from woman to woman, Uskul's study supports the findings of Ussher,

Johnston-Robledo and Chrisler that women themselves perpetuate social constructs depicting femininity in a negative light.

Lee and Sasser-Coen (1996) investigate the social construction and representation of menarche in contemporary Western societies, and report on the prescriptions tied to this bodily event through cultural models. They acknowledge the worrying existence of negative social constructs around menarche and set out to explore narratives in order to produce women as embodied, sexualized beings. In her 2010 book, Bobel, depicted as a third-wave feminist, builds on this research of the past few decades by examining feminist engagements with menstruation and the emergence of menstrual activism. She proposes involvement in a feminist movement that owns menstruation to the point of claiming the label 'menstruator' instead of 'woman'. Contrasting Bobel's self-declared 'radical' calls to action with the milder requests of Graham and Bancroft from the early nineties, identifies a trend of growing discontent with the biomedical model and its perceived associated gender stereotyping and objectification of women. Yet Graham and Bancroft (1993, p.15) explains the frustration with the disjunctions in female issues sensitively, when they summarise that, "The controversy has therefore centred on the question of whether cyclical variations in mood are a function of the biological processes involved in the menstrual cycle or rather a consequence of social learning, expectation and attribution.", and explain why this clash in opinion has real-life consequences which seem irreconcilable, "On the one hand, women's experiences of menstruation and menopause, previously ignored by the medical profession, have become the subject of serious research attention. On the other hand, medicalization encourages the idea that women experiencing cyclical mood changes are in some way 'ill', which serves to undermine their sense of self-sufficiency and self-esteem." (p.14). This quote seems to address the heart of the matter in terms of the conflict between the biomedical and social considerations of the female reproductive cycle, and is born out in several works, including that of Browne, where she considers the thorny issue of PMS/ PMDD, "…PMDD should not be listed in the DSM or the ICD at all, [we have to] recognise PMDD as a socially constructed disorder. I do not claim that there are no women who experience premenstrual distress or that their distress is not a lived experience. My point is that such distress can be recognised and considered significant without being

pathologised and that it is unethical to describe premenstrual anger/distress as a mental disorder. Further, if the credibility of women's suffering is subject to doubt without a clinical diagnosis, then the way to address this problem is to change societal attitudes towards women's suffering, not to label women as mentally ill." (Browne, p.313, 2015).

Browne echoes the rising voice of feminist literature which maintains that women's discomfort should be able to be acknowledged without women being socially constructed as inept or less than, men. Easteal (1991) in her comprehensive study of menstruation and PMS as legal defence in four countries, considers the implications of PMS as a social construct which threatens the return of biological deterministic theories of male superiority should women be seen to be at the mercy of their hormones. She explores the feminist view on gender inequality and the conundrum of either acknowledging the strain that hormonal fluxes can cause versus the societal disqualification of an entire gender due to an inability to be in 'full control' of their physiology and cognition. In conclusion it can be deduced that moods associated with the menstrual cycle are both a physiological and a socially constructed reality and that whereas trying to separate the exact points at which a woman's experience is either one or the other, might seem impossible, it is none the less of importance to be aware of both epistemological positions at all times while interacting with menstrual/ mood data.

This section was a summary of the tremendous body of work that has been done on women in relation to their reproductive cycles, as seen with a social constructivist lens and mostly from a feminist perspective. It has highlighted the metaphysical and ethical sensitivity of menstrual research and the necessity to consider the wider implication of philosophical orientation and methodology in such studies.

The following section takes note of recent research in the field of cycle-moods with an emphasis on showing the wide range of interest depicted through research studies.

2.4 More recent research in the field

It is encouraging to see that there have been more research studies reported in the field of menstrual cycle related moods and behaviour over the last two years than during any other time period reviewed. The research discussed in this section is most closely aligned with the main premises of this study in terms of investigative interest as well as study design and data analysis. The section starts with an overview of research studies that looked specifically at the premenstrual period, followed by studies which are now starting to look at and advocate for the inclusion of the whole cycle in menstrual/mood research. Once studies that look at all cycle phases have been noted, the review moves on to various factors that have been linked to cycle phases before it considers what factors might influence or have an effect on menstrual moods. Considering the environmental stressors that influence mood naturally leads on to a contemplation of how menstrual cycle related moods impact on the quality of life of women.

In the last few paragraphs, the emphasis in this review proceeds to matters more closely related to research design itself, namely the use of various research instruments such as self-report diaries. Research methodologies have slowly started aligning in the field of menstrual research, largely due to societies and bodies with this shared interest, such as the International Society for Premenstrual Disorders (ISPMD) and others who are mentioned before a contemplation of the future of data gathering and analysis through e-data (digital methods of collecting and analysing data). The 'so what' of menstrual/ mood research culminates in the value it has for women and is reviewed in the section on studies on interventions before moving to the impact of both menstrual/ moods and interventions for these on the wider family and community.

The Literature Review is concluded with a brief look at the diverse fields in which menstrual/ mood research is currently being conducted to indicate the widening of the field and the broad-spectrumed application of menstrual research.

PMS and other cycle phases

The majority of studies reviewed centre on PMS and PMDD, such as that of Chin and Nambiar (2017) as well as Pearlstein and O'Brien's (2017) on the management of PMS and Nakulan's (2017) on the management of premenstrual disorders in general. Bosman et al. (2016), Cohen et al. (2002), Craner et al. (2016) and several other papers stressed that research studies investigating cycle-related moods and behaviour should include all days of the menstrual cycle (Bosman et al., 2016) in both the data collection and in analysis (Rubinow, 2015). Craner et al. (61 participants) tested across thirty days and identified three phases: menstrual, intermenstrual and premenstrual; whereas Cohen et al. (260 participants) monitored all participants across a full cycle before introducing an intervention during the second cycle and Bosman reviewed 75 studies for the use of daily data recording during the menstrual cycle. Exceptions where all phases were indeed investigated, are most notably the work of Chung et al. who investigated the influence of menstrual cycle phases and Androstadienone (ANDR) on female stress reactions and found that female stress reactions are related to stress sensitivity with menstrual cycle phase (especially mid-follicular) being a critical impact factor (Chung et al., 2016), thus introducing the idea of cycle phases other than the premenstrual being linked to certain cycle events. Pineles et al. (2016) found that menstrual cycle phase has an influence on extinction retention (being able to suppress unsolicited memories), indicating that cycle phase influences the way women act and react, with differences noted between distinct phases. Van Reen and Kiesner (2016) investigated circadian rhythms echoing Shechter's (2012) study, finding that menstrual cycle phase does influence sleeping patterns and that there are two distinct groupings, an idea which links with Van Goozens's (1997) study and that of others (Bäckström et al., 1983) who are starting to differentiate behaviours and sensitivities according to whether women are seen to experience PMS (Slyepchenkoa et al. 2017) as well as other indicators (positive affective experiences and proceptivity) (Teatero, 2016) pointing to a differentiation between groups of women (5.6.2). So not only does Schechter's work support the findings of Chung and Pineles that cycle phase impacts women's experiences, but in addition finds that not all women react in the same way in specific cycle phases.

Factors linked to cycle phase

There is a definite increase in study findings that support the premise that moods and behaviour are linked to cycle phase, but what are these moods and other factors, besides those mentioned above? Romans et al. (2013) found that there was an association between the cycle moods tested and the menstrual cycle phase of their participants and Craner et al. (2016) found that 'symptom' ratings varied between cycle phases. Potter-Efron et al. (2016) reported that 67% of menstruating alcoholics in their study on aggression, family violence and chemical dependency, related their drinking with menstrual cycle phase and were aware that alcohol is absorbed into the blood stream faster during the premenstrual period. Potter-Effron's study is important as it indicates that not only do women feel different during specific cycle phases, but these feelings evolve into behaviour that is then markedly differentiated between cycle phases. Matejovica et al. (2016) investigated attitudes about sexual identity; opinions about sexual activity and satisfaction with sex life and found that research into the correlation between female hormones and behaviour can be helpful in identifying "insufficiently known relationships" between female physiology and psychology (Matejovicova et al., 2016, p.5). Matejovicova, like Potter-Effron, felt that 'fore-warned is fore-armed' and was hopeful that empowering women with information about when in their cycles they might be most vulnerable to risky behaviour, would assist women in better planning and ultimately ensuring their health and safety. Rossi and Cesaroni (2015), in their study on the role of estradiol in learning and memory, confirmed that ovarian hormones regulate a wide variety of non-reproductive functions and that estrogen has a number of effects on cognition and brain function. Rossi and Cesaroni's contribution is a valuable one in terms of women's rights as the partial or full removal of reproductive organs has long been a too often used medical procedure which disregards the importance of women's sexual biology as part of their identity. Starting from a place where it can be shown that the reproductive organs do not have a single purpose only, introduces a viable medical concern in terms of its removal without a life-threatening cause. This was confirmed by Pletzer et al. (2016) in their article on brain networks, where they state that emotion processing, olfaction, audition, vision and coordination relates to a variety of cognitive functions which are menstrual cycle phase dependant (Pletzer et al., 2016) and by Mačiukaitė et al.'s (2016) study on the effects of menstrual cycle

phase on the processing of emotional images. It is encouraging to note progressively more studies are monitoring their participants through all the menstrual cycle phases and finding links such as these mentioned above as well as that of Wolfram et al. (2011) who state that although the cortisol awakening response (CAR) has become a standard tool for stress research in ambulatory settings, their study is the first to measure CAR during different menstrual cycle phases.

Influences on menstrual moods

Both Craner et al. (2016) and Simon et al. (1985) examined the effects of being self-focussed on the experience of PMS, concentrating on the well-held belief that women who are more sensitive (also referred to as anxiety sensitivity) and more prone to mood disturbances in general (Kruger & Botha, 2011), tend to report PMS more often and to a greater intensity, than women who are less self-focussed. Craner et al. (2016) found that self-focussed attention (SFA) did play a role in the intensity to which participants experienced PMS 'symptoms' whereas Simon et al. (1985) found that menstrual 'symptom' reporting might be influenced more by cultural beliefs and stereotypes than by self-focus. Craner and Simon's findings indicate that PMS is not a stand-alone syndrome as postulated widely in medical writing, but rather a social construct which is highly interpretable and open to influences from cognitions, personality and societal beliefs. So, for example, Cohen et al. (2002) found that cigarette smoking and working outside the home had a similar influence on the intensity of the PMS experience whereas Romans et al. (2013) reported that physical health; perceived stress and social support were strong predictors of mood. Interestingly, Wetherill et al. (2016) found that progesterone protected, whereas estrogen made women more vulnerable to smoking (for example, having a cigarette when they had given up smoking). I think this indicates the holistic nature of human physiology and psychology in that the endocrine system has a definite impact on moods and cognitions and so do moods and cognitions have an impact on our physiology and psychology. Environmental or outside factors and intrapsychic factors both come into play where moods are concerned and the extent to which one or the other type of influence dominates is individual and even so, dynamic or transitory.

In terms of the influence of cycle related moods on quality of life, Rubinow (2015) was emphatic that women with PMDD tend to be misunderstood in their social context leading to rejection and alienation and resulting in poor quality of life. What is unclear in Rubinow's study is whether the study participants might have precipitated alienation from their social group prior to displaying PMDD features and that the initial rejection might have led in some part at least, to women developing behaviours which would later be diagnosed as PMDD 'symptoms'. Rubinow's perspective was supported by Malary et al. (2015) who found that feelings and behaviours, in Malary's case, of low libido ascribed to cycle related moods, led to low levels of life satisfaction overall and emphasised that sexual desire was a noticeable predictor of quality of life. Kapur and Narula (2016) similarly found that PMS positively correlated with reduced productivity and social disability which had a negative effect on both health and quality of life. Although it is therefore difficult to ascertain which came first – cycle related moods or moods which were later associated with cycle phase, these studies indicate a perceived relationship between moods and the monthly menstrual cycle which have an impact on women's quality of life.

Research instrument usage as reflected in the literature review

As far as research methods in this field are concerned, using concurrent self-report diaries and including blood tests (or some sort of cyclical monitoring) alongside psychometric instruments to determine moods, as initially introduced by Abplanalp et al. (1979b) and explored by Freeman et al. in 1996, has become a well-accepted norm (O'Brien et al., 2011). This implies a combination of quantitative and qualitative data gathering which results in multi-method studies such as that of Cohen et al.'s (2002) which took cognisance of lifestyle characteristics; gynaecological history; psychiatric morbidity and medical conditions. Bosman et al. conducted a review on daily ratings of 'symptoms' (through the use of diaries) in PMDD studies and found that they were a valuable and important tool (Bosman et al., 2016). Van Reen and Kiesner (2016) encouraged the use of electronic data gathering through daily self-reporting and Gervais (2016) recommended diary use in gathering menstrual cycle related mood data. The move towards concurrent,

daily gathering of data across all days of the cycle is a common thread running through these studies and with the proliferation of phone applications, this has become a far more accessible research goal.

In terms of the psychometric instruments that are currently being used in menstrual research, the POMS is still used (Wolfram et al., 2011) and Ilhan et al. (2017) recently also used: the Beck Depression Inventory; the PMS Daily Record of Severity of Problems; the Female Sexual Function Index (FSFI) and the Female Sexual Distress Scale-Revised (FSDS-R), whereas Reuveni (2016) favoured the Premenstrual Symptoms Screening Tool (PSST) and the Difficulties in Emotion Regulation Scale (DERS). Teatero (2016) utilised a similarly menstrual cycle specific instrument, namely the Women's Reproductive Experiences Questionnaire (REP) in her PhD thesis on 'Women's reproductive experiences and hormones: patterns of affective, sexual, and physical well-being', while Matteson (2017) made an impassioned plea for the incorporation of patient-reported outcomes (she utilised the Patient-reported outcome measures [PROMs]) and 'harmonizing' the use of questionnaires in research and clinical care to improve patient-centred care delivery for women and improve the generation of evidence-based guidelines in evaluation and treatment. Although the use of disparate methodologies in menstrual cycle research is commonly criticized, one has to also acknowledge that studies are nuanced and researchers are pursuing their own specific interests and as a result different instruments suit certain studies and not others. Perhaps it is time for greater global collaboration through which studies might be conducted in diverse countries and research settings simultaneously, thus aligning methodologies and use of research instruments and contributing ultimately to larger and more accurate data sets. Some such collaborations are discussed below.

Societies focussing on menstrual cycle research

A group of researchers who had been investigating cycle related moods (mostly in relation to PMS and PMDD) held an inaugural meeting in Montreal in 2008 and from there grew the establishment of the International Society for Premenstrual Disorders (ISPMD). The group consisted of some of the most cited scientists in the field, including Lorraine Dennerstein, who has been focussing on endocrinology and

the menopausal transition (Dennerstein et al., 2000); Meir Steiner, who co-designed the Born-Steiner Irritability Questionnaire (Steiner et al., 1980); Jean Endicott, a psychiatrist who has focussed on symptoms and diagnosis of psychiatric disorders including PMDD (Spitzer et al., 1978); C. Neill Epperson and Elias Erikson, who have focussed on the role of sex hormones in psychiatric disorders including PMS and PMDD (Epperson et al., 2002) (Eriksson et al., 1995); Uriel Halbreich and Ellen Freeman, who specialized in PMS/ PMDD (Halbreich et al., 2003) (Freeman et al., 2000) and Khaled Ismail and Nicholas Panay who went on to publish articles on subsequent findings and resolutions by the Montreal group (O'Brien et al., 2011) (Ismail et al., 2016). The group included Teri Pearlstein (Pearlstein et al., 2000), Tjorborn Bäckström (Bäckström et al., 1983) and Kimberley Yonkers (Yonkers et al., 2008), all three of whom have been leaders in the field of cycle related hormones for at least two decades and have published seminal works in this study area. This group, and others, such as John Bancroft, David Rubinow and Diana Sanders, have co-written a slew of articles[8] from their respective professional perspectives: psychiatry, gynaecology; endocrinology, pharmacology and psychometrics/ diagnostics. They have mainly focussed on the aetiology, diagnosis and pharmacological treatment of PMS/PMDD although the Montreal papers show a shift towards unification of method design and research as well as specifically advocating for the inclusion of daily self-report diaries in menstrual cycle research (O'Brien et al., 2011).

There are other cells of scientific study concentrating on the menstrual cycle, such as the Society for Menstrual Cycle Research, with their official journal, ‘Women’s Reproductive Health’, which was founded in 2014 in Illinois, USA (Bobel, 2016). The American Congress of Obstetricians and Gynecologists (ACOG) are active in the field of menstrual cycle related research as is the Karolinska Institute (Sweden) (ACOG, 2017) (Karolinska Institute, 2017). The Foundation for the Study of Cycles is an interesting movement, looking at all kinds of cycles, including menstrual cycles, but mostly concentrating on economic cycles (Dewey, 1944). As is the nature with

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[8] (Yonkers et al., 1997; Freeman and Halbreich, 1998; Pearlstein et al., 2000; Halbreich et al., 2002; Cohen et al., 2002; Halbreich et al., 2006; Halbreich et al., 2007; Yonkers et al., 2016)

groups in society, these different societies drive their own agendas, and these are disparate. One could claim that the overall aim is to help women, but the deep-rooted conflicts in beliefs and method might be too great a divide to cross in terms of envisaging a future where all menstrual cycle related research could be harnessed to pursue the same ideals.

Using electronic data gathering methods

The Quantified Self is an international movement interested in measuring anything to do with human physiology and behaviour, with some researchers focussing exclusively on menstrual cycle data. The Quantified Self members use diverse methods of data collection, including digital data gathering such as smart phone applications (apps) (The Quantified Self, 2015). Sandstrom et al. (2016) recently published an in depth article on the use of electronic means to gather patient data, stating that periodic doctor's visits can only ever provide course-grained data and advocating for the use of global positioning systems (GPS); accelerometer and anonymized call logs which could combine momentary assessments and sensor data to give a fuller clinical picture. They talk about machine-learning algorithms which could predict outcomes and how the use of these incorporated with gamification features make apps engaging, resulting in continued use and thus, rendering of large scale data. One of the smart phone applications used by their team was downloaded 38 000 times worldwide (Sandstrom et al., 2016). Kauer et al. (2011) investigated the use of apps in 2011, realising its appeal for adolescents and Chiyoung and Nam (2016) considered the use of the 'Happy Healthy 20's app' as a tool for identifying women's premenstrual cycle events and providing tailored care. Thompson (2016) wrote her Master's thesis on women's attitudes towards menstrual cycle apps in 2016, while Jones and Moffitt (2016) started exploring the ethical implications of app usage and Veiga and Ward (2016) were concerned about the fact that patient-facing professionals capable of articulating appropriate sensor-enabled solutions, generally lack the full range of skills to develop such systems. They presented their paper at the first International Workshop on Mobile Development in Amsterdam in 2016, drawing attention to the rise of the use of smart phone applications and other digital tools in health, aptly named 'M-Health' (Veiga & Ward, 2016).

There are certainly a wide range of commercial menstrual cycle diary apps available but as can be seen from the studies above, electronic data gathering and information distribution is a relatively new field which offers challenges alongside its various advantages. The University of Cape Town is currently in the throes of negotiating the world of online learning and electronic data handling and one of the main stumbling blocks it is encountering, as stated by Veiga and Ward (2016) is that its expert clinicians do not have the time or skills to develop digital platforms of engagement.

The next section looks at another factor in menstrual research which helps to position the current study, namely moving from data gathering methods to the actual outcomes of research studies.

Management of cycle related mood concerns

There are three broad categories of cycle mood management which have prominence in the field: pharmacological, psychological and alternative treatments. Leahy (2017) is still a supporter of purely pharmacological interventions for PMS and proposed that semi-intermittent dosing can result in 'symptom' stability, whereas Hunter et al. (2009) found that the use of fluoxetine and that of cognitive behaviour therapy (CBT) were equally effective in treating women with PMDD, but that those treated with CBT had better results over the long term. Worsley et al. (2016) questioned the use of estrogens and androgens, claiming that there is no proof for the successful use of either in treating menstrual disorders and Masoumi et al. (2016) investigated more innocuous supplement usage such as Vitamin B6 and calcium as PMS management alternatives. The conflictual beliefs of feminist and bio-medical groups as to whether PMS and PMDD are in fact mental disorders that should be treated medically or social constructs that should be addressed through political means, is a conundrum which several researchers have pondered (Graham and Bancroft, 1993; Ussher, 1992) and leaves a question mark over the ethics, applicability and potential value of especially pharmaceutical intervention in women who report perceived severe cycle events.

Both Takemoto and Beharry (2015) and Cohen et al. (2002) advocated for early diagnosis and treatment of cycle related moods which were experienced as negative and unsettling by their participants, and Fontana and Badawy (1997) noticed that their unaffected control group utilised coping skills such as situational redefinition more than their PMS group – implying that women with better coping skills can be less intrusively affected by cycle related moods. This finding was echoed by Givshad et al. (2016) who found that knowledge about PMS was a positively correlated mediator for the severity of PMS 'symptoms'. Sirakov and Timova (2015) commented that the treatment of cycle related moods is still mostly limited to the prescription of anti-depressants and oral contraceptives, both of which have a broad spectrum of side-effects ranging from somatic symptoms such as bloatedness, to serious psychotic behaviours including suicide in spite of the fact that (far less harmful) therapeutic interventions such as Maddineshat et al.'s (2016) group cognitive-behavioural therapy (CBT) sessions and Rani et al.'s (2016) Yoga Nidra intervention are available and showed a significant positive difference in their respective study groups.

Maddineshat et al. (2016) found good results with group CBT and Rezaee et al. (2017) did ground-breaking work with similar positive results using spousal support for PMS affected couples. Ussher and Perz (2017) made use of three groups in their study testing the efficacy of no intervention, against CBT for individuals and CBT for the woman affected by PMS and her partner. As with Rezaee et al.'s (2017) study, Ussher and Perz (2017) found that including the partner in the intervention gave the best results compared to no intervention, or CBT with individual intervention only. One of the concerns, from the feminist camp, about calling a set of cycle related moods a 'syndrome', is that it can lead to stereotyping, objectification and marginalising of women (Lee and Sasser-Coen, 1996), which has certainly held true, historically. However, the above research implies that there is a possibility for a positive outcome in addressing social constructs when the initial intervention includes another who is close to the affected woman and the intervention is conducted with sensitivity and with the agenda of de-stereotyping. Lustyk et al.(2009) did a review on cognitive-behavioural therapy for the treatment of PMS

and PMDD to outline the wide application of treatment modalities already in place and Broderick (2005) put forward a thoughtful and comprehensive treatment plan centring on mindfulness and coping. Asadi et al. (2016) explored the effect of relaxation and positive self-talk on women who experience PMS while Abdalla and Gibreel (2016) found that even programmes that focussed only on increasing knowledge about menstrual cycle associated physical and psychological manifestations (cycle events), reduced PMS 'symptoms' overall. Reuveni et al. (2016) added their voices to the call for more individually tailored treatment protocols in treating premenstrual syndromes, especially pertaining to emotional regulation. From these studies it is clear that the range of options for women who struggle with cycle related mood dissatisfaction is wide and that the emphasis should not be on 'female malady', but rather on psychological discomfort which may be linked to certain cycle days only in as far as it can help with planning and coping.

Contextualising the impact of successful interventions with cycle related mood dissatisfaction on the lives of women globally, the direct and indirect costs of PMS are explored by Borenstein et al. (2007) in the Journal of Occupational and Environmental Medicine and aligns with Ducasse et al.'s estimates (2016) who used the Global Burden of Disease model to calculate years of disability (DALY) due to PMS being nearly 15 million days annually in the United States alone. This is a contentious study as menstrual cycle moods are constructed as a syndrome and a disease, but is nonetheless mentioned here as it speaks to women's psychological well-being and desire for relief from perceived cycle related mood dissatisfaction.

Social discourses

The work of Rezaee et al. (2017) on spousal support, as well as that of Van Iersela et al. (2016) and Tartagni et al. (2015) introduces the wider context of menstrual cycle related issues, especially the social discourse around menstruation and the role of children, men and society in conversations about menstruation. Newton (2016) wrote the book, 'Everyday Discourses of Menstruation: Cultural and Social Perspectives' in which she explores menstruation as both an everyday and sensitive subject, delving into the history of attitudes about menstruation from Pliny to

twentieth century debates about menotoxin[9] . She explores the social and cultural dimensions of menstruation, looking specifically at the use of humour, jokes, popular knowledge, folklore and euphemism and encourages discourse on how these impact on the menstruating body. Peranovic and Bentley (2016) similarly look at the stigmatization of menstruation as well as menstruation as part of relationships and open versus closed communication as reflected in social commentary. Sveinsdóttir's (2016) Icelandic study interrogated the role of menstruation in women's objectification, using multiple instruments to elicit a comprehensive overview of self-objectification: the Self-Objectification Questionnaire, the Objectified Body Consciousness Scale, the Belief and Attitudes Towards Menstruation Questionnaire and the Suppress Menstruation subscale of the Attitudes Towards Menstrual Suppression Questionnaire. Roberts et al. (2003; 2013) and Johnston-Robledo (et al., 2002 and 2004) also explored these issues and added to the growing body of work re-normalising menstruation.

A growing field

Finally, it is elucidating to get an overview of the different disciplines and wide areas of interests which are being related to menstrual cycle related moods in current research. The following is a list of research reviewed by me where menstrual cycle was referenced as a primary concern -the influence of menstrual cycle phases on: person perception/ social cognitive functioning (Macrae et al., 2002); cooperative preferences (Anderl et al., 2015); physiologic functioning during behavioural stress (Stoney et al., 1990); women's preference for composers of more complex music (Charlton, 2014); spontaneous intrusive recollections (Ferree et al., 2011); pain and emotion in women with fibromyalgia (Alonso et al., 2004); gender specificity of heterosexual women's sexual arousal (Bossio et al., 2014); cardiovascular reactivity to mental stress (Shenoy et al., 2014); post learning stress and memory (Zoladz et al., 2015); social stimulus perception and self-evaluation

[9] In his article entitled, 'Menstrual toxin: An old name for a real thing?', Dr Nelson Soucasaux explains that 'menotoxin' is the word used to explain the belief that women who are menstruating are 'poisonous', as captured in folklore about ineffective yeast, dying flowers and other anomalies, that occur around women who are menstruating (Soucasaux, 2001).

(Alagna and Hamilton, 1986); exercise metabolism (Oosthuyse and Bosch, 2010); bipolar mood symptoms (Shivakumar et al., 2008); physiological and cognitive responses to intravenous nicotine (DeVito et al., 2014); sensitivity to insulin (Zykova et al., 2010); economic choice and rationality (Lazarro et al., 2016); shopping behaviour (Issar, 2015); the female (singing) voice (Vigil, 2015) and women's physiology in terms of cardiac function (Kaplan et al., 1990) are some of the more recent topics reported on.

Several articles pertaining to working with adolescents and women with intellectual disability in relation to menstrual cycle related issues were found, positioned alongside the paragraph above, reference to these studies are included for the sake of showing the wide scope of studies within the field, but as it falls outside the scope of this study, only three will be referenced here, namely Van Iersela et al.'s (2016) study on the impact of menstrual cycle-related physical manifestations on daily activities and psychological wellness among adolescent girls and Tartagni et al.'s (2015) study on vitamin D supplementation in addressing mood disorders in girls with PMS. Tracy et al. (2016) published an article on menstrual issues for women with intellectual disability which is sensitively and sensibly written and containing a diverse and useful range of resource references.

In addition to the studies themselves, it is enlightening to see where they are being conducted. In recent years, as can be seen from the last section of the Literature Review, researchers globally have shown an interest in issues throughout the menstrual cycle. The work referred to herein originated from Pakistan, Korea, Israel, India, Iceland, the Slovak and Czech Republics, the USA, Canada, Turkey, Bulgaria, Iran, Italy, South Africa and The Netherlands.

In conclusion, this literature review was conducted to explore the context in which the research study was conducted with a specific focus on addressing the research questions which ask how women feel and act during the different days of their menstrual cycles and how could women benefit from understanding the feelings and behaviours that they associate with their different cycle days?

The literature search concentrated on the history of menstrual cycle research particularly as it pertains to menstrual cycle phases and PMS and then moving on to more recent research which is interested in the relationship between moods and all days of the menstrual cycle. This first, contextualising, section of the literature review informed decisions about semantics and constructs, specifically about the terms, ‘PMS’; ‘menstrual cycle’ and ‘symptoms’, emphasising that this study would utilise measuring moments in the form of cycle days rather than phases.

In the second section, focussing on literature about the development of research methods relevant to this study, the exploration of the whole cycle was re-emphasised and specific methods such as using concurrent testing and making use of self-report diaries were further highlighted. Further key features of this study which were informed by this particular part of the literature review included the relevance of irritability as an important feature of cycle related moods and utilising a sample group from the wider population rather than a sample taken only from a student or health professional population.

In the third section of the literature review the focus moved to the different lenses through which menstrual cycle research can be viewed, emphasising the constructivist-interpretivist philosophies alongside feminist perspectives. This section explores issues around cultural stereotyping, biases, stigma and secrecy as they relate to menstruation and the body of work that created narratives which question the biomedical or even patriarchal models of menstrual research and served to inform the metaphysical and ethical sensitivity of this study.

In the last section of the literature review, I look at more recent research in the field of menstrual cycle research which focussed the investigative interest of the study and informed the study design and data analysis methods in terms of using whole cycle data and using a self-report diary. This section further elucidated which factors might influence or be influenced by menstrual moods and provided a consideration of environmental stressors in cycle related moods. It further

informed me on the different types of existing interventions in cycle related mood dissatisfaction and explored other factors in post-research reality such as the impact of cycle related moods on family and community.

As will be seen in the chapters below, this reviewed research impacted on the thinking around how the study was envisaged, from outset to conclusion and incorporating all facets of the process from philosophical underpinning through data gathering, analysis and dissemination of the results.

3 Theoretical framework

The following chapter presents the philosophical underpinning of this study, followed by a brief description of the theoretical framework and methodology employed. Chapter Four will discuss the actual research design in terms of methods for data collection and analysis.

The theoretical framework largely adopts the principles of systems theory. Systems theory countenances transdisciplinary study and embraces multi-methods approaches in the investigation of the human experience. In so doing, it creates analytical scope for understanding how systems (however defined) and patterns work together to make sense of experiences, and provides direction on possible methods to investigate these. Importantly, the theory not only recognises phenomena as dynamic and intersectional, it also assesses the relative stability of patterns over time.

3.1 Philosophical underpinning

Philosophy had its beginnings in the 5th century BC in Greece (Zeno, Pythagoras, Socrates, Plato, Aristotle). What we view today as the philosophical underpinnings of social science was seeded in that time and progressed after the French Revolution or period of enlightenment during the latter part of the 18th century (Bacon, Descartes, Locke, Spinoza, Diderot, Hume, Kant, Rousseau, Voltaire). But it is only really during the twentieth century that what we identify today as the main development of social science theories, took place. The natural sciences and mathematics were positioned as positivist (atheoretical) and any exploration that fell outside of the world of empirical testing was suspect, yet politics and economics (Marx, Engels) were being investigated rigorously as thinkers sought theories that captured systems which could be defined and measured so as to either be avoided or replicated. At the same time, psychology branched away from qualitative inquiry (Jung, Freud) and into behaviourism (Watson, Skinner), where the subconscious mind was abandoned as quasi-scientific and experiments could echo the natural science methodologies in an attempt to legitimise this field as

‘medical’, thereby distancing itself from pastoral or non-religious spiritual practices which were scorned as unscientific. In this strife for palpable theories which could explain fractions of the world, all the major subject areas – anthropology, sociology, psychology, economics, political science and theology produced great thinkers that moved away from positivism, through post-positivism and to constructivism, interpretivism and even further to critical-ideological and post-modern paradigms. From each of these were birthed a multitude of methodologies, some of which worked well with others, and some of which split off because they could not work well with others.

Choosing a theoretical underpinning or anchoring paradigm for a research study now calls for an understanding of the ontology, epistemology, axiology, rhetoric and methodology of that paradigm, or in other words – to fully be aware of what is out there in terms of philosophy and how each possible philosophy views reality and will interact with reality at a method level. In the words of Haas, “Any knowledge about the world, any epistemological truth, is a metaphysical statement to which we may apply ethical principles.” (Haas, p.1, 1992). Haas further held forth that the choice of one’s concepts to describe ideas betrays one’s ideological bias. Making the choice is complicated by what he described as a “conceptual and theoretical babel” and which Thomas Kuhn sketched as “a plethora of disparate theories” (Haas, p.3, 1992).

Anfara and Mertz postulated that theories consist of concepts, constructs and propositions, moving from the concrete to the abstract and in so doing, are profoundly helpful in understanding the experiential world (Anfara and Mertz, 2006). Agnew and Pyke (1969), and later McMillan and Shumacher (2001) were among many who discussed theory criteria and developed the debate about what social science theory is and what it should consist of, including concepts such as being consistent with the current body of knowledge and being internally consistent (Anfara and Mertz, 2006). Lincoln and Guba (2000) describe social science theories as basic belief systems that have emerged as successors to conventional positivism, stressing that inquiry can never be value free (Anfara and Mertz, 2006). Denzil and Lincoln describe the coming together of philosophical sub-

structures by stating that, “The researcher approaches the world with a set of ideas, a framework (theory, ontology) that specifies a set of questions (epistemology) that he or she then examines in specific ways (methodology, analysis).” (Anfara and Mertz, p. xxi, 2006). Creswell echoed this by arguing that the role of theory varies with the type of research design and Patton extrapolated on this by adding that how you study the world determines what you learn about the world (Anfara and Mertz, 2006).

Having positioned this study as social science research which was informed by the rich history of theory creation outlined above, how would it be described in terms of paradigm?

This study is a multi-method investigation with a largely quantitative focus and a lesser qualitative section conducted in a concurrent design, resulting in the qualification QUAN + qual as outlined by the Methods-Strands Matrix (Teddlie and Tashakkori, 2006). Both sections are seated within a constructivist-interpretivist anchoring paradigm which can be ontologically described as a perspective from which human beings are seen to live socially constructed multiple realities which are all equally valid. Epistemologically the paradigm subscribes to a highly interactive researcher-participant relationship that leads to discovered meaning and expression of experience. Axiologically the researcher’s values are expected and should be discussed alongside the thesis findings. The rhetorical structure of this paradigm prescribes that the writing is in the first person with adequate voice given to participants in a discovery oriented approach (Ponterotto, 2010). Both the contructivist-interpretivist and the critical-ideological paradigms promote meaningful, collaborative and prolonged contact between researchers and study participants.

During this study, I was aware of the very personal nature of the information that participants would have to share with me as well as the level of commitment they would have to have towards the study to continue submitting data over a two to three month period. With this in mind, the research design was nestled within the value system of constructivism and structures were put in place to facilitate

relationship building. This can be seen most clearly with the intake and feedback interviews which were conducted as informally as possible, with ample time allowance. Relationship building was further facilitated through brief comments made by me when participants reported daily events (via e-mail) that were particularly disturbing or joyous to them.

The main method of inquiry was quantitative through the use of structured questionnaires. The intrinsic nature of the questions, however, makes the constructivist underpinning apparent. Other than the gathering of biographical data through the MMSQ, all other questions asked the participant to express an opinion, perspective or feeling. None of these are positivist or even post-positivist as would usually be the case with a quantitative inquiry as the questions do not assume one true approximal reality (Ponterotto, 2010).

The main focus throughout inquiry was on how women make meaning of their reality, and there is therefore no pre-supposed reality (Boyatzis, 1998). Each participant's meaning emerges through inquiry and is captured in either a quantitative expression such as a number which can be statistically aligned or contrasted with the data from other participants, or through a qualitative expression in the form of a quotation which elucidates a number or sets of numbers. Marrow, Nelson and Quintana state that qualitative data compliments quantitative research by adding descriptive depth (Ponteretto, 2010). According to Larsen and Larson, emotion is a multi-faceted construct inferred from multiple indicators (Eid and Diener, 2006). This study utilises aligned and dove-tailed modes and tools of inquiry to interrogate all accessible facets of constructed emotions experienced by participants to discover indicators that are at the root of cycle-mood junctions. Quotations collected through field notes give voice to these constructs which add meaning to the quantitative representations of the same experiences but go further by acknowledging the humanity intrinsic to each data set.

Sciarra emphasises this importance of highlighting the personal in research by putting forth that, "Not only are emotions allowed in qualitative research, they are

crucial. Because entering the meaning-making world of another requires empathy, it is inconceivable how the … researcher would accomplish her goal by distancing herself from emotions." (Ponteretto, p. 44-45, 2010). In both the qualitative and quantitative modalities, the aim was to discover relationships between constructs and not to identify causality. Constructivism is informed by hermeneutic inquiry which grapples with understanding and interpretation. Max Weber believed that problems with understanding and interpretation are encountered while unfolding the fundamental features of our 'being-in-the-world', whereas Gadamer points out that we are always immersed in traditions which provide us with the prejudices that make understanding possible. Indeed, he theorised that understanding must be seen as an open and continuously renewed fusion of historical horizons. Dilthey maintained that cultural phenomena are purposive expressions of human life which are objectified in a sphere of conventions and values which are collectively shared (Kuper and Kuper, 1985). All three of these hermeneutic theorists speak to the entrenchment of human beings in culture from which meaning is made and lived, pointing to the causal relationship between the established culture of the day and the individual perception of constructed reality.

In conclusion I would like to point out that the meaning-making of participants are accepted through constructivism as a given, but no exploration is pursued into the culture which embeds them or of the potential causal relationship between that culture and the reality they have each constructed.

The next section will consider the methodology for this study in terms of the disciplinary scope of the research, the multi-methods approach and systems theory.

3.2 Methodology

This section deals with the methodology of the study in more detail, starting with a description of the disciplinary scope of the research, followed by an outline of the multi-method approach and concluding with the methodological paradigm that informed the methods (discussed in the next chapter) utilised in this research.

The constructivist-interpretivist paradigm forms the underpinning of this research and determines the key philosophical parameters: ontology, epistemology, axiology, rhetoric and methodology, as outlined above. Merriam emphasized that we would not know what to do in conducting our research without some theoretical framework to guide us, whether it is made explicit or not, and calls the theoretical framework the “structure, the scaffolding, the frame of your study” (Anfara and Mertz, p. xxiii, 2006). Maxwell outlines the framework as a conceptual context which contains the goals, experiences, knowledge, assumptions, and theory the researcher brings to the study and incorporates into its design and Flinders and Mills expands on this by pointing out that the theory underpinning a study is pragmatic and bound with the study from conception to conclusion (Anfara and Mertz, 2006).

The methodology or ways of obtaining knowledge and evidence is inductive, meaning that the research first looks at a multitude of instances before it attempts to draw some conclusions about the phenomenon under investigation. The resulting findings are descriptive and interpretive, representing the lived experiences as constructed and then reported by participants. These lived experiences are seen as having originated from multiple sources (or sub-systems) as described in Lang’s bio-informational theory (1979), namely the behavioural, language and physiological elements. All of these elements are addressed through various methods of inquiry as they constitute elements of value in terms of their knowledge contribution and are each seen as a channel that carries potential information about the emotional state of the person (Eid and Diener, 2006).

Haas held that studies which combine both attitudes and physical attributes are cast in a dualist paradigm and that studies which are conceived in dualist terms can answer more sophisticated metaphysical questions than those using monist designs, because they admit “twice as much of reality” (Haas, p.9, 1992). Haas feels that holistic approaches offer far more depth than monist designs.

3.2.1 Disciplinary scope of the research

This section looks at the disciplinary scope of this research study. It is an exploration of the relationship between the menstrual cycle and moods. While the assessment of mood(s) is psychologically based, this study reflects on the presence and influence of hormones which necessitates references to content housed best within the fields of endocrinology, neurology and gynaecology (Galea et al., 2008). As stated by Easteal (1991, p.4), "…[menstrual cycle/ mood] 'experts' include endocrinologists, psychiatrists, general practitioners, gynaecologists, sociologists and more". These fields are encompassed by the emerging interdisciplinary field of psychoneuroendocrinology, which provides an appropriate disciplinary home for this research. It is important to note that there seems to be few psychologists, however, who are currently aligned with this umbrella interdisciplinary construct.

Thus, a multidisciplinary team of consultants was assembled to advise on the neurological, gynaecological and endocrine aspects of the study (Holger, 1998). The focus of the study, however, remains psychological as traversing beyond this discipline would require the mastery of a number of other clinical fields that converge on the subject of female hormones. For the sake of clarity, it is important to point out that any study dealing with a woman's menstrual cycle, by implication has to reflect on the hormonal substrate. To accommodate and facilitate a rudimentary outline of the endocrine processes informing an average menstrual cycle, section 2.1 (A background on menstrual cycle phases and PMS) was included in the study. I do not, however, claim to have medical knowledge nor that medical knowledge is required in order to interrogate the relationship between a woman's menstrual cycle and her moods. No assumptions about any participant's hormones or hormone levels are made in this study other than my own pre-suppositions which are bracketed and presented in the research questions, study motivation and aims and discussion. The same can be said for phases of the month and to facilitate the narrative of the thesis, any reference to timing in a cycle was labelled only with the days when an experience occurred, for example, during days 11-14 ('menstrual phase' is the exception as participants knew when they were menstruating). Day one is always the day that a woman starts menstruating and every day of the cycle that follows, follows on from day one, until she starts menstruating again, when the

previous cycle ends and she starts counting from day one again. Participants were all menstruating and able to determine day one through the onset of bleeding.

Finally, as the study straddles both the natural and social sciences, qualitative data was collected not in an attempt to create a new framework as might be the case with for example, grounded theory, but rather to augment the quantitative findings by providing texture and a human dimension reflecting the lived experiences of the participants. Accordingly, the design follows a multi-method analysis in line with social science trends (Johnson and Onwuegbuzie, 2004).

3.2.2 Multi-methods approach

In order to better understand the relationship between the menstrual cycle and mood, this research adopted a multi-method approach. The use of both qualitative and quantitative methods allowed for the dynamic analysis of patterns over time (based on the principles of systems theory). Using the mixed method typology of Teddlie and Tashakkori (2006), the study can be positioned as a sequential quasi mixed design which answers exploratory and confirmatory questions chronologically in a pre-specified order. In quasi mixed designs, researchers work within one approach (for example quantitative) primarily, gather and analyse data associated with the other approach in order to triangulate data sources, or in order to answer different aspects of the same research question. If the design is 'mixed' only in the methodological/analytical stage, and not in the conceptualization or inference phases of the study and is without deliberate integration, it should be called a quasi-mixed design. According to Teddlie and Tashakkori's (2006) three main typology elements, this study used both quantitative and qualitative methodological approaches, incorporating four distinct data gathering phases (or strands) which were operationalised sequentially, although there was a concurrent element in the simultaneous collection of daily data through the SRD and weekly data through the BRUMS, MDQ and BIQ. The four phases or strands were: 1.) Completion of the MMSQ; 2.) Initial interview; 3.) Collection of daily and weekly data; 4.) the feedback interview. The study is termed 'quasi-mixed' as there was no

convergence of qualitative and quantitative data, in other words, the data was not integrated through conversion from one to the other method (for example, from quantitative to qualitative data). According to Sandelowski, this type of study is called a multi-method rather than a mixed method study, and her terminology will be applied throughout this text as it is felt that this term is more accessible than Teddlie and Tashakkori's technical terminology (Tashakkori and Teddlie, 2006).

The multi-method approach thus provided an analytical nexus from which to better understand this phenomenon, particularly since, as illustrated in the Literature Review, the medical sciences tend to favour quantitative data (Mehta and Josephs, 2011) and the social sciences have a tendency towards the use of qualitative data (Becvar and Becvar, 2000). Thus, integration of data through diverse methods not only enhances the data at the convergence, but provides cross-sectional perspectives that can assist in clarifying similarities and differences (Eid and Diener, 2006). Simply put, multi-method approaches 'triangulate' methods, simultaneously employing qualitative and quantitative measures and/or different instruments to validate findings (Mathison, 1988). Mathison (1988, p. 13) states that, "triangulation has risen as an important methodological issue in naturalistic and qualitative approaches to evaluation control bias and establishing valid propositions because traditional scientific techniques are incompatible with this alternate epistemology".

The most important data were the participants' responses to the quantitative instruments which were analysed statistically to test for relationships, but the complementary qualitative data from the interviews provided a richness of personal experience not accessible through quantitative representations. The inferences from the study were made inductively within the constructivist-interpretivist framework with the discussion including some anecdotal evidence from the participants.

As most studies focussing on psychological phenomena are multi-determined, it helps if they focus on both detecting associations between different components as well as levels of a phenomenon and on identifying individual differences through

the covariation of identified components. In this study, participants' quantitative data are used to capture rhythms and patterns in moods, whereas the qualitative data are used to expand on the intensity (or lack thereof) of these lived experiences – a dimension that could not be adequately captured by the quantitative approach. By way of example, the qualitative data are particularly helpful in, for instance, calibrating the numerical values used to rate mood intensity and in providing more depth to the cross-method analysis of individual patterns. Particular to this study is the convergence of data across different measuring instruments (section5.6) but variance according to different 'measuring moments'. This means that data is gathered using different methods, resulting in slightly different perspectives. Looking at the same phenomena from different perspectives, contributes to more reliable data. Variance in 'measuring moments' further deepens the dimensions of the data and contributes to their reliability. The question of whether a measuring instrument produces data that indicate a trait, or merely reflect the method used, can also be addressed by comparing findings from the quantitative data gathering methods to the qualitative data gathered, such as those from interviews. Cross-referencing the qualitative and quantitative data in this way can counteract the response specificity of the quantitative data.

Denzin and Lincoln (2000, p. 16) state that mixed method studies engender a "crisis of representation". In a multi-method study such as this one, where there is no convergence of the quantitative and qualitative data, the challenge is to represent the findings in a parallel yet supportive manner while still maintaining the main research narrative. As a mainly quantitative study, the lay-out of this thesis follows the basic IMRAD design, namely: Introduction; Methodology; Results and Discussion, with the following modifications: the Literature Review was removed from the introduction and positioned in its own chapter; as a social sciences study, a section on theory (or philosophical underpinnings) was added to the methodology chapter; the research design was separated from the methodology section and placed in its own chapter and the qualitative and quantitative data were placed in distinct chapters. Furthermore, each chapter contains its own introduction, main body and conclusion to facilitate the couching of the multi methods within contained units.

As introduced earlier, systems theory supports the choice of multi methods employed in this research and provides the philosophical underpinning for this study. Systems theory is discussed below.

3.2.3 Systems Theory

This section outlines the basics of (first order) systems theory at the hand of systems' principles which were utilised in the design and execution of the study methodology.

A woman cannot be held to be only the sum of her parts. As a whole, she functions through the interaction of all of her parts, as suggested by 'psychoneuroendocri-nology', the term created to define this study area. In fact, Lee and Sasser-Coen (1996) describes 'self' as inherently multiple. Until the nineteen fifties, the predominant research approach in contemporary science has been to structure experimentation within an 'atomistic' framework (Iannone, 2001). Philosophical atomism is a reductive argument not unlike Cartesianism which holds that a phenomenon to be studied has to be dissected into its individual elements and these parts are analysed and studied in order to provide a better understanding of the phenomenon as a whole (Grosholz, 1991). In line with the thinking of the time, it provided great advances in science and technology during the latter part of the nineteenth and first part of the twentieth century but as our understanding of the known world becomes more complex and the interrelatedness of everything increasingly self-evident, the limitations to this approach have become clear.

Cartesian study design takes for granted the notion that it is both possible and desirable to isolate parts of the world in a way that allows study of behaviours in an isolated condition and as a result discover important properties of the 'organism' as a whole. The relationships between the menstrual cycle and moods become apparent at the convergence of brain, hormones, physiology and psyche. The system cannot be divided into independent parts or into discrete entities of inquiry. The effects of the behaviour of some parts on the whole depend on what is

happening to other parts (Fuenmayor, 1991). A problem arises when a reductionist approach is used to analyse other kinds of systems such as philosophical, social, and psychological systems. Unfortunately, these other types of complex phenomena do not readily lend themselves to such analysis because, in contrast to physical or chemical experiments, they are composed of hybrid structures. Similarly, a woman as a part of her experiences cannot be separated from her wider social system which has major influential forces and diverse environments: her family; her work; her community, and her society (Ackerman, 1967). This open structure cannot be diminished to a closed experimental situation normally used to trace cause and effect relationships in the laboratory. Typically, experimental methods have attempted to limit the number of variables which might influence the object or process under investigation. However, in complex systems, many variables exist in relationships which make it practically impossible to ignore some and isolate others because of the cumulative effect which they exhibit in relation to one another; the whole is more than the sum of the parts.

It is within the context of this larger whole that the understandings gained from this study will have an impact. For a woman to understand her own cycle, makes it possible for her to anticipate and adjust for its effects, and as a result feel and act in a way that has a positive impact on her own state of mind, her family, her work colleagues and so on, in ever-widening circles. Seen through an atomistic lens, the small and varied parts that make up an individual's menstrual related emotional experiences could be magnified and exaggerated by virtue of their apparent independence, and in so doing insight gained through making meaning by observing the system as a whole, could be lost.

In response to the need for a new paradigm for the investigation of complex systems, there has surfaced a variety of cybernetic, information-theoretical and general systems approaches which have been brought together under the broad banner of General Systems Theory. The concern of this discipline is to identify sets of theoretical structures based on the notion of 'whole systems'.

These theories are based on the identification of general systems principles which may be applied to any system irrespective of the nature of that system or of the elements of which it is composed. The field of general systems is concerned with both theories about generalized systems and generalized theories about systems. Central to its development is the identification of correspondence in general systemic principles among systems and the identification of structural similarities and isomorphisms between systems and disciplines.

The central theme of this thesis is the exploration of the relationship between a woman's menstrual cycle and her moods, set against the implicit understanding that her body is a closed system which forms part of a much wider, open system, extending ultimately to her community and society. The position taken is that this way of viewing menstrual moods offers distinct and demonstrable advantages over traditional models of inquiry, viz., those emphasizing reductionist analysis. The unique contributions of general systems theory, centred on the integrity of the emergent properties of the whole system, appear to offer several distinct advantages. This does not deny the value of the other approaches, rather it builds on them and subsumes them into a more viable, flexible, and comprehensive structure.

Where phenomena are taken to be a part of a larger whole, synthetic thinking is required to explain system behaviour (Georges, 2010). 'Synthetic thinking' refers to the principal of trying to understand the wider context before looking at the individual. Once the individual concerned comprehends the wider systems, they are asked to extrapolate on the behaviour of the system (Anderson and Carter, 1990). Synthetic thinking is used in this manner to explain why the parts of the system play the roles that they do, and has its point of departure outside the parameters of a system, working inwards to discover the role of that system within this wider context and explaining the system's behaviour in this context (Atwater et al., 2005). This is referred to as a 'systems approach', and includes both qualitative and quantitative forms of inquiry such as direct observations, informal interviews, naturalistic fieldwork and inductive analysis (Becvar and Becvar, 2000).

This study takes into account a systems description of women's lived experiences which demonstrates that all the various changes which occur during the menstrual cycle may be integrated into a single whole. Such a description provides a more comprehensive overview from which to examine the differences and similarities among a group of women and the various feelings and behaviours they experience through sequential menstrual cycles. The investigation of women's lived experiences should be at the forefront of contemporary inquiry because it potentially sheds light on crucial areas in the specific fields of behavioural science and philosophy as they relate to global concerns captured in the Sustainable Development Goals (SDG's). Women are key to successful sustainable development which aligns with a systems paradigm with its commitment to a systemic, holistic, and evolutionally-directed organisational change. It will be proposed that this evolutionary direction views women as the building blocks of families and that families are seen as cornerstones of society. The development of women therefore implies organisational change which could under gird the development needed to achieve sustainability at every level as described throughout the SDG's, from ensuring quality education to ensuring food security. This is manifested as evolutionary 'self-transcendence' which is characterized by the "same aspects of imperfection, non-equilibrium, and non-predictability, or differentiation and symbiotic pluralism, which seem to govern life in all its manifestations" (Jantsch and Waddington, 1976, p. 5).

Any attempt to provide an explanation or even a description in predictive terms for a phenomenon which is uncertain and unpredictable in its outcome is likely to fall short, which is probably why no single theory of menstrual cycle related moods has surfaced to take precedence over the others developed in this field.

In the strictest sense of the definition of theory – namely "an internally consistent body of verified hypotheses" (Hearn, 1958, p.8) system's theory is not a theory but rather seen as, "a new approach to the unity of science problem which sees organisation rather than reduction as the unifying principle, and which therefore searches for general structural isomorphisms in systems." (Gray et al., 1969, p. 7). Systems theory, is derived from a convergence of several disciplines, including

engineering, biology and psychology (Ashby, 1956). The core principles of the theory have been summarised as: "Every system operates according to its structure, that is, according to how it is made, in the interplay of the properties of its components… The structure of such a system determines everything that occurs in it or to it in terms of its internal changes as well as in terms of what it can encounter in an interaction" (Maturana, in Ruiz, 1996, p. 286). Systems theory has been used as an underlying philosophy in studies investigating mood (Mapp, 2006). Its main application in the field of psychology is in family therapy and as this study looks at a woman as a central figure in the family as well as a cornerstone of wider society, the principles of how all members of the family system impact on the entire system, is well suited to this study (Atkinson and Heath, 1990).

This study focusses on the interplay between a woman's body (system) and her moods and how her experience of this interplay influences her actions and perceptions within her social system, most notably her family and other significant partnerships. As such, the interdisciplinary foundations of systems theory provide an ideal unifying framework across the disciplines of endocrinology, neurology, gynaecology and psychology (Bertalanffy, 1968).

Systems theory has developed two main branches: first order (the original theory) and second order systems theory. Second order systems theory is differentiated from first-order systems theory by the assertion that observation changes the system's behaviour so that, by observing, the observer becomes part of the system (Maturana, 1978). This study will take cognisance of first order systems theory principles only.

The key epistemological elements of first and second order system theory are summarised in Table 3.1, and those of first order systems theory are discussed below.

Table 3.1 Key epistemological elements of first and second order systems theory

First order system theory (Becvar and Becvar, 2000)	Second order systems theory (Becvar and Becvar, 2000)
recursion	wholeness and self-reliance;
feedback	openness and closedness
morphostasis/morphogenesis	autopoiesis
rules and boundaries	structural determinism
openness and closedness	structural coupling and non-purposeful drift
entropy/negentropy	epistemology of participation
equifinality/equipotentiality	reality as a multiverse
communication and information processing	
relationship and wholeness	
goals and purposes	

3.2.3.1 First Order Systems Theory

Recursion

Recursion captures the notion of reciprocal causality (Skyttner, 2005), where every consequence is seen to alter reality as opposed to linear causality, where every action has a consequence and the line of cause and effect moves in one direction only (Minuchin and Nichols, 1993). In recursion, meaning is derived from the interaction between components of the system, and it is acknowledged that each component influences all other components with which it has contact (Bateson, 1970). This concept is particularly relevant with respect to a woman's cycle-moods as her body is a series of interplaying sub-systems, many of which she is not necessarily conscious. Although she may be unaware of these sub-systems and their processes, they influence her behaviour towards external systems (people and groups of people) (Anisman et al., 1998). Her behaviour, in turn, elicits a response from others, which affects her internal systems, and so on in a continuous loop or recursive pattern (Boszormenyi-Nagy and Spark, 1973). This complicated interplay between internal and external systems is almost impossible to unravel as there is no independent linear line of cause and effect, which makes the subject and study of the menstrual cycle and moods extremely challenging.

Feedback

Feedback incorporates recursion but focusses on self-correction (Falzer, 1986). ‘Positive’ feedback refers to feedback that brings about a change in a system, and ‘negative’ feedback refers to feedback that does not bring about any change in a system (Powers, 1973). For instance, support groups have been shown to provide psychological relief (Baraka et al., 2008). This may be because participants are able to share and receive advice that helps them and that may otherwise have been inaccessible, but may also be because the participant no longer feels they are alone in their experience(s) (Gale, 1993).

Morphostasis/Morphogenesis

Morphostasis refers to the system’s ability to remain the same in the face of change and morphogenesis refers to the system’s ability to change in a state of stability (Keeney, 1983). In medicine, a specialist needs to know when to strengthen an existing system (setting a bone) and when to change the system (remove a limb) in order for the greater system (body) to survive and flourish.

Rules and boundaries

The rules of a system are derived from its behaviour and the boundaries are set by the outer limits of that behaviour (Anderson and Carter, 1990). If a woman understands her body’s rules and boundaries she can either accept or modify its behaviours.

Openness/Closedness and Entropy/Negentropy

The openness/closedness of a system is dynamic and will vary according to time and context (Becvar and Becvar, 2000). Entropy refers to openness to the point of chaos and negentropy to closedness to the point of dysfunction. In other words, the extent to which a system embraces or rejects new elements, which can take the form of information, people or other systems, determines its openness or closedness (Miermont, 1995). Openness and closedness function on a continuum from either ‘too open’ on the left, to ‘too closed’ on the right. Where a system is

currently (and where it needs be) on this continuum in order to function optimally, varies according to situation and over time. To attain optimal functionality, these two conditions must vary dynamically according to the system's proximity to other systems (Bertalanffy, 1968).

Equifinality/Equipotentiality

Equifinality describes a system's tendency to arrive at the same destination regardless of its starting state. Conversely, equipotentiality refers to a system's ability to arrive at a different outcome even when it starts from the same place (Simon et al., 1985). Equifinality can best be understood in real life terms when one observes an individual who tries to change an outcome in their lives and tries very many different ways of 'changing', but ultimately ends up with the same outcome (for example a behaviour) in spite of their efforts. Equipotentiality can be practically illustrated by contemplating siblings (even identical twins), who have the same or very similar start to life, but end up differently in later life. Gaining an understanding of a participant's diverse starting and ending points, as described through the concepts of equifinality and equipotentiality is usually done through the use of questionnaires and/or qualitative interviews.

Communication and information processing

In systems theory, there are two sources of information in communication: digital (verbal) and analog (including non-verbal and context). Applied to these are three key principles: (1) one cannot not behave; (2) one cannot not communicate, and (3) "the meaning of a given behaviour is not the true meaning of the behaviour, rather it is the personal truth for the person who has given it a particular meaning" (Becvar and Becvar, 2000, p. 72). Important elements within these are congruent and incongruent communication and avoiding communication traps (Becvar and Becvar, 2000). When it is stated that communication is 'incongruent', it means that the digital and analog modes are out of sync, for example, a person might say they are open to a conversation, but their non-verbal behaviour suggests they are closed - through crossed arms or not making eye contact. To test this, information gathered in qualitative interviews can be compared and contrasted with data

gathered in daily and weekly questionnaires to cross check a participant's communication and information processing styles.

Relationship and wholeness

Even when systems theory is applied to an individual, that individual is viewed as part of a larger system, the complexity of which increases as it grows larger (for example from a partnership to an extended family) (Becvar and Becvar, 2000). A woman's places in her close and her more distant systems play a defining role in guiding effective cycle-mood management (Bowen, 1976).

3.2.3.2 In conclusion

Anatol Rapoport stated that, "The systems approach is often portrayed as a counter-current to the increasing fractionation of science into highly specialized branches resulting in a breakdown of communication between the specialists." (Rapoport, 1986, Preface). This move away from Cartesian thinking towards a more holistic approach where one human body is seen as a whole, rather than a collection of parts which needs to be attended to by medical specialists from differentiated fields and further, towards that human being forming part of ever widening systems, each impacting on the next, is a strong theme throughout this thesis, as can be seen in section 3.2.1 and in chapters seven and eight. Van Gigoh (1974) refers to this wider context of humanity as the organisations in which man lives, works and plays, expressed as 'organised complexity'. His reference to complexity is a reminder that any organising system is merely an attempt at order towards the purpose of understanding, but can never be a prescriptor. The systems principles discussed above are therefore lenses through which to view complex processes and provide methods to make sense of complicated human existence and interaction.

4 Research design

The research design for this study was informed by the Literature Review and resulted in the use of: interviews; an uneven Likert scale; a non-medical participant sample and daily self-reporting and was further informed by the tenets of systems theory and the principles of social-interpretivism. There is strong evidence in the literature to show that these methods are effective especially in light of the objectives of the research, namely depth of knowledge rather than fewer data sets per participant obtained from a larger sample group. The methods were further motivated by an exploratory element to the study and in this context, designed to draw out the best possible value of information to answer the research questions.

Although quantitative studies have been the mainstay of research within the field of the natural sciences, qualitative research has shown to provide rich and textured data when human populations are under investigation. Mehta and Josephs (2011) emphasised the shift towards 'social' research in the medical field, prescribing interviews as a method of obtaining more personalised data. Following a constructivist-interpretivist framework, it is imperative to include participants' narratives (Ponterotto, 2010). Although systems' theory does not advocate the use of a specific methodology, it can be intuitively deduced that exploring elements such as rules, boundaries and communication behaviours (to name but a few systems' theory principles) would best be achieved through creating a strong researcher-participant bond enabling the interviewer to negotiate sensitive narratives in an environment of open sharing. One on one interviews were chosen as a research methodology as it allows for the sharing of personal and sensitive narratives and the ethical maintenance of anonymity, which could not be guaranteed in, for example, focus groups.

Gardner and Martin (2007) found that an uneven numbered Likert scale led to a reporting bias where participants would more often than not, choose the middle number when they were in any way uncertain of their choice. This led to disrepresentative data which could be avoided if the questionnaire utilised an even numbered Likert scale, thus compelling a research participant to make a choice

which would categorise their response as falling in one or the other category (for example, 'low' or 'high'). For that reason, the SRD made use of an even numbered Likert Scale.

In the majority of research reviewed to inform this study design, researchers had made use of convenience sampling by sourcing participants from their immediate environments such as hospital clinics (patients); hospitals themselves (healthcare providers) or universities (students) (Abplanalp et al., 1979a; Weiner et al.; 2004, Tenker et al., 2003). To arrive at results which would be more representative of a general population, participants for this study were actively sourced from a wider community base.

This chapter presents a chronology of the research process, and a description of the methods and research instruments that were employed, as a result of lessons learnt from the reviewed literature, in the collection and analysis of data. This includes sampling methods and inclusion criteria; methods of recruitment; ethical considerations and unforeseen challenges and limitations in the execution of the research.

This section describes how the research population was identified and the recruitment process was employed. This is followed by a detailed description of the qualitative and quantitative methods used to investigate the central research question.

4.1.1 Research participants

4.1.1.1 Defining the research population

The study investigates women between the ages of 20 and 50 who menstruate normally; do not suffer from serious mental illness; have daily access to the use of e-mail, and; are sufficiently self-motivated to volunteer for a research study. A list of inclusion and exclusion criteria are used to draw the parameters around this population to ensure that no members of the intended population are less likely to

be included in the study than any other potential participants, thus reducing data sampling bias (Cortes et al., 2008). These criteria are developed on the basis of similar criteria used in other studies that have investigated the links between women's hormones and their emotional experiences and which have usefully illustrated that these criteria are best used to identify a sample which will be most representative of the general population (Van Goozen et al., 1992). The MMSQ and in-depth interview are utilized to determine whether potential participants comply with these criteria.

Initially the inclusion criteria were narrower, but in their application it became apparent that excluding potential participants who were 'Younger than 22 or over 45'; had 'irregular cycles'; 'used contraceptives or hormone treatments in the three months prior to participating in the study'; and 'used psychiatric medication that might interfere with mood', narrowed the pool of potential participants to the extent that finding 28 volunteers within the constraints of the study became implausible. Participants who indicated that they were taking a low dose of anti-depressant medication during the initial interviews, were allowed to participate in the study as the sample was intended to represent a reasonably average cross section of society and as anti-depressant use is so prevalent, excluding these participants would have resulted in a specificity not intended in the study design. An amendment to the criteria was requested and approved by the UCT Human Research and Ethics Committee (HREC), resulting in the criteria listed in Table 4.1.

Table 4.1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Women	Men, transgender or gender/gender identification other than woman
Between the 20 and 50 years of age	Younger than 20 and over 50 years of age
With regular menstrual cycles	With no or irregular cycles
With both ovaries and uterus	With no or partial reproductive organs
No history of reproductive health problems	Past or current reproductive health problems, including infertility
Not pregnant or breastfeeding	Pregnancy or birth within previous 12 months
Able to communicate in English	Cannot read, write, understand or speak English
-	Currently using illicit narcotics or above average

Inclusion criteria	Exclusion criteria
	amounts of alcohol/prescribed medications/over-the-counter medications
Mentally stable	Diagnosed with or shows signs of severe mood/personality or psychiatric disorder
Not currently using hormone based contraceptives such as contraceptive tablets, injections or an intrauterine device	Currently using hormone based contraceptives such as contraceptive tablets, injections or an intrauterine device

Two biases were identified: (1) only women with e-mail access were able to take part in the study and (2) participants represent a portion of the female population who are motivated to participate. In terms of bias 1, only one potential participant was unable to participate due to lack of e-mail access. I am unable to access bias 2 and so includes 'self-motivated' as a descriptor of the research population.

4.1.1.2 The recruitment of research participants

Potential participants received some information about the nature of the study as part of the recruitment campaign. It was postulated that a study which would require the level of engagement from and ongoing support of respondents in order to bring depth to the research had to include informed consent. Convenience sampling was used and, as can be seen from the recruitment methods below, this resulted in a variation of sampling that broadened the research population to an experimentally accessible population with analysis units coming from a wide sample framework. Although it was initially envisaged that only women from the False Bay area could be included in the study (due to the limitations of collecting blood results locally), the on-boarding of a national pathology laboratory with wide-spread collection points, made the widening of the sample base possible and lead to a similar broadening in recruitment platforms, for example, using social media (such as Facebook).

At the time of writing the research proposal it was envisaged that the completion of weekly data sets and blood tests, would be personally attended by me. Due to time constraints (on the side of the participants) this was not possible and after

thorough introduction and tutoring, participants completed the daily and weekly questionnaires at their homes and submitted the results via e-mail, immediately after completion (daily for SRD and weekly for BRUMS, MDQ and BIQ).

As the original study design determined that participants had to be located close enough to the researcher for manual data collection, the initial recruitment campaign was executed in a local district in the Western Cape Province Peninsula, False Bay. As can be seen below, the locations for in person recruiting centred on two central hubs in the False Bay area. The eventual complement of participants included some women from the broader Cape Town area and two women residing in New Zealand.

Some related studies (Alonso et al., 2004; Borenstein et al., 2007) recruited women from PMS clinics, but as this study dealt with women in the normal range, using these particular clinics for this purpose was not plausible. The limitation of recruitment from clinical populations is that few studies have sampled a general population outside of clinical settings which could be more representative of the normal population. It is because of this that a wide range of other recruitment avenues were explored.

Research participants were recruited using the following methods:

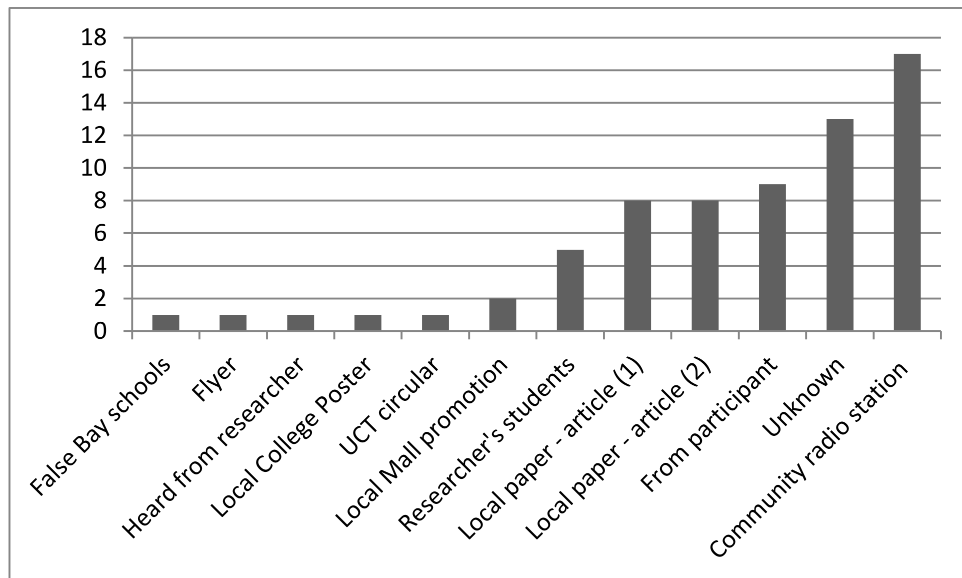


Figure 4.1 Advertisement methods that attracted the 67 women who contacted the researcher with a view to participating in the study.

A website was set up to provide information about the study and encourage recruitment. The site was user friendly and written in an accessible, informal style. Information on the website included: what the study was about; how participants might benefit; inclusion and exclusion criteria; frequently asked questions; steps for how to get involved in the study; and a disclaimer. The website served the purpose of being informative as well as being a portal for participation. Interested women could follow the steps set out on the website, the first of which was to contact the researcher and complete and send the MMSQ (including an initial consent form).

The majority of research participants who rendered complete data sets visited the website after hearing about the study from the other sources and thereafter contacted the researcher to enquire about inclusion in the study.

Two talks were scheduled at the Fish Hoek library on week nights between 18h00 and 19h00. These talks outlined the study; the path participants would follow and the benefits of participation in the study.

The talks were advertised through:

- Three schools and one college in the False Bay area utilizing school communications including an electronic notification system; school notices and a formal presentation to the teachers of a school. As this means that most participants are mothers, use is made of snowball sampling to extend the group beyond this demographic.
- Paper flyers distributed in the Fish Hoek and Sunnydale area.
- Two newspaper articles in the local Fish Hoek paper, the Echo, reporting on the study and expressing the need for volunteers to participate in the study.
- Notifications through social media (Facebook).
- A snowball method starting with friends and colleagues of the researcher and spreading to the wider University of Cape Town community.
- Posters in several places of business, including medical practices, in the False Bay area inviting clients, customers and patients to attend the library talks.
- Twenty medical practices in the False Bay area were e-mailed and asked to place posters (attached to the e-mail) in their practices.

The library talks were unfortunately poorly attended and no completed data sets resulted from this recruitment strategy. Although further talks were considered, the poor attendance of the initial two suggested that pursuing this method of gaining exposure for the study would be ineffective and it was not pursued further. All of the above advertising methods, however, were included on the study's website. Numerous participants volunteered for the study after seeing these and visiting the website, which did result in the collection of 17 full data sets.

I utilised the services of four undergraduate students from the Faculty of Health Sciences at the University of Cape Town (second year medical students), who staffed a table at the Long Beach Mall for a four-hour period to give exposure to the study. Visual material such as T-shirts, a banner, posters, catch phrases printed and displayed on walls and small black boards with the words 'Menstruation' and

other messages relating to the core issues of the study, were displayed to draw attention of passers-by. Interested parties who approached the table were informed about the study and asked to visit the website and to add their names to an e-mailing list to be contacted by the researcher for possible future inclusion in the study. The students also campaigned among their fellow students but were unable to recruit any of their peers to the study.

Two such recruitment days were arranged and executed at the Long Beach Mall. At these recruitment days, the students obtained permission to be photographed with the interested parties and these pictures were posted on social media platforms including Instagram, Facebook and Twitter. Two participants were recruited for the study in this way and rendered full data sets.

Posters advertising the study and asking for volunteers to participate were placed on 12 community notice boards in the False Bay area. No completed data sets resulted from these posters.

A radio presenter held an interview with me on a community radio station (567 Cape Talk) on the 10th of November 2015. The interview was approximately eight minutes long and resulted in 127 visits to the study website in the 24 hours following the interview. At least eight completed data sets results from this exposure.

Permission to contact lecturers in the Faculty whose courses align with the core issues in the study (for example, Gynaecology, Public Health, Physiology) was sought from the Head of Undergraduate Studies at the University of Cape Town, Faculty of Health Sciences. She proposed a partnership to these lecturers through which students partake in the study and, in return, receive input from the researcher with regards a more holistic approach to moods and hormones, as well as the practical application of this knowledge in medical practice.

Other studies have used similar methods to recruit participants, especially focusing on staff in hospitals or students at universities where the studies have taken place (Kiesner, 2009; Balaha et al., 2010; Abdalla and Gibreel, 2016). Initial contact is almost always through notice boards and advertisements in in-house publications.

Two lecturers were approached via e-mail which outlined the study, its application in practice and the partnership possibility with the lecturer. Neither lecturer replied to the e-mails, nor did any data sets result from this interaction. However, in my capacity as senior researcher at the Child Nurse Practice Development Initiative, I hosted five undergraduate medical students for four weeks. As I had been granted permission to recruit UCT students, I asked the students whether they would volunteer for the study. They agreed and I collected three sets of data from this group. The students also canvassed their fellow students to volunteer but no data sets resulted from these efforts.

Other methods of recruitment that were attempted but which did not produce any additional participants included canvassing local government services in the primary recruitment district; a medical insurance company; a local gym and utilising my personal and other group social media (Facebook) pages.

The recruitment strategy was maximised within the resources of the study. The recruitment yielded a final sample of 28 participants who met the inclusion criteria for the study. Data were collected from the 25th of July 2014 until the 4th of November 2015. During this time, active recruitment was on-going. In spite of several attempts to broaden the recruitment base (for example, by enrolling post graduate nursing students or UCT medical students) no new recruitments were forthcoming. It was surmised that the personal nature of the study (a woman's menstrual cycle) and the duration of the study (at least two full cycles or approximately 56 days) limited the participation numbers. However, at this stage, in consultation with the UCT Department of Statistics, the sample power was sufficient to close study recruitment and to proceed with the next stage of the study.

As can be seen from this section, data was eventually collected for a period of eighteen months, during which active recruitment was on-going, yet only 28 full data sets were collected. The detailed description above was included to indicate the extent to which I pursued every avenue to recruit participants as well as to show the need for research funding in providing compensation to participants as a motivation for participation. On reflection it is understood why so many research studies make use of participants from medical data bases, but this was actively avoided as the research called for normally menstruating women not suffering from any medical condition.

4.2 Application of research instruments

This section discusses the eight research instruments that were used to obtain the quantitative and qualitative data. For each, a brief history of the selected instrument pertaining to its validity and research rigour is provided. The processes followed to select the instrument are outlined, taking into account specificity, generalisability, cost and other relevant factors. Instruments which were identified in relevant research studies but excluded due to cost implications; inaccessibility or lack of fit, are outlined in Table 4.2, after which an indication is given of why these instruments were found to be unsuitable for this specific study. Where new instruments are introduced, the motivation, design process and utility of the instrument are explained. The scope of data gathering (number, nature and frequency of application) was determined by the systematic review of literature within the field of mood-hormone relationships.

As the main aim of the research was to establish whether there is a consistent relationship between a normally menstruating woman's cycle and her moods, the study used a suite of mood questionnaires that together captured every possible mood that may be associated with cyclical changes.

The relevant hormones were identified through systematic Literature Review and discussion with specialists in the field of gynaecology and endocrinology. The systematic Literature Review indicated that the hormones that are most prevalent in a woman's 28-day menstrual cycle are Estradiol, Progesterone, FT, LH and SHBG. This selection of hormones was subsequently confirmed by Prof Lynette Denny (Head, Gynaecology and Obstetrics Department at UCT) and Dr Malika Patel (Endocrine gynaecology specialist at GSH).

The list of all moods found to date in relation to the menstrual cycle, also relied on a literature search and discussion with specialists. Of the articles, the most relevant was Budeiri et al. (1994), which reviewed 350 studies in menstrual mood research. Budeiri et al. (1994) compiled a list of 199 menstrual-related 'symptoms' (physiological as well as psychological) and identified 105 questionnaires used in the reviewed studies. Several of the authors of the instruments identified by Budeiri et al.(1994), including Hirschenfield (Menstrual Distress Questionnaire); van Wijk (Brunel Scale of Moods); Schalling (Karolinka Scales of Personality); Fridén (Cyclicity Diagnostic Scale); Feuerstein (Calendar of Premenstrual Experiences); Donnely (Social-Sexual Activities Log); Born (Draft Daily Mood Tracker) and Mendes (Sarlo/Ekman Chair in the Study of Human Emotion - University of San Francisco) were contacted to gauge the value of including these or other instruments in the study. The responses from these researchers, together with the Literature Review and Budeiri's (1994) findings were then collated to create a list of 39 possible mood research instruments for inclusion in the study. The 36 instruments that were excluded from the study are listed in Table 4.2.

Table 4.2 Research instruments excluded from the Study

#	Instrument	Reference
1	Profile of Mood States (POMS)	(McNair et al., 1992)
2	The Social Sexual Activities Log (SSAL)	(Abplanalp et al., 1979 a)
3	The Mood Disorder Questionnaire (MDQ)	(Hirschfield et al., 2000)
4	The Positive and Negative Affect Scale – Expanded version (PANAS-X)	(Watson and Clark, 1999)

#	Instrument	Reference
5	Psychiatric Status Schedule (PSS)	(Spitzer et al., 1980)
6	The Review of Life Experience (ROLE)	(Abplanalp et al., 1979 a)
7	The Cyclicity Diagnose (CD) scale	(Fridén 2004)
8	The Karolinska Scales of Personality (KSP)	(Ortet et al., 2002)
9	Swedish universities Scales of Personality (SSP)	(Gustavvson et al., 2000)
10	The Buss–Durkee Hostility Inventory (BDHI)	(Buss and Durkee 1957)
11	The Irritability, Depression, Anxiety Scale	(Kevin et al., 2008)
12	The Irritability and Emotional Susceptibility Scale	(Snaith et al., 1978)
13	Wilcoxon Mann–Whitney U test (also called the Mann–Whitney–Wilcoxon or MWW)	(Wilcoxon et al., 1976)
14	The Anger, Irritability, Assault Questionnaire (AIAQ)	(Coccaro et al., 1991)
15	The Psychological General Well-Being Index (PGWB-S)	(Grossi et al., 2006)
16	The Diagnostic Criteria for PMTS (DC)	(Steiner et al., 1980)
17	The Self-Rating Scale for PMTS (PMRS)	(Budeiri et al., 1994)
18	The Schedule for Affective Disorders and Schizophrenia (SADS) – including: Lifetime version (SADS-L) and the version for measuring change (SADS-C)	(Spitzer et al., 1980)
19	Somatic-Behavioral-Sexual Symptom Profile (SBS)	(Haskett and Abplanalp, 1983)
20	Choice of graded statements	(Sanders et al., 1983)
21	Mood Adjective Check Lists	(Nowlis 1965)
22	The Lord-McNair (MACL)	(Sanders et al., 1983)
23	Calendar of Premenstrual Experiences (CoPE)	(Feuerstein and Shaw, 2002)
24	The Beck Depression Inventory Fast Screen (BDI)	(Benedict et al., 2003)
25	Altman Self-Rating Mania Scale (AMRS)	(Schulze et al., 2007)
26	The University of Wales Institute of Science and Technology - Mood Adjective Checklist (UWIST-MACL)	(Symonds et al., 2004)
27	The Cambridge Neuropsychological Test Automated Battery (CANTAB)	(Robbins et al., 1994)
28	Vigil Continuous Performance Test	(Porter et al., 2003)

#	Instrument	Reference
29	Rey-Auditory Verbal Learning Test (RAVLT)	(Rosenberg et al., 1984)
30	Stroop Colour-Word Test	(Pritchatt 1968)
31	Life Event Questionnaire	(Norbeck 1984)
32	Eating Disorders Inventory (EDI-3)	(Garner et al., 1983)
33	Body Image Rating Scale	(Thompson and Gray, 1995)
34	Aggression Questionnaire (AQ)	(Buss and Perry, 1992)
35	State-Trait Anxiety Inventory (STAXI)	(Spielberger and Syderman, 1994)
36	State-Trait Depression Adjective Check List (ST-DACL)	(Osman et al., 2002)

The original 39 instruments were subjected to a process of exclusion aimed at reducing the list to a more manageable number. Instruments were reviewed for: (i) applicability; (ii) ease of use; (iii) accessibility; and (iv) cost, resulting in the exclusion of these 36 scales. Three remained from this review and were used in the study. This is discussed in further detail in In Section 4.2.1 (excluded scales) and in Section 4.2.2 (included scales).

4.2.1 Research instruments excluded

The following section discusses the research instruments that were reviewed for inclusion, but not utilised in data gathering. Instruments that focus on the diagnosis of psychiatric disorders, such as the Psychiatric Status Schedule and the Schedule for Affective Disorders and Schizophrenia (SADS), were naturally excluded. This was because all research participants were scanned for psychiatric disorder through the MMSQs and clinical intake interviews. Only women who did not meet the criteria for psychiatric disorders were included in the study, thus all measuring instruments needed to be designed for application in mentally well populations. Examples of the reasoning for these exclusions follow.

The Profile of Mood States (POMS) compiled by McNair and Lorr (1964) is widely used to measure affective mood states in the sub-scales: tension, depression, anger, vigour, fatigue and confusion. It has been applied in clinical medical settings such as hormonal treatment and successfully translated and used in many languages, including Korean, Arabic and Spanish. It has also been shown to remain reliable and valid in different English-speaking settings (Van Wijk, 2011). However, I found that the application of the POMS in mood/hormone studies did not render subtle enough differentiations in mood to capture the variation across the 28-day menstrual cycle, as can be seen in the work of Abplanalp et al. (1979b). In addition, POMS is extremely long, and would have been onerous for research participants to complete daily/repeatedly as required in this study and the POMS' language has become outdated and is at times inaccessible to respondents (Dr van Wijk, South African Military Medical Core, pers. comm. 11 Oct 2013). Dr van Wijk proffered that the word 'muddled' is especially difficult to understand in this context and is often not understood by those asked to complete this questionnaire.

The expanded version of the Positive and Negative Affect Scale (PANAS), called PANAS-X was developed by Watson and Clark (1994). This questionnaire focuses on what the authors define as the dominant dimensions of emotional experience, namely positive and negative effect. The PANAS-X includes 11 specific effects: fear, sadness, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness, and serenity. I excluded the PANAS-X as a measuring instrument as the 60 items it includes are general and do not capture adequately the hormone-specific moods of the menstrual cycle.

Two other instruments were excluded as their mood parameters are too narrow for this study, investigating only anxiety and depression. These were: the State-Trait Anxiety Inventory (STAXI), designed by Spielberger et al.(1994) to assess anxiety as an emotional state (S-Anxiety) and individual differences in anxiety proneness as a personality trait (T-Anxiety), and the State-Trait Depression Adjective Check List (ST-DACL), which was designed by Lubin in 1994 to measure both state and trait depression (Spielberger and Syderman, 1994).

Similarly, several of the instruments only measure cycle events of the premenstrual phase of the cycle. As I wished to capture moods during the entire cycle, these were excluded. They are the Psychological General Well-Being Index, the Diagnostic Criteria for PMTS (DC) and the Self-Rating Scale for PMTS (PMRS).

Irritability is recognised as the major underlying emotion in premenstrual tension, and so several irritability questionnaires were evaluated, resulting in the eventual inclusion of the BIQ (Born & Steiner, 1999). Those excluded were:

Table 4.3 Summary of descriptions of instruments measuring irritability which were excluded from the study as well as reasons for exclusion

Name and description of instrument	Reason/s for exclusion
The Irritability, Depression, Anxiety Scale (Craig et al., 2008) designed to measure irritable mood and to explore its nature and subtypes. This self-rating questionnaire was developed to cover a range of subjective experiences, judgements and behaviours deemed to encompass the components of irritability. The items were rated along intensity and frequency dimensions (Craig et al., 2008).	This questionnaire was excluded because it was developed primarily to measure irritability in populations with neurological deficits.
The Buss–Durkee Hostility Inventory (BDHI; Buss and Durkee, 1957) was designed to measure individual differences in trait hostility (66 items) and guilt (9 items). At the time of its initial development, there were no existing measures of hostility components, so one of the important features of the scale is its intentionally multidimensional character. BDHI was developed to assess 8 subscales: (i) Assault: physical violence against others; (ii) Indirect: roundabout and undirected aggression; (iii) Irritability: readiness to explode with negative affect at the slightest provocation; (iv) Negativism: oppositional behaviour, usually against authority; (v) Resentment: jealousy and hatred of others; (vi) Verbal: negative affect expressed; and (vii) Guilt: feelings of having done wrong (Buss and Durkee, 1957).	The BDHI was excluded because hostility to the degree that the inventory was designed for falls in part outside of 'mentally healthy', which was an inclusion criterion for this study.
The Irritability, depression, anxiety scale (IDA) is a clinical scale for the self-assessment of irritability, depression and anxiety and was developed by Snaith et al. (1978).	This scale was excluded because it was constructed on the basis of a clinical population, rather than an average psychologically 'normal' or mentally well population.
The Anger, Irritability, Assault Questionnaire (AIAQ; Coccaro et al., 2012) is a 42 question self-report questionnaire designed to assess several aspects of impulsive aggression putatively related to serotonergic function and is the self-	This interview was excluded as there is an emphasis in the current study on mood measurements that are specific only to the day of testing and therefore needs to be concurrent

Name and description of instrument	Reason/s for exclusion
report version of the Lifetime History of Impulsive Behaviours (LHIB) interview. It focuses primarily on the inability to control aggression and is composed of five subscales. Each question is rated on five time frames from past week to childhood, resulting in 210 items (Cocarro and Schmidt-Kaplan, 2012).	rather than retrospective in its design
The Aggression Questionnaire (AQ); Buss and Perry (1992) designed to screen large groups of individuals for aggressive tendencies. It is a self-report instrument which is based on an age-stratified sample of 2,138 individuals, separated by gender for verbal and physical aggression scales (Buss and Perry, 1992).	The Aggression Questionnaire was excluded as the researcher needed an instrument that would capture irritability specifically (as the primary negative mood during the menstrual cycle) as well as a broad-based instrument to capture a wider range of moods. It was felt that aggression did not feature prominently enough in cycle related mood literature to warrant an entire instrument on aggression to be included in this study.

Finally, four measuring instruments were excluded as: correspondence with their authors failed to elicit replies (authors did not reply to me), the existence of the instruments (authors could not find the instrument), access (instruments were unobtainable or too expensive for inclusion), or usability (instrument was received but not in a usable format, for example, no manual could be found). These instruments were:

The Social-Sexual Activities Log (SSAL) was developed and used by Abplanalp et al. (1979a) during their study into the Psychoendocrinology of the Menstrual Cycle: Enjoyment of Daily Activities and Moods in 1979 to assess subjective enjoyment of daily activities. The SSAL items were developed from semi-structured individual interviews and assess behaviour across eight different categories, namely: work; social activities at work; housekeeping; sexual activities with partner; sexual activities alone; solitary activities; activities with partner only; activities with others. These areas were rated according to number, time and enjoyment. Results indicated that the SSAL was a reliable self-report instrument (Abplanalp et al., 1979a).

The Cyclicity Diagnose (CD) scale (Sundstrom et al., 1999) was designed to evaluate cyclical 'symptoms' and has been validated as an instrument for diagnosing cyclical conditions. The CD Scale consists of four negative mood parameters (depression, fatigue, irritability, tension); three positive mood parameters (cheerfulness, friendliness, energy), and; four somatic 'symptoms' (headache, swelling, breast tenderness & menstrual bleeding). In addition, the CD scale contains a score for measuring every-day social function and work performance. The CD Scale is a Likert scale ranging from 0-8, with 0 as complete absence of a particular 'symptom', and 8 as the maximal severity 'symptom' (Sundstrom et al., 1999).

The Karolinska Scales of Personality (KSP) is a personality test. A newer version of the test is the Swedish Universities Scales of Personality. KSP measures the personality with a 135-item questionnaire with answers on a four point Likert scale. The answers are grouped into 15 scales: psychic anxiety; somatic anxiety; muscular tension; psychasthenia; inhibition of aggression; detachment; impulsiveness; monotony avoidance (sensation seeking); socialization; indirect aggression; verbal aggression; irritability; suspicion; guilt and social desirability (Klinteberg et al., 1986).

The Calendar of Premenstrual Experiences (CoPE; Mortola, 1990) was designed to assess 22 PMS behavioural and physical 'symptoms' including mood 'symptoms', somatic/cognitive 'symptoms', appetitive 'symptoms' and fluid retention 'symptoms'. The COPE diary is a reliable instrument for identifying fluctuations in behavioural and physical 'symptoms' during the luteal phase (Feuerstein and Shaw, 2002).

4.2.2 Research instruments used

Eight research instruments were used in the study, namely:

- A MMSQ
- An in-depth interview
- A structured self-report diary (SRD)
- BRUMS(Terry and Lane, 2010)

- MDQ (Moos, 1968)
- BIQ (Born et al., 2008).
- Clinical blood tests
- A feedback interview.

All quantitative instruments were administered electronically. The MMSQ was used to collect biographical data, and the clinical and feedback interviews were used to gather qualitative data. The SRD was used alongside established measuring instruments, to ascertain whether, like Kamakura found in his study, a single item measuring instrument could be used to assess moods accurately during a menstrual cycle (2015). This is with a view to future applications of the SRD by health care professionals, which would not be feasible with a multi-item instrument (Kamakura, 2015). The participants' responses to the SRD were supported by the three personality and mood questionnaires administered by me: the BRUMS, MDQ and BIQ, which were completed once a week, on the same day, for the length of each participant's involvement in the data collection (Anderson, 2006; Eid and Diener, 2006; Connoly, 2001). The BRUMS, MDQ and BIQ were used alongside the SRD: 1.) as they are established instruments that could confirm the accuracy of the SRD and 2.) because each instrument elicits slightly different data, which was necessary to answer the research questions adequately.

The two older and more established instruments, BRUMS and MDQ, have been used for many years with consistent results (Ross and Coleman, 2003). Whereas the BRUMS has been used in South Africa (Van Wijk, 2011), neither the MDQ nor the BIQ have previously been used in a research study in this country. The Irritability questionnaire has shown evidence for internal consistency and mean inter-item correlation and the new self-report application makes use of daily reporting to elicit concurrent data (Born et al., 2008). The four mood research instruments covered most angles of the research question pertaining to menstrual cycle and mood, including the combination of sixteen mood and physiological symptoms found to be most prevalent during the menstrual cycle, as identified by the American College of Obstetricians and Gynaecologists in 1995 (Feuerstein and Shaw, 2002). Importantly,

unlike the SRD, the BRUMS, MDQ and BIQ have established norms and were thus used to corroborate the mood findings ascertained by the SRD.

4.2.2.1 MMSQ

The MMSQ served three main purposes: 1.) to obtain the potential participant's contact information; 2.) to check whether the potential participant fitted with the study's inclusion and exclusion criteria, and 3.) to provide context for the participant's behaviours and feelings reported in using BRUMS, MDQ and BIQ in the daily SRD.

The MMSQ contained twelve sections: biographical; educational; occupational; income; health; pregnancy and children; diet and exercise; stress and relaxation; relationships and sex; menstruation and hormone history; self-care and hormone/mood history and is attached as Addendum A.

Initially the data from the MMSQ informed whether a participant should be included or excluded from the study (as indicated by the study's inclusion and exclusion criteria). As most participants were already well-informed about the study before completing the MMSQ (through the radio interview; library talk; newspaper articles and the website) no participants submitted MMSQs that led to them being excluded from the study.

Lastly the MMSQ captured contextual data, which guided me through the clinical and feedback interviews. Participants' reported histories and behaviours, were discussed in detail and provided a fuller picture of a woman's internal and external world perceptions and experiences. For instance, I utilised these data to ascertain whether a woman's menstrual history was similar to others in her family and whether a discrepancy between 'how many times I have sex' and 'how many times I want sex' was indicative of libido or partner needs.

4.2.2.2 In-depth interview

The in-depth interview had three objectives: 1.) to check that data in the MMSQ were correct; 2.) to ascertain whether the research participant's mental state fell within the normal range and 3.) to gather further qualitative data from the participant.

The in-depth interviews happened at three different venues or per phone/ Skype. I had access to three different venues which were safe and offered a private space (closed room) with comfortable furnishings, which are situated across Cape Town. Participants were invited to choose a venue and time that was most convenient for them (for example, close to their place of work). Some participants preferred to do the interviews over the phone or Skype due to geographic distance from me or due to a lack of transport. The interviews were not structured, but I used the completed MMSQ as a guide through the various data required from the participant. Participants' MMSQ replies were checked and discussed to ensure that all questions were understood correctly and answered accordingly. In particular, I made use of mood markers in the questionnaire to lead onto questions on mood and potential addictive behaviours (Op, 1990). Interview times varied from between 35 minutes to 90 minutes, depending on how much additional information the participant wanted to share with me. Interviews were not audio-recorded. I made use of field notes to record the interviews.

The DSM V guidelines were utilised for identifying possible psychiatric illness that could have led to the exclusion of the participant from the study (APA, 2013). None of the participants had any mental disorders other than mild depression, anxiety or PMS and all participants who took part in an in-depth interview proceeded to the data collection stage of the study.

Once it was ascertained that all information was accurate and that there were no previously undiagnosed or un-realised conditions that would exclude the respondent from the research study, I proceeded with the interview, following the main headings from the MMSQ as outlined in section 4.5.1, including questions

about her menstrual cycle history; feelings of self-efficacy and perceptions of life success and happiness (Golafshani, 2003).

Data from the in-depth interview was enriched by question eight from the SRD, 'did anything dramatic happen in your life today?', as well as from the data obtained from the feedback interviews, to form the full suite of qualitative data for this study. Feedback interviews are discussed in section 4.2.2.7.

4.2.2.3 Self-Report Diary (SRD)

Self-report diaries are useful in exploratory research, collecting data from participants over an extended time period through recording their thoughts, feelings and behaviour (Stone and Shiffman, 2002). An eight question self-report diary (SRD) was designed specifically for use in this study and is attached as Addendum B. Budeiri, Wan Po and Dornan (1994) identified 350 clinical trials, 38 proceedings of symposia and six theses that dealt with hormonal cyclical issues in women published between 1966 and 1992. In these articles, 65 different questionnaires were used comprising 199 separate 'symptom' items for PMS. The cycle events ranged from irritability, depression, tearfulness, anxiety and anger, through comfort eating behaviours, lack of libido, confusion and a whole host of physical manifestations.

A synthesis of Budeiri et al.'s (1994) 'symptom' list, with assistance from other studies, for example, (Abplanalp et al., 1979 a; Björn et al., 2006; Haskett and Abplanalp, 1983; Weiner et al., 2004), revealed the following six moods as those that might be most strongly associated with hormonal fluctuations: feeling weepy; aggression; depression; feeling energetic; feeling sexually aroused, and; feeling nurturing. I utilised these six most prevalent moods as experienced by women during their menstrual cycles. The SRD was designed to record the presence and intensity of each of these six moods during the participant's day. I ensured that 50% of questions pertained to positive moods and 50% to negative moods. Six of the questions related to these identified moods, while one indicated cycle phase and the last dealt with confounding issues. Participants responded to eight questions

each day at a particular time (18h00) over a two-month period. Rubinow (2015) recommended that daily report diaries should be consistently completed at the same time of day as varying the time of day when reports were made, could influence the findings.

The diary was designed to identify, on a scale from 1-6 in terms of intensity, how research participants rated their moods each day, 1 being the least intensive and 6 the most intense experience of the particular mood. Explanatory notes were provided for each question to ensure each participant's understanding of emotive terms was clear (Born, personal correspondence, 17 July 2013) and to foster motivation (Breakwell et al., 1997). The question on cycle phase asked whether the participant had started menstruating on that day and then asked her to indicate the length of her menstruation by marking subsequent days where there was bleeding, by using a number, for example: '2'. When bleeding stops, the participant answered 'no' to the question. The question on confounding issues asked participants whether anything dramatic had happened in their life on that day, to which they could add a short note clarifying the event, for example: 'moved house today'. This question was included because the associated endocrine release in times of extreme stress is known to over-ride the normal perception of the underlying endocrine cycle (Patel, 2014).

Even in early, relatively-small samples, self-report diaries reveal common themes and patterns (Martin and Hanington, 2012). Connoly (2001, p. 471) states that, "… daily ratings should demonstrate a (measurable) premenstrual increase in symptom severity …This is achieved by dividing the cycle into phases and comparing the symptom scores for each phase… comparing average scores in the troublesome days premenstrually with those obtained in the days after menstruation would have most relevance clinically. Confirming subjectively reported functional impairment can be problematic, but the use of social adjustment scales and quality of life measures holds promise".

Most of the studies that were reviewed made use of their own self-report diaries, which range from retrospective report writing to concurrent question answering for

example, COPE (Symonds et al., 2004) and SSAL (Abplanalp et al., 1979a). In this study, the data were gathered concurrently to inhibit false reporting which is a problem with longitudinal self-report diaries as participants tend to 'bundel' data before submitting data sets (Eid and Diener, 2006). Low accuracy has been reported in retrospectively collected data (Haskett and Abplanalp, 1983). An additional issue in retrospective reports is that this type of assessment tends to result in overestimation of cycle events as they rely on the recall of memories. Memories are never an exact reflection of an event and can be biased by previous experience or context (Rubinow, 2015). To make sure that participants recorded their moods daily, thereby avoiding bundled data, participants had to submit their self-report diaries each day.

An even-scale Likert Model answered concurrently is indicated as a reliable manner in which to obtain the required data (Norman, 2010). Uneven scales, according to Norman's findings, too often lead to participants choosing the 'middle' number when unsure of their response, thus biasing the results towards a 'flat' distribution. Even-numbered Likert scales, on the other hand, force the participant to make a choice which places the response in a 'higher' or 'lower' category.

In summary, the SRD provided: (i) a daily report on moods- feeling weepy, aggression, depression, feeling energetic, feeling sexually aroused and feeling nurturing; (ii) an immediate indication of the onset of menstruation, and (iii) an indication of whether there were any extraneous factors which might bias mood.

4.2.2.4 The Brunel Scale of Moods (BRUMS) – Peter Terry and Andrew Lane

The BRUMS is based on the Profile of Mood States (POMS), a well-established instrument utilised in the testing of transient mood states and is attached as Addendum C. The POMS contains 65 items relating to a participant's current emotional experience, which is rated on a five-point Likert scale ranging from 'not at all' (1) to 'extremely' (5). It is rated as internally consistent and as having excellent discriminant validity (McNair et al., 1992). The BRUMS is shorter than the POMS and was designed in 1999 by Terry and Lane (Terry and Lane, 2010), with

more up to date language than the older POMS (Terry and Lane, 2003). One of the main reasons it was selected is that it has established norms in South Africa (Van Wijk, 2011). It contains 24 items pertaining to various mood states that are rated from 'Not at all (0)' to 'Extremely (4)', which makes it less onerous for participants to complete than the POMS, especially in a repeat-test study such as this one.

An Afrikaans version of BRUMS, known as the Stellenbosch Mood Scale, is currently being used at the University of Stellenbosch (Grobbelaar et al., 2010). In one study, normative data for a sample of educated and employed South Africans (N=2200) from various backgrounds was presented and van Wijk found that the test's brevity, and language-friendly nature, makes it a useful measure for screening for "psychological distress in the South African clinical health care context" (Van Wijk, 2011, p. 44).

The BRUMS' 24 items are brief enough to prevent research fatigue, yet capture the span of positive and negative mood states that a woman might experience on a given day. Including an instrument that does not exclusively focus on menstrual related moods (such as the MDQ), or a feature from menstrual related moods (such as the Born-Steiner Irritability Questionnaire) also reduced the possibility of bias as a result of focussing a participant's attention too exclusively on a subset of moods.

4.2.2.5 The Menstrual Distress Questionnaire (MDQ) – Rudolf Moos

The MDQ was developed in 1968 and has consistently been shown to yield reliable data on pre-menstrual 'symptoms' (Ross and Coleman, 2003) and is attached as Addendum D. The instrument contains 46 items that are rated from 'No presence of the symptom (0)' to 'Present, severe (4)'. The MDQ addresses 'symptoms' related to hormones through all the menstrual phases. Moos (1968) stresses the importance of using the same instrument in different studies of this nature to facilitate comparisons. He opines that, "The development of standard methods for collecting cross-sectional and longitudinal information on menstrual cycle symptoms would appear to be potentially useful both for comparing estimates of the prevalence and severity of symptoms in various populations and for more

careful study of the psychological and biochemical correlates of different types of menstrual and premenstrual distress" (Moos, 1968, p. 855).

A group of 839 women was tested in the initial development of the instrument, making use of a wide array of reported menstrual-related symptoms. Although the instrument is now more than forty years old, there have been consistent reviews and it has been found that there has been no "instrument deterioration" (Moos, 2010). Rudolf Moos has remained active in the field of menstrual related moods and still publishes current findings based on the MDQ.

The MDQ takes about two minutes to complete and Moos advises that it "be given repeatedly either in longitudinal investigations of change in menstrual symptomatology or in cross-sectional investigations of large samples of women to estimate prevalence and severity of different types of menstrual cycle symptoms" (Moos, 1968, p. 865).

Each participant completed the MDQ four times in a menstrual cycle and at least eight times during participation in this study. This allowed collation of cycle-related 'symptoms' from a single participant for all the different phases of the menstrual cycle.

4.2.2.6 The Born-Steiner Irritability Self-Rating Scale (BIQ) – Leslie Born and Meir Steiner

The BlQ was developed in 2008 (Born et al., 2008) and is attached as Addendum E. It has 14 rated items plus an additional seven items that make use of a visual analogue scale (VAS). This instrument was specifically designed to capture the intensity of a woman's irritability during her menstrual cycle. On this basis, the instrument was included rather than any of the other irritability/ aggression instruments listed above.

"Irritability is a prominent symptom in the spectrum of female-specific mood disorders" (Born et al., 2008, p. 344) and thus requires a separate instrument. The Born-Steiner irritability self-rating scale was developed to record female-specific state irritability and uses the core items of irritability identified by Born and her team: annoyance; anger; tension; hostility; and sensitivity to noise and touch (Born and Steiner, 1999). The instrument contains fourteen items that are rated from 'Not at all (1)' to 'Most or all of the time (4)'. In addition, the scale includes a VAS rated from 'Not at all' to 'Extremely' for a further seven items. The VAS introduces a ten centimetre horizontal line, with a start and end point (left and right), and asks the participant to rate a specific feeling on the scale, with left representing the lower end of the scale, and right representing the higher end of the scale.

Born et al. (2008) maintain that this instrument is able to identify a specific 'symptom' cluster for clinical assessment in an area that might have been overlooked in previous instruments testing for emotional disturbances during the reproductive cycle.

This instrument is included in the current study because in a cross-national survey on the impact of premenstrual symptomatology on functioning and treatment-seeking behaviour, Hylan and colleagues (1999) found irritability and anger to be the primary premenstrual mood 'symptoms' in 80% of 1045 subjects from the United States, the United Kingdom and France. In addition to these countries, Born et al. (2008) cite eight other authors who have found irritability to be the primary mood complaint in perimenopause, including studies in Taiwan, Norway, Guatemala, Morocco, Finland and Sri Lanka, concluding that this is a "cross-cultural phenomenon" (Born et al., 2008, p. 345).

4.2.2.7 Feedback Interview

One to one feedback interviews were conducted once all questionnaires from a particular participant were received and collated. Each participant was thanked for their participation and presented with graphs and summaries of their individually collated data. The participants and I then discussed the correlations between the

participant's cycle phase and moods, taking into consideration any major co-concurring life events. Participants indicated why they felt that their particular scores were particularly high or low and often gave more information about these reasons in terms of their life contexts. I articulated her own theories about certain correlations or patterns and the participants were invited to accept or reject these theories. All prevalent observations were recorded and utilised in the analysis of the findings.

4.3 Clinical data

When investigating a possible correlation between menstrual cycle and mood, both the physiology and psychology of the participant need to be assessed in a manner that is measurable and re-testable (Eid and Diener, 2006). In order for me to identify correlations between menstrual phase and mood, participants' daily position in the 28-cycle had to be determined with some degree of accuracy. Onset of menses was established by participants indicating the first day of menstruation in Question 7 of the SRD. I wanted to test some of the participants' bloods to see whether participants were in fact following the typical hormone fluctuations in a normal 28-day cycle, as described by Louanne Brizendine in her book "The Female Brain" (Brizendine, 2007).

In other studies that have focused on mood and sexuality, this has been done using clinical investigative methods to determine levels of, for example:

- Cortisol and Dehydroepiandrosterone (Symonds et al., 2004);
- Serum levels of FT, total Testosterone, SHBG, Estradiol, and Progesterone (Weiner et al., 2004);
- Testosterone, Androstenedione and other steroids (Abplanalp et al., 1979a; Sanders et al., 1983)

Weiner (2004) looked specifically into the impact of androgens on mood and Bancroft et al. (1983) focussed on describing changes in mood and physical state, whereas Abplanalp et al. (1979a) and Symonds et al. (2004) assessed the

correlations between endocrine functioning, related to the menstrual cycle, and mood.

Studies with a similar focus that did not use blood tests to determine cycle phase, tended to focus on the premenstrual phase only, utilizing onset of menstruation as their cycle phase indicator (Batra and Harper, 2003) or on the menopausal period in a woman's life, when monthly cycle phase is no longer as relevant (Soares and Zitek, 2008).

In this study, to establish whether participants followed a normal 28-day cycle, blood was collected from a sample group on Day 1, 14 and 21 of the cycle (Patel, 2014). Dr Malika Patel, an endocrine specialist from the University of Cape Town, based at Groote Schuur Hospital recommended these three days as those in the cycle when the hormone levels indicative of normal cycle functioning could best be captured. Day 1 is indicated by the onset of menses; Day 14 should correspond with ovulation, and Day 21 should be associated with dropping female hormone levels before the next onset of menstruation. On all three occasions the bloods were tested for Estradiol, Progesterone, FT, LH and SHBG. The presence, combination and level of these six hormones indicate at which phase of her cycle a woman is at the time of testing.

Test results were analysed by the pathology laboratory and these were interpreted by Dr Patel. She found that all results were indicative of normally cycling women. Unfortunately there was not enough funding to analyse bloods for all participants and therefore the cycle phases of the balance of the participants cannot be empirically stated. For this reason, this study makes use of cycle days to refer to participant progression through their menstrual cycles.

4.3.1 Electronic data collection

I used e-mail and text messaging to send and receive information and data from the participants. The decision to make use of an electronic format was supported by literature, which indicates that:

- research done in electronic format is easily converted to paper, but paper research is not so easily converted to an electronic format;
- compliance for a longitudinal study of this nature completed on paper (Huysamen, 1994) is 11%; and that
- electronic data collection reduces the chance of 'bundling' as the data could be submitted every day (bundled responses are when participants complete several weeks of a self-report diary entries on a single day before submission is due) (Eid and Diener, 2006);
- electronic data assured that compliance could be easily assessed and as there is no need to return forms by mail or in person, it lessens the burden on the participant (Rubinow, 2015).

An added advantage of using electronic data collection was that two sets of data were collected with every self-report submission: the data themselves and an electronic record of when they were submitted. Data were collected in Excel format and later transferred to STATA and Primer statistical programmes for analysis.

4.4 Summary of study measures: Interviews; Self-Report Diary and Questionnaires

The aim of this study was to ascertain whether there is a relationship between a woman's menstrual cycle and mood during her monthly menstrual cycle. To capture both the participants' experiences as well as the inter-relatedness of the components of their experience (systems theory), the research design had to record data on their physiological events; daily life experiences and the moods they experienced during participation. The SRD recorded menstruation dates as well as daily life events as well as moods experienced. As a new instrument, the SRD had to be validated by established psychometric instruments. This role was fulfilled by the

BRUMS, MDQ and Born Steiner Irritability Questionnaire. These three questionnaires covered a wide range of mostly psychological data pertaining to mood states specifically related to the menstrual cycle (MDQ); moods experienced in general (BRUMS) and the most prevalent mood experienced during the menstrual cycle – irritation (BIQ). The BRUMS and MDQ dove-tailed to ensure that both moods in general and those which have been associated with the menstrual cycle specifically, were captured adequately, while the Born Steiner Irritability Questionnaire has more items devoted to exploring a specific mood in depth.

4.4.1 Schedule of data collection

The data collection schedule is outlined in Table 3.4. Participants joined the study by returning their MMSQs, and taking part in the in-depth interview. If the in-depth interview confirmed their suitability for participation, the self-report diary and the other questionnaires were sent to the participants via e-mail. They were then tutored in the use of the questionnaires and invited to start completing and submitting their responses.

In-depth interviews were conducted at various times according to the availability of both participant and researcher, between 07h00 and 20h00, Monday to Friday until the required number of completed data sets had been reached.

Considering that there are fluctuations in a woman's cycle from one month to the next, a single cycle's data was deemed insufficient to show a pattern in her phase/mood correlation. Thus, as mentioned previously, the data for each participant were collected over at least a two-month period. Table 3.4 shows the application of each of the research instruments over that period. The administration intervals and number of repetitions were chosen to: avoid respondent fatigue; and to capture mood as accurately as possible through concurrent self-reporting.

Table 4.4 Data collection schedule

Week number	Venue	Activity
Weeks 1-4	n/a	Study recruitment commenced and website opened. Advertisements for research participants pasted to notice boards and distributed throughout False Bay area. Talks at library. Newspaper articles. Distribution of flyers. Advertising through various school talks and school and church newsletters. Canvas Dr's practices. Radio interview.
Weeks 1-4	n/a	Potential participants contact researcher through website and e-mail. MMSQ is e-mailed out. Completed MMSQ is received and reviewed for inclusion. Respondent attends in-depth interview and starts submitting data. After completion participant attends a feedback interview.
Weeks 9-20	Pathology Laboratory	Five participants each have blood tests done on days 1,14 & 21 of their second month of participation
Week 53	Groote Schuur	Submission of amendments to research proposal to Human Research and Ethics Committee requesting inclusion of ages 20 -50; medical students & students from the CNPDI.
Week 53	n/a	Permission for amendments to research proposal received from Human Research and Ethics Committee.
Week 70	n/a	The last data are collected.

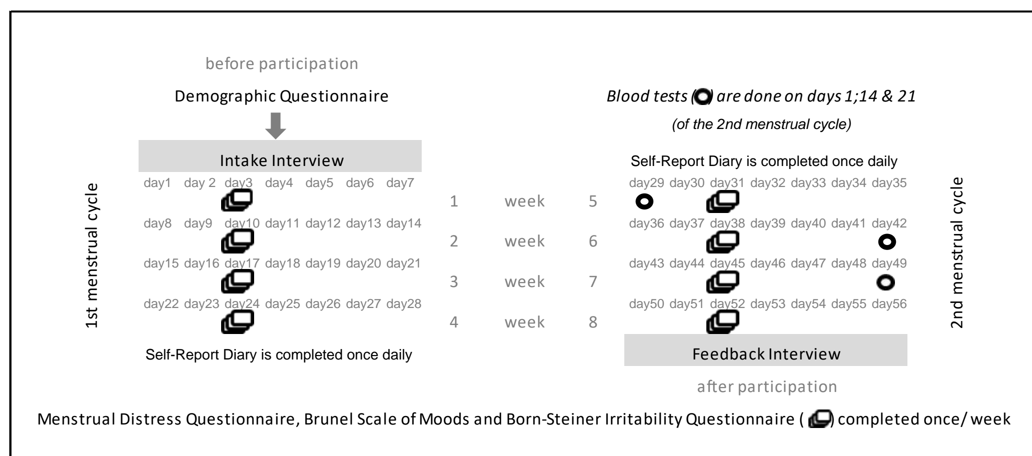


Figure 4.2 Timetable indicating the application of all research instruments over a two-month period

Collection of data was conducted in batches, with research participants who responded to the first round of recruitment running concurrently, followed shortly by all research participants who responded to the second round of recruitment and so on, until the desired number of data sets had been reached.

No stipulation was made about where in the participant's menstrual cycle a woman should start to collect her data, but in cases where two full menstrual cycles had not been captured in the two months, and where the participant was willing to do so, additional days or weeks of data collection were completed until two full menstrual cycles had been captured. All participants who were requested to extend their participation on this basis, obliged.

Blood tests were administered in the second month of a participant's data collection. Once the participant had completed and submitted data for one full menstrual cycle, the timing of the administration of blood tests in the second cycle was simple to predict (where applicable). Blood tests were done on Days 1 and 14 21 of the second cycle. If these days fell on a Sunday (the only day that the pathology laboratory could not collect bloods) participants had their tests early on the Monday.

Six sets of blood samples were collected and since the results from these correlated with the model of hormone distribution on which the study relies (Brizendine, 2007), no further blood tests were done (Patel, 2017).

4.5 Data analysis

Three main approaches were adopted for analysing the quantitative data. The first assessed whether particular moods were associated with particular cycle days and is discussed in section 4.5.2. In the second approach, individual graphs were compiled representing data for each instrument and is discussed in section 4.5.3. These two data analysis approaches aim to answer the research question: how do women feel and act during the different days of their menstrual cycles? The third approach investigated whether women can be grouped on the basis of similar moods on specific days in order to address the research question: if you group women together who feel and act similarly on the different days of their cycles, what will the groups look like, and is presented in section 4.5.4.

This approach is in line with Rubinow (2015), who found that there is a lack of generalisability from group findings to individuals of the same group (such as this sample) and therefore stressed the importance of analysing data on an individual level. Furthermore utilising data from the entire cycle assisted in drawing conclusions about within-person processes and informed insight into phasic changes. According to Rubinow's (2015) recommendations, data analysis should: 1.) include all data; 2.) be done at individual level and 3.) include between-group differences.

Two different statistical software packages were used to achieve these aims. The first is STATA, which is routinely used by the University of Cape Town to analyse data collected in the social sciences. Stata is a general-purpose statistical software package created in 1985 by StataCorp (StataCorp, 2015). Its capabilities include data management, statistical analysis, graphics, simulations, regression, and custom programming. With STATA, a two-level mixed model by restricted maximum likelihood (REML) estimation was used (West et al., 2015), with REML being a form of maximum likelihood estimation (MLE) that reduces the impact of outliers. This is discussed in more detail in section 4.5.2.

I was not satisfied that the STATA data analysis had answered the research questions satisfactorily and after much consultation about alternative ways to analyse the data for this study, I was encouraged to use PRIMER. The Plymouth Routines In Multivariate Ecological Research (PRIMER) is a statistical package that is a collection of specialist univariate, multivariate, and graphical routines for analysing species sampling data for community ecology. The subject matter normally studied through PRIMER was multi-source and biological and the analysis methods could indicate similarities and dissimilarities, which is what I was trying to gauge in my data. The parallel between river systems (with multiple components) and women (with multiple components), which are both living systems and in turn form part of greater systems, as described in systems theory, presented an opportunity for applying this statistical analysis method interdisciplinarily. Types of data analysed (with PRIMER) are typically species abundance, biomass, presence/absence, and percent area cover, among others. It is primarily used in the

scientific community for ecological and environmental studies (PRIMER V6; Clarke and Warwick, 2006). As far as I am aware, ecological software has never been used to analyse cycle-mood data and it was decided that it would be a good fit with the current sample as both rivers (PRIMER's usual source of data) and women, are biological entities with various factors that produce data over distinct time frames. None of the other statistical software analysis programmes that were investigated, offered this feature. The multivariate routines from PRIMER that seemed to fit best with the data from this study were: grouping (CLUSTER); hypothesis testing (ANOSIM); sample discrimination (SIMPER) and trend correlation (BEST), which are described more fully in section 4.5.4.

Finally, individual cases are discussed, with particular mood highs and lows as well as the spread of these across the cycle. Drawing on examples from the participants' data in short narratives that highlight their feelings in relation to the measuring instrument, brings the data to life in an illustrative way that indicates the real-world value of the data sets for each participant in the same way as it is anticipated that clinical data collection will assist clients/ patients in therapeutic settings. The co-measurement and analysis of quantitative and qualitative data results in a representation of multi-method findings with a higher utility in real world application. In other words, seeing the data represented as a full 'story', rather than just tabulated or outlined, gives the reader a sense of the aim of the research outcomes namely for the clinical application of questionnaires in a health or therapeutic setting.

4.5.1 Menstrual Mood Study Questionnaire data

The sample was described by summarising the information obtained from the MMSQs, which provided information on how many people met the inclusion criteria, and the biographical and other information related to each participant.

4.5.2 Moods and cycle days

To assess the effect of phase on moods, a two-level linear mixed model was implemented using STATA statistical analysis software (StataCorp, 2015). This method was employed across all measuring instruments. The menstrual phase was specified as the reference category, in other words, moods in other phases were assessed to see whether they were statistically different from those in the menstrual phase. A two-level mixed model was used instead of the standard analysis of variance (ANOVA) because the assumptions associated with ANOVA would have excluded any cases with missing data, for example, a participant who did not have data for a specific phase. ANOVA also assumes sphericity (the variances of the differences between all possible pairs of within-subject conditions are equal), which is a limiting assumption; whereas the two-level mixed model does not. A further advantage of mixed models is that they consistently handle uneven spacing of repeated testing, whether intended or unintended. Also decisive is that data analysed using this type of model is usually more intelligible than classical repeated measures. Finally, mixed models can also be protracted as generalized mixed models to non-normal outcomes (Seltman, 2012).

The models were fitted by restricted maximum likelihood (REML) estimation (West et al., 2015). REML is a form of maximum likelihood estimation (MLE) that reduces the impact of outliers. MLE estimates the likely parameters in a model based on measurements of a few individuals. In this study, these would be the likelihood of a particular mood being experienced in a particular phase, based on the mean and the variance of the moods experienced by all participants in that phase. REML assumes that the data are normally distributed.

Multiple correspondence analyses were not use in the analysis for individual mood patterns because this method identifies clusters rather than correlations between phase and mood, and were thus more appropriate for use in the testing for groupings discussed in section 4.5.2.

4.5.3 Individual mood patterns

Twenty eight participants were tracked over 60 days (average) of participation, utilising five distinct clusters of cycle days for comparative analysis. The sample was described using summary statistics including means, medians, standard deviations and counts (including with proportions).

Data sets were collated according to instrument: each of the BRUMS; MDQ; BIQ and SRD individual data were combined into a single Excel spreadsheet. Data collected from the BRUMS and MDQ were converted from test scores to standard scores using conversion tables from the instruments' own manuals. Each day of data was allocated a data label indicating: a letter designating participant; instrument name; cycle of participation; menstrual phase; day in that particular cycle phase; a full stop and lastly the day in that cycle (Table 4.5).

Table 4.5 Key to data labels

WBR3M1.1	
W	Denotes participant: Participant W
BR	Denotes research instrument: The Brunel Scale of Moods
3	Denotes number of cycle: Data was collected during the women's 3rd cycle of participation
M	Denotes menstrual phase: Data was collected during the Menstrual Phase
1	Denotes day of phase: Data was collected on day one of the menstrual phase
.	Full stop separating number before and number after
1	Denotes day of cycle: Data was collected on the first day of this cycle

Data from a particular instrument and for particular cycle days was then summed across all participants and divided by the amount of data sets, resulting in an average score for each item, per cycle day cluster (of which there were five during each monthly cycle). This was done so that it could be seen whether the score for a particular item would be similar during the same cluster of cycle days in one month compared to the next. In other words – across the sample group – do the same moods feature during the same days of the menstrual cycle? The data were represented graphically so that the average scores could be observed across the cycle days, indicating this similarity (or variance if not similar).

As can be seen in sections 5.2.4; 5.3.4; 5.4.4 and 5.5.4, the data were analysed individually before group analyses. Each participant's data were collated into a combined profile Figure 5.154 Summary of the data collected for one participant (Participant E) for all questionnaires administered.(Figure 4.14). Individual graphs were compiled representing data for each instrument.

Emphasis was placed on high and low scores (does the mood in question fall in a 'low' or 'high' category?). I commented on how mean scores compared (higher or lower) relative to the reference phase (menstrual). For example, the mixed model showed that some of the average feeling of sexual arousal scores (utilising the SRD) differed from the reference phase – the mean 'feeling of sexual arousal' scores in the mid-follicular and ovulatory phases were significantly different from the mean 'feeling sexual arousal' scores in the menstrual phase. In both cases the mean 'feeling sexual arousal' scores in the menstrual phase was lower than in both the other two phases. So here low and high scores were used to compare the mean scores on feelings of sexual arousal between the different phases. However feelings of sexual arousal scores were not classified as high or low based on a particular criterion. A two-level mixed model was used as it "provides a general, flexible approach in these situations, because it allows a wide variety of correlation patterns (or variance-covariance structures) to be explicitly modelled" (Seltman, 2012). The data were temporal as the same method was used to test the same participants, repeatedly (frequency data).

4.5.4 Testing for groupings based on mood

The moods of the participants were compared at two levels: 1) for individual menstrual days (grouped together in five clusters of days for each menstrual cycle)s and 2) several clusters of days combined. For both sets of analyses, multivariate analyses (PRIMER V6; Clarke and Warwick, 2006) were used to discern patterns of similarity within the participants based on the suite and intensity of moods they experienced during their menstrual cycle. Data were 4th root transformed. The 4th root transformation is a non-linear transformation that is aimed at normalising the

distribution of a sample (much in the same way that a log transformation would do for data with a log normal distribution). The 4th root transformation reduces the influence of outliers and boosts the presence of less prevalent moods at lower intensities. In other words, the 4th root transformation is a tool utilised to identify whether a particular feature (in this case mood) was present across a particular measuring period (menstrual cycle), even if the intensity of the mood was low – so presence of mood, rather than how high the scores were for that mood, could be identified.

Bray-Curtis similarity coefficients (also referred to as dissimilarity coefficients) were calculated between groups to identify trends and the results were displayed using CLUSTER analyses (Clarke and Gorley, 2006). The Bray-Curtis similarity (Bray and Curtis, 1957) is used to quantify the compositional dissimilarity between two different samples, based on abundance (or intensity) of groups (moods) in each sample. In ecology, it is typically used to measure the similarity (or dissimilarity) between sites on the basis of the abundances of the species that occur at each. In this study, it was used to show when moods were most intense across all cycle days and between distinct groups of women. The distinction of the group was based on the similarity in intensity of mood for individuals who were then ascribed to a group, with individuals with different mood intensities on the same days, being ascribed to a different group.

The index as applied here is:

$$BCij = \frac{2\mathrm{Cij}}{\mathrm{Si} + \mathrm{Sj}}$$

Where Cij is the sum of the lesser intensities for the moods that occur in both samples. Si and Sj are the total intensities of moods in both samples (adapted from Bray Curtis 1957).

ANOSIM (analysis of similarities; Clarke and Warwick, 2001), a non-parametric permutation procedure analogous to ANOVA was used to determine significance of separation between groups. So the ANOSIM indicated how different two groups

actually were in terms of their mood intensities on particular cycle days, whereas the SIMPER (similarity percentages) routine in PRIMER (Clarke and Warwick, 2006) was used to discern typical and differentiating moods between groups and the results were tabulated.

The PRIMER package was selected for use because the dendograms (see figures 5.2; 5.3; 5.6; 5.8 and 5.10) utilised in Primer are designed to show clusters (or groupings) in diagrammatic format. Primer has the ability to do hierarchical clustering into sample groups from where data can be rotated or collapsed (Clarke and Warwick, 2006). The methods make few, if any, assumptions about the form of the data ('non-metric' ordination and permutation tests are fundamental to the approach) and concentrate on approaches that are straightforward to understand and explain (Clarke et al., 2014). The attributes make PRIMER a powerful tool for describing and explaining pattern, which is what was required for testing for the groupings based on mood in this study.

4.5.5 Qualitative data analysis

This section deals with the qualitative data analysis as utilised in this study to make sense of both the open-ended written questions participants answered, as well as the field notes taken from the initial and feedback interviews. Initially there is a brief contemplation of thematic analysis, followed by a short discussion of Paul Collaizi as a psychologist and social scientist and the beliefs and thinking which led him to designing this method of data analysis, after which I move on to the method itself. The data analysis method is described in stepwise format, drawing on examples from this study to illustrate the method. Following an outline of the seven steps of Collaizi's method, the section concludes with a brief summary and some final remarks.

Boyatzi says that thematic analysis is a way of seeing and that seeing leads to encoding and interpreting. He emphasises the craftsmanship and intuition of the researcher as key skills in a process that calls for pattern recognition, openness and flexibility. He goes on to say that theoretical sensitivity is the ability of the

researcher to recognize what is important, give it meaning and conceptualize his or her observations, as described at length by Miles and Huberman in their book on qualitative data analysis (Miles and Huberman, 1994). With regards the process at work during analysis, Boyatzi says that thematic analysis enables the researcher to use a wide variety of information in a systematic manner that increases her accuracy or sensitivity in understanding and interpreting observations about people, but Silverman's warning to students that fieldwork and the resulting data is always more messy than social theories imply, lends a real-world insight to the perception that might be created by Boyatzi that such 'systematic' methods might be simplistic (Silverman, 1993). Boyatzi's premise that conducting qualitative research involves emotional, value-laden and theoretical preconceptions, preferences and world-views sits well within the social-interpretivist paradigm which acknowledges the researcher herself as a research tool which cannot be fully objective and plays a role in constructing beliefs about the data (Boyatzi, 1998). Haas supports this view, stating that the researcher's choice of concepts to describe ideas betrays her ideological bias (Haas, 1992) and Maxwell maintained that these concepts contain the researcher's goals and experiences (among other things) and so influences the design of the project (Anfora and Mertz, 2006). Zucker encourages the use of thematic analysis in case studies, underwriting Boyatzi's view that it is a systematic approach to ordering data in a scientific manner which can render usable results (Garner et al., 2009).

Collaizi was a social scientist with a focus in phenomenology, specifically in the subject area of psychology (Collaizi, 1973). He contemplated the nature of natural science research in relation to social science research and devised his own method (the Collaizi method) of analysing qualitative data, especially originating from interviews, written scripts and observations (Collaizi, 1978). He explains that natural science is often inaccessible to the layman and that natural scientists ensure a distance between their theories and their experiences and says that, by contrast, social scientists cannot hope to achieve the same distance (Collaizi, 1975). In his philosophising about objectivity he argues that objectivity can only reside where experience does not, and since social science depends on human experience, objectivity should not be the gold standard for research. He postulates that this lack of distance can create the impression that there is more intellectual

value in natural science research than in the social sciences, and for that reason, social scientists have to devise methods that satisfy the intellectual need without compromising the humanity of the subject matter. In fact, he reminds us that we must always remember that a research participant can never be viewed merely as a source of data, but always as an "exquisite person", and therefore advocates that gathering data should be a process of 'respectfully listening' (Collaizi, 1978, p.64). It is the great deal of thought that Collaizi put into analysing research in the social sciences, as well as the deductions he made and the way in which he was able to clearly express that which often remains abstract and intangible, which led me to utilising his qualitative data analysis method (Collaizi, 1978). His beliefs as outlined here were deliberately used in designing his analysis method and his descriptions of his own research encounters are a guiding hand at every stage of the research process, as when he considers that, "we will discover that our experience is always how we behave towards the world and act towards others." (Collaizi, 1978, p.52), which re-emphasised the need for questions in both the quantitative as well as qualitative sections of this study about how the participant (not only felt) but also acted (especially towards others). How these questions develop into valuable research findings is illustrated in Figure 4.3. Collaizi tried to design an analysis method in answer to a call for a method which "tries to sustain contact with experience as it is given" (Collaizi, 1978, p. 53). As a result the qualitative data in this study were handed with great sensitivity and consideration for who the participants are as people, how they project themselves into the world and what the intentions are behind their statements. Collaizi refers to his methodology as 'understanding-descriptive' (Collaizi, 1978), which is a concise summary of the way in which data were interpreted and represented in this thesis.

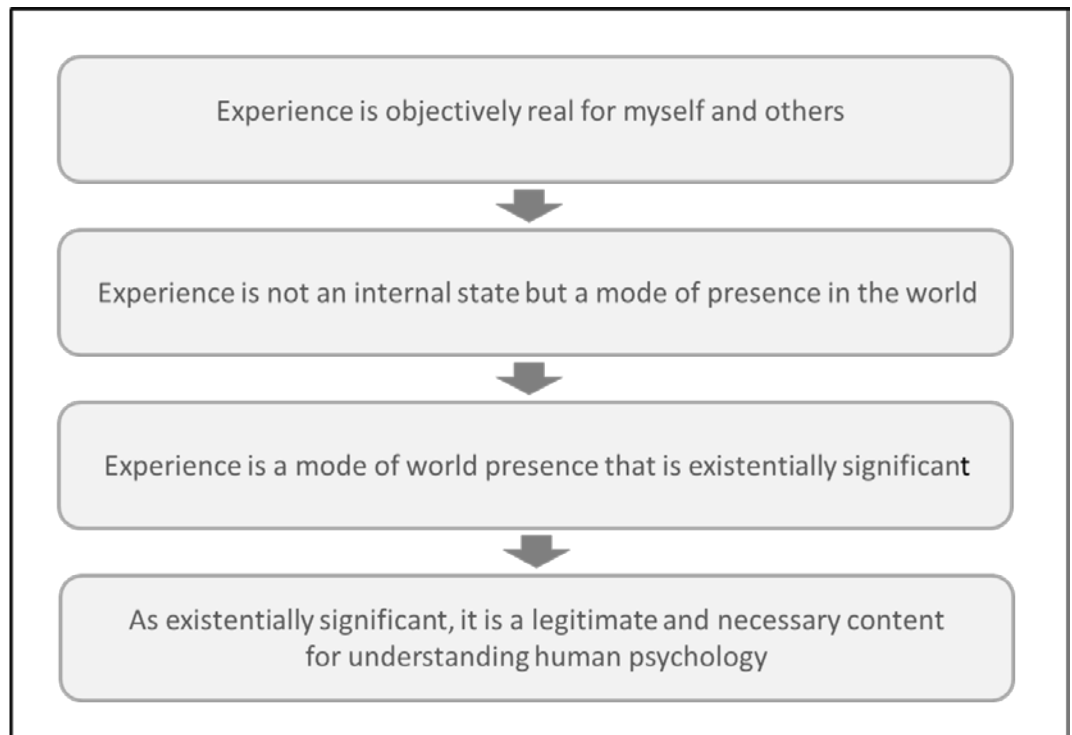


Figure 4.3 Collaizi (1978)'s description of why human experience is a legitimate research entity

What follows here is an outline of the seven steps of the Collaizi data analysis method (Collaizi, 1978):

Step one

Field notes were read several times to gain a sense of the whole content. This helped to explore the experiences of the participants.

Step two

In this stage of analysis, phrases pertaining to moods and the menstrual cycle were extracted from each transcript. Repetitions were eliminated and specific points were transposed to more general formulations resulting in significant statements and which were pasted in a separate document and coded by attaching the participant's allocated letter (e.g. 'A') to each statement. Forty eight significant statements were extracted from the twenty eight transcripts (Table 4.6).

Table 4.6 Examples of Significant Statements

Significant Statement	Participant
"When I explode it all comes out at once and it is all over."	B
"Over the last four to five months I have consciously said, 'I need to do something differently here.' "	D
"The days before I start menstruating, my mood changes, I am less patient, scratchy and irritated more easily."	K

Step three

This step entails spelling out the meaning of each significant statement by creating formulated meanings. Collaizi states that this process cannot be precisely delineated as it calls for 'creative insight' as the researcher moves from what the participant said to what the meaning was of what was said. He advises that these formulated meanings should discover and illuminate the data without severing all connection with the original interviews. Each underlying meaning was coded (categorized) in one category as the combined categories formed an exhaustive description of all significant statements. Categories at this stage of analysis were indicated by highlighting the data that fit in that category, a specific colour. I compared the formulated meanings with the original meanings maintaining the consistency of descriptions. A hundred and thirty two formulated meanings were derived from the forty eight significant statements (Table 4.7).

Table 4.7 How significant statements were converted into formulated meanings.

Significant statements	Formulated meanings
"I have had my fair share of time seeing a therapist of being in group therapy, working on this or that." (Participant B)	The participant reflects on past experiences with psychological therapy.
"Generally irritable. But could commit murder during those two weeks." (Participant H)	Participant indicates a level of a particular emotion during a specific time in her menstrual cycle.
"I am very tantrummy, get very upset, jealous, very happy and incredibly sad all day long." (Participant M)	Participant shares how a mood can impact on her overall life satisfaction.

Step four

After creating the formulated meanings, the data from the different sources are aggregated and the process of grouping all these formulated meanings into categories that reflect a unique structure of clusters of themes was initiated. Each

cluster of themes was coded to include all formulated meanings related to that group of meanings. Groups of clusters of themes that reflect a particular issue were incorporated together to form a distinctive construct of themes. Collaizi advised that researchers should have a tolerance for ambiguity because, “what is logically inexplicable may be existentially real and valid.” (Collaizi, 1978, p. 61). During this part of the analysis, I did not find data or themes which contradicted each other or were completely unrelated to other data. All these themes were internally convergent and externally divergent; meaning that each formulated meaning fell only in one theme cluster that was distinguished in meaning from other structures (Mason, 2002). During the process of creating and grouping theme clusters, they illuminated each other, resulting in subtle differentiations relating to the core issues highlighted by participants (Glaser and Strauss, 2006). It is at this stage that theme clusters might appear to over-lap to some degree. Further interrogation of the data, especially in the form of discussion with a fellow researcher about whether the cluster of themes imply anything that was not intended in the original interviews, led to some theme clusters being combined, and others further differentiated, to clarify the strongest recurrent participant concerns (Golafshani, 2003) (Table 4.8).

Ten theme clusters emerged which were grouped into five emergent themes. Table 4.8 shows an extract from the process of constructing the first theme ‘Menstrual cycle related moods, behaviours and physical sensations’ through integrating various clusters of themes.

Table 4.8 Example of how the first theme ‘Menstrual cycle related moods, behaviours and physical sensations’ was constructed from different formulated meanings and clusters of themes (extract only).

Formulated meanings	Theme cluster	Emergent theme
Participant has self-diagnosed as having experienced PMS. (A) (C) (E)	Experience of pre-menstrual moods/ behaviours/ physical sensations	Menstrual cycle related moods, behaviours and physical sensations
The participant states that she gets physical manifestations before the onset of menstruation, e.g. headache. (A)		
The participant states that she is most irritable between days eight to fourteen of her cycle, especially after ovulation. (J)	Correlations between a specific mood and day/s of the cycle (not premenstrually)	
The participant reports that she becomes insular during ovulation and withdraws from interactions with people. (N)		
The participant is aware that her emotions escalate until she has a verbal explosion. (B)	Emotions associated with cycle	
The participant describes her cycle related emotions as being challenging because they oscillate rapidly between extreme highs and lows. (M)		

Step five

At this stage of analysis, all emergent themes were defined into an exhaustive description. After merging all study themes, the whole structure of the phenomenon 'relationships between women's moods and their menstrual cycles' was extracted.

Step six

This step was a continuation of the previous one, with a re-investigation of theme clusters and themes. One of the original themes, namely the impact of diet on mood and mood on diet, was removed, as its initial value was over-estimated and therefore found to be redundant. Other clusters of themes were further combined to result in the final five themes. This level represented the most abstracted representation of the original interview data (Martin and Hanington, 2012). Identifying themes into a cohesive whole which aligns with the research aims is a

step-by-step process that identifies, organises, and connects the data in a way that speaks to the heart of the research investigation (Attride-Stirling, 2001) and which later become the research narrative (Martin and Hanington, 2012). This resulted in the final thematic map, which is represented as Table 4.9.

Table 4.9 Final thematic map

Theme 1: Menstrual cycle related moods, behaviours and physical sensations
(41 Formulated Meanings)
Experience of pre-menstrual moods/ behaviours/ physical sensations
Correlations between a specific mood and day/s of the cycle (not premenstrually)
Description of the impact that cycle related moods has had on daily life
Emotions associated with cycle
Perceived impact of cycle related mood on others
Perceived impact of cycle related moods on self
Moods/ behaviours/ physical sensations that are associated with cycle because they are different to the participant's norm

Theme 2: Perceived life satisfaction
23 Formulated Meanings
Level of satisfaction with work
Level of satisfaction with home-life
Significant stressors in life
Participation in activities outside of home and work
Perception of own health
Perception of state of mind

Theme 3: Sex life
23 Formulated Meanings
How participant feels about her sex life
Reports on and feelings about perceived low libido
Frequency of sex and desired frequency of sex
Interventions to do with sex life
Feelings about sex
Thoughts about participant's sex partner
Reasons for not having sex
Sex and the menstrual cycle

Theme 4: Strategies for ameliorating the effects of perceived negative cycle related moods
11 Formulated Meanings
Strategies devised to cope with cycle related moods
Interventions for cycle related moods

Theme 5: Impact of study participation on participants
34 Formulated Meanings
Level of awareness and self-monitoring prior to participation
Perceived meaningfulness of participation in this study
What particular benefit the participant experienced
Feelings related to individual data feedback
Level of understanding of mood/ cycle correlations after participation
Reflections on the process of recording moods
Reports of change in behaviour due to participation in this study

Step seven

In Collaizi's method, this step would incorporate 'member checking', where the findings to date would be reflected back to the participants to validate the study findings. This step was incorporated during the fieldwork stage, when participants took part in their individual feedback interviews. At that time, their own data was

reflected back to them and they had the opportunity to engage with the findings and give their opinions on its validity. All participants supported the validity of the findings.

In summary, the Collaizi qualitative data analysis method described as understanding-descriptive, was utilised to analyse all written as well as interview data. I found that this method offered a structured and thorough reading and understanding of the participant data while at the same time maintaining the integrity of the participants and resulted in a thematic map which facilitated a concise summary of the qualitative study findings. The full findings are outlined in Chapter 6 and discussed in Chapter 7.

4.6 Ethical considerations

Potential research participants had free access to the study website where the study motivation and the participation process, were all clearly outlined. They were informed that participation would entail two in-depth interviews of at least one hour each book-ending two cycles (or in the region of 56 days) of daily data gathering (of approximately two minutes) as well as weekly data gathering (of about 10 minutes) and potentially three blood tests (at the cost of the study). I also made my e-mail address freely available and prospective participants were encouraged to contact her with any questions or concerns. I made an effort to respond quickly and respectfully to all prospective participants whenever they contacted her.

This study design covered the core principles from the World Medical Association's Declaration of Helsinki (7th edition – 2013) encompassing the ethical principles for medical research involving human subjects. Prior to the start of the study, a research protocol was submitted to and approved by the Human Research Ethics Committee of the University of Cape Town (UCT).

The main purpose of this study was to understand a human condition and related behaviour and to improve existing interventions. The study was executed ethically and respect for participants was promoted and ensured. Participants' rights were protected, including their: dignity, integrity, right to self-determination, privacy, and confidentiality of personal information. I obtained the appropriate ethics and scientific education, training and qualifications to conduct the study as well as a professional registration with the Health Professions Council of South Africa. Groups that are underrepresented in medical research were given access to participation in the study (although e-mail was ultimately utilized, only one potential participants who did not have e-mail access applied to be a participant and, for her, arrangements were made for short message service (sms) submission). I conducted a thorough predictable risks and benefits assessment and put in place an extensive referral system. Risks were monitored continually during the study. Based on these assessments, no modifications to the study were necessary, and none of the participants had the need to make use of the referral system. Participants reported experiencing a benefit during and after participation in the study. Every precaution was taken to protect the privacy and the confidentiality of participants' personal information. All qualitative data was anonymised. All participants were invited to contact the researcher after conclusion of their participation should they require further information or counselling regarding the findings in their data during participation (WMA, 2013). Once enrolled in the study, all participants read and signed the study consent form, which outlined the above.

During the in-depth interview I took time to make sure participants understood the study and their contributions towards the study. I engaged participants in conversation about their personal histories, current circumstances and their relationships and sex lives. I used my clinical skills and experience to support the participants through this process of sharing.

Prior to embarking on the study, I designed an extensive referral network in the event that any participants who required referrals for psychological or physiological issues - including substance abuse; spousal abuse; endocrine or gynaecological issues; children with developmental problems (including learning difficulties) or

legal issues. No such referrals were necessary. Once participants had completed their data, I referred some participants to a gynaecologist (to address an issue with painful and long periods) and an endocrinologist (for assessment and treatment of hormone associated moods). No other referrals were required.

Participants were each allocated a research number and the list connecting the participant's name and data to the number was stored on an external hard drive which was password protected and accessible only to me. No data that could identify a research participant were used in this thesis, nor will they be used in any other forum at any later date. Blood samples were destroyed after analysis and blood results were only made available to the participants from whom they were taken.

4.7 Limitations and challenges of the methods

4.7.1 Participation fatigue and attrition

As with all similar studies, the screening of potential research participants is vital to the study's successful outcome (Abplanalp et al., 1979 a; Haskett and Abplanalp, 1983). Given that each participant was required to contribute data for a full two months (and in some cases more), it was important to try to minimise research fatigue. The first point of contact which required a time-input from the potential respondent was the MMSQ. The questionnaire made use of multiple choice options and took approximately 10 – 15 minutes to complete.

The second requirement from the participant was to attend a in-depth interview. This was the most onerous part of the participant's participation. The in-depth interview took, on average, an hour to complete. To facilitate research participants, I had three possible venues for this interview, all offering privacy and comfort and situated at points throughout the greater Cape Town area for ease of accessibility. Participants were also offered the option of doing the interview telephonically. Other instruments were less onerous to complete, such as the mood questionnaires, which the participants had to complete once a week. The

questionnaires contained between 21 and 46 items and took about two minutes each to complete. In addition, e-mail was used for the collection of the daily and weekly data. This process took no more than a minute or two per day.

Three participants ended their participation in the study prematurely due to their own time constraints. In all instances these constraints were punctuated by a sudden and unexpected increase in demanding personal events or work responsibilities. All other participants reported that their participation did not make undue demands on their time and that the personal insights they gained from recording the data out-weighed the effort they made to continue their participation.

4.7.2 Drawing blood samples

It was initially anticipated that blood samples would be taken by a registered freelance phlebotomist; collected by me and transported to the government service for analysis. This impacted on the recruitment plan (especially advertising) for the study as I was limited to potential participants who could access a central collection point. I was later able to enrol a privately funded laboratory testing pathology service, PathCare, with laboratories situated widely across the whole of South Africa, as a research partner. As samples could now be collected anywhere in South Africa, participants could be recruited far more widely. The challenge to this study was that this second plan was only put into place once the bulk of the recruitment plan had been rolled out and I did not have the resources to expand the recruitment campaign at this particular point in time other than through limited digital platforms.

4.7.3 Digitisation of the Self Report Diary

At the start of her research planning I planned to make use of a digitised version of the Self-Report Diary. She approached ten different technology companies who offer the service of creating digital phone applications. She further pursued the initial communication and quotations supplied by the service providers, by having

in person interviews with three of these companies. The cost of the development of the applications was high and in order to cover these costs, I reached out to the University of Cape Town's Research Contracts and Innovation Unit (RCI). After several meetings the project manager informed me that the application could not be developed through the RCI until she had published her thesis. Further avenues for funding of the application were explored, but none were successful.

4.7.4 Expanding the participant base from local to national/ international

The subsequent plan put into place was to centralise all data gathering. Both blood samples as well as questionnaire data would be collected at a central point in the False Bay area and I had made arrangements to utilise two venues for this purpose.

During the in-depth interviews, held at three venues (as well as telephonically), prior to blood sample and questionnaire data being gathered, participants indicated that they would find it difficult to contribute data at a specific venue and would prefer to send their data over e-mail. As the motivation for the research design of data gathering required daily data gathering to eliminate 'data bundling', but could not fault the process being conducted digitally rather than at a central point, the research design was adjusted to facilitate daily data submission via e-mail. An amendment to this effect was approved by the UCT Human Ethics Research Committee. A centralised research hub would have resulted in more one on one contact between me and the research participants, potentially resulting in richer qualitative data gathering.

4.7.5 The researcher/supporter

The tension between the role of researcher and supporter, especially during the course of life-experience research is well documented in mental health and other social sciences literature. The boundaries between these two roles may tend to blur albeit minimally or unintentionally.

The research participants were advised that I could not play an overly supportive role during data collection (therapeutic intervention would bias data) and so these therapeutic responses were limited. However, even perceptions of support, particularly during interviews where natural, human empathy was expressed (however unintentional) worked to motivate participants to continue participation, thus lowering attrition during particularly difficult times in participants' lives.

At least three participants reported that they felt an obligation towards me to continue with data submission because they felt they had 'gotten to know her' and 'saw the importance of the science behind the study' because of interactions during the in-depth interviews.

5 Results – Quantitative Data

This was a multi-method study making use of both quantitative (MMSQ; SRD; BRUMS; MDQ and BIQ) as qualitative data (in-depth interviews and open-ended questions). Twenty eight participants completed all requisite questionnaires for a period of two (or more) months each. All 28 sets of data were analysed and the resulting data was reported here, by firstly referring to the MMSQ, followed by the endocrine data and then the SRD and the other three quantitative instruments, before moving on to the qualitative data in the next chapter.

5.1 Menstrual Mood Study Questionnaire (MMSQ) Findings

Forty five potential research participants completed the MMSQ and of these, 28 went on to complete all other requisite questionnaires for a period of two menstrual cycles. Attrition was highest after completion of the MMSQ but before completing the first month of data entry. Possible reasons may have been that potential participants re-considered making the time commitment and decided to withdraw from the study or because they found their attention drawn to other matters such as home or work life. Once participants started submitting data the attrition rate dropped dramatically, possibly because the participants then felt committed or were eager to see the results of their data. For this reason, I invited potential participants to start submitting data a week or so before conducting the in-depth interview. In this way, interviews (the most onerous of the researcher's tasks) were limited to those participants who were already committed to the study.

The MMSQ contained 12 sections: biographical information; educational information; occupational information; income; health; pregnancy and children; diet and exercise; stress and relaxation; relationships and sex; menstruation and hormone history; self-care and hormone/ mood history. Only data from the participants who completed all study requirements were analysed and are summarised in Table 5.1. The questionnaire is affixed as Addendum A.

Table 5.1 Summary of data from MMSQs

Parameter	Number replies	Mean	Standard deviation
Age (in years) at time of participation	28	37.50	8.44
Number of languages spoken	28	2.07	0.60
Number of pregnancies	28	1.50	1.40
Number of children born to me	28	1.25	1.14
Number of abortions had to date	28	0.07	0.26
Current weight (in kilogrammes)	27	67.30	7.93
Age (in years) at onset of menstruation	26	12.50	1.17
Average days of menstruation	24	5	1.93

Parameter	Number replies	Total 'yes'	Total 'no'	Percentage 'yes'
Employed (including self-employed)	28	21	7	75.00
Happy with work on a day-to-day basis	21	17	4	80.95
Work is stressful	20	12	8	60.00
Have existing health issues	26	6	20	23.08
Have had an addiction	28	1	27	3.57
Practice alternative health strategies	28	8	20	28.57
Eat a balanced diet	28	24	4	85.71
Have a marked sugar intake	28	2	28	7.14
Have noticed how sugar affects moods	28	14	14	50.00
Have had an eating disorder	28	4	24	14.29
Exercise at least twice a week	28	15	13	53.57
Have a hobby	28	19	9	67.86
Take part in organised sport	28	2	26	7.14
Do volunteer work	28	7	21	25.00
Take part in alternative exercise	28	13	15	46.43
Have high life stressors	28	8	20	28.57
Have a pet/ pets	28	18	10	64.29
Home life is stressful	28	7	21	25.00
Home life is happy	28	24	4	85.71
Sex life is active and rewarding	26	14	12	53.85
Sex life is non-existent	28	12	16	42.86
Sex life is abusive	28	0	28	0.00
Am happy with sex life	28	13	15	46.43
Take pain medication during menstruation	26	14	12	53.85
Take time off from work during menstruation	25	3	22	12.00
Know when ovulation happens	27	18	9	66.67
Have had issues with fertility	24	6	18	25.00
Have had mood dissatisfaction prior to menstruation	28	21	7	80.77
Have seen other correlation between cycle and moods	27	21	6	77.78
Have employed strategies to cope with cycle related moods	26	13	13	50.00
Cycle related moods has had a significant impact on life	26	17	9	65.38
Have sought treatment for the psychological effects of cycle	26	12	14	46.15
Psychological treatment would have helped me be happier	26	19	7	73.08

Parameter		Number	Percentage
Language spoken at home	English	23	82.14
	Afrikaans	1	3.57
	English and Afrikaans	3	10.71
	Tsonga	1	3.57
	Total number of replies	28	
Educational level	Grade 10	2	7.14
	Grade 12	4	14.29
	Some tertiary	15	53.57
	Honours' degree	2	7.14
	Masters' degree	4	14.29
	PhD	1	3.57
	Total number of replies	28	
Occupation	Hospitality	1	3.57
	Student	3	10.71
	Home	1	3.57
	Sciences	1	3.57
	Administration	1	3.57
	Finance	2	7.14
	Education	3	10.71
	Holistic Health	2	7.14
	Communications	3	10.71
	Entrepreneur	4	14.29
	Medical	3	10.71
	Sales	3	10.71
	Psychology	1	3.57
	Total number of replies	28	
Monthly income	Below R10000	4	14.29
	R10000 - R20000	9	32.14
	R20000 - R30000	4	14.29
	Above R30000	6	21.42
	Not applicable/indicated	5	17.86
	Total number of replies	28	
Combined monthly income (participant and partner/ husband)	R10000 - R30000	6	21.43
	R30000 - R50000	13	46.43
	Above R50000	4	14.29
	Not applicable/indicated	5	17.86
	Total number of replies	28	
General health	Below average	3	10.71
	Average	7	25.00
	Good	18	64.29
	Total number of replies	28	
Parameter		Number	Percentage
Smoking	Yes, about ten per day	6	21.43

Parameter		Number	Percentage
	Yes, about 20 per day	2	7.14
	Yes, about 30 per day	1	3.57
	No	19	67.86
	Total number of replies	28	
Alcoholic beverages per week	0	10	35.71
	1 to 5	11	39.29
	6 to 10	6	21.43
	More than 10	1	3.57
	Total number of replies	28	
Relationship status	Heterosexual	28	100.00
	Married	18	64.29
	Living with partner	4	14.29
	Involved, but living apart	1	3.57
	Single	2	7.14
	Not indicated	3	10.71
	Total number of replies	28	
Libido	Low	6	21.43
	Average	18	64.29
	High	3	10.71
	Not indicated	1	3.57
	Total number of replies	28	
Masturbate - number per month	Not at all	14	50.00
	1-5	10	35.71
	6-10	1	3.57
	10+	1	3.57
	Not indicated	2	7.14
	Total number of replies	28	
Sex - number per month	Not at all	6	21.43
	1-5	12	42.86
	6-10	4	14.29
	10+	4	14.29
	Not indicated	2	7.14
	Total number of replies	28	
How many times per month would you like to have sex?	Not at all	0	0.00
	1-5	4	14.29
	6-10	10	35.71
	11-20	6	21.43
	20+	2	7.14
	Not indicated	6	21.43
	Total number of replies	28	
Parameter		Percentage	
Wish for amount of sex exceeds current amount of sex	Does exceed	18	64.29
	Doesn't exceed	5	17.86

Parameter		Number	Percentage
	Not indicated	5	17.86
	Total number of replies	28	
Menstruation flow intensity	Light	4	14.29
	Medium	12	42.86
	Medium-heavy	1	3.57
	Heavy	8	28.57
	Very heavy	2	7.14
	Not indicated	1	3.57
	Total number of replies	28	
Does menstrual flow intensity fluctuate	Yes	14	50.00
	No	12	42.86
	Not indicated	2	7.14
	Total number of replies	28	
Use of sanitary pads and tampons	Only use sanitary pads	3	10.71
	Only use tampons	13	46.43
	Use a combination	9	32.14
	Use something else	0	0.00
	Not indicated	3	10.71
	Total number of replies	28	

The mean age of the participants was 37.8 years (median = 38 years); the youngest was 19 years and the oldest was 50 years. Eighty two percent of participants spoke English at home and the participants spoke a mean of two languages. The biggest grouping for individual income was 32% earning between ten and twenty thousand Rand per month and the biggest grouping (46%) for joint income was between thirty and fifty thousand Rand per month. Eighty one percent of the participants were happy in their work and 60% viewed their work situation as being above-average in terms of stress. Sixty eight percent of participants did not smoke and 35% drank no alcohol, with 21% drinking six or more alcoholic beverages per week, mostly wine. All participants identified as heterosexual, and 64% were married. The mean for the onset of menstruation was 12.5 years with a standard deviation of 1.17, with the mean length of menstruation at 5 days. The participants had a mean of 1.25 children per person and two of the participants had had abortions.

During the process of data analysis, the following demographic data was found to be of particular relevance and will be explored further in the Discussion chapter:

Fifty three percent of participants had some tertiary education with 25% having obtained a post graduate degree. Twenty one percent of participants were employed in the health field.

Ten percent of participants reported their own health as 'below' average. Fourteen percent of participants indicated that they did not follow a nutritional diet and 7% felt that they ate an above average amount of sugar, while 50% reported that they were aware of how the way they ate influenced their moods. Fifty three percent exercised at least twice per week, with 46% partaking in alternative exercise such as yoga; 7% took part in organised sport; 67% had a hobby; 25% did volunteer work and 64% had pets. None of the 28% of participants who said their lives were stressful took part in sport or did any kind of volunteer work. Twenty five percent of participants reported extraordinary stressors in their lives such as a live-in mother or child with a chronic health condition (particulars drawn from interviews).

Fifty three percent of participants were happy with their sex lives, with 42% reporting that their sex lives are 'non-existent'. Sixty four percent of participants would like to have sex more regularly than they are currently. Twenty one percent of participants indicated that they felt they had low libidos. None of the participants were in a sexually abusive relationship during participation in the study.

Fourteen percent of participants described their bleeding as light; 42% as medium and 28% as heavy, with 50% stating that their menstruation fluctuated over time and 42% that it stayed the same. The majority of participants indicated that their periods lasted on average 5 days, with one menstrual period lasting as few as 2 or as many as 12 days. Fifty three percent of participants experienced so much pain during menstruation that they took pain killers and 12% so much pain that they had taken days off from work.

Eighty percent of participants reported that they had experienced mood dissatisfaction prior to menstruation and 77% indicated that they had also noticed correlations between their menstrual cycle and moods outside of the premenstrual period. Fifty percent reported that they had employed strategies to plan for or cope with moods associated with their menstrual cycle. Sixty five percent felt that their cycle related moods had had a significant impact on their lives and even though 46% had sought some sort of intervention for the psychological effects of their menstrual cycle, 73% said that they felt their lives would have been improved had they sought intervention for cycle related mood dissatisfaction.

5.2 Self-Report Diary (SRD)

5.2.1 Description of instrument

The SRD was designed by the researcher as described in 4.2.2.3.

The SRD contained eight items. The first six related to a participant's mood as she experienced it during her day (SRD's had to be completed as close as possible to six o' clock in the evening). The first three items pertained to negative mood, for example: 'How weepy did I feel today?' and contained the following descriptor: reacting to TV/ children/ music/ news stories/wept or nearly wept/ finding the world harsh/seeing love and pain acutely. The last three items pertained to positive mood, for example: 'How nurturing did I feel today?' and contained the descriptor: wanted to cook and clean/ spend time with my children, partner/ wanted to buy a homeless person a meal. These items had to be rated from 0 (not at all) to 5 (incredibly so) – and was therefore an even numbered Likert scale. Item seven asked: 'Did your period start today' –using menstruation as the definitive marker in determining a participant's cycle phase. Lastly question eight asked: 'Did anything dramatic happen in your life today?' with the descriptor, for example: pet passed away/ lost my job/ won the lottery/ got engaged/ moved house. This question was included as Dr Patel (personal correspondence) indicated that external events can

trigger endocrine reactions which could over-shadow the normal mood fluctuations of the menstrual cycle endocrine events (Patel, 2014).

5.2.1.1 Adjustments to content or use of the instrument

The SRD was sent to participants via e-mail and they submitted their daily scores by return e-mail. Participants were further asked to submit a few words to describe the dramatic event (if present) on a particular day. This was included as it aided me and the participant in understanding the participant's data better during the feedback interview. For example, when Participant A's data indicated that she felt very depressed for three days during a time in her cycle when she would normally feel positive, she reported that her beloved cat had passed away at that time.

5.2.2 Self-Report Diary (SRD) findings

Participants completed a total of 1799 self-report diary days at an average of 64 per participant, with the shortest being 21 days and the longest 136 days of participation. Most self-reports were collected during the menstrual phase, followed by days 15-21 with the smallest number of data sets collected during days 11-14. Each participant experienced an average of two menstruations during her participation. These data are represented in Table 5.2.

Table 5.2 Summary of data sets (n=28) collected per participant for each cycle phase and in total using the Self-Report Diary

Participant	Total days recorded	Days 1-5	Days 6-10	Days 11-14	Days 15-21	Days 22-28	Menstrual Periods
A	74	12	15	12	18	14	2
B	96	6	5	3	6	7	1
C	66	11	10	8	14	10	3

Participant	Total days recorded	Days 1-5	Days 6-10	Days 11-14	Days 15-21	Days 22-28	Menstrual Periods
D	69	5	5	4	7	4	2
E	99	12	10	8	14	38	3
F	58	5	5	4	7	0	1
G	67	11	10	12	14	9	3
H	97	10	3	0	0	0	2
I	66	15	12	8	14	16	3
J	57	9	10	4	7	7	2
K	71	15	14	8	13	10	3
M	136	15	0	0	0	0	4
N	66	10	10	8	14	13	3
O	61	7	10	13	10	8	3
P	75	11	10	8	14	21	3
R	60	13	10	8	14	11	3
S	62	15	4	4	4	4	3
T	62	14	15	11	14	8	2
U	50	11	10	8	12	8	2
V	53	11	10	8	12	10	3
W	62	14	15	13	13	6	2
PA	37	9	4	3	6	5	1
PB	21	5	5	4	7	0	1
PC	61	5	5	4	7	5	1
PD	22	5	5	2	0	5	1
PE	27	10	3	0	0	9	1
PF	47	10	10	8	14	5	2
PG	29	5	5	4	5	5	1
Total	1751	281	230	177	260	238	59

5.2.3 Moods and cycle days

The summary scores depicted in Table 5.2 represent the sum of the 28 participants' most prevalent moods according to cycle days. Feeling energetic and feeling nurturing scored highest across all days; and feeling weepy scored the lowest. The highest feeling weepy scores were during days 6-10, followed by the menstrual

phase. Feeling weepy was never the most prevalent mood during days 11-14, days 15-21 or days 22-28. Aggression was relatively low across all cycle days, but was highest during days 22-28 (or premenstrual phase). Aggression was rated by some women as their dominant mood during the menstrual phase, days 11-14 and days 15-21, but no participants rated it as dominant during days 6-10. Depression was most prevalent during days 11-14, followed by the menstrual phase, days 15-21, days 22-28 and days 6-10.

Table 5.3 Sum of participants most prevalent moods according to cycle days

Mood	Days 1-5	Days 6-10	Days 11-14	Days 15-21	Days 22-28
Feeling Weepy	1	3	0	0	0
Feeling Aggressive	2	0	2	2	4
Depressed	6	4	7	5	4
Feeling Energetic	14	13	11	13	11
Feeling Sexually Aroused	5	7	4	2	0
Feeling Nurturing	10	11	11	12	8

Table 5.4 presents the total and average scores (from all 28 participants) for all moods, per cycle days; and the total number of days when negative moods scored zero (0). Whereas Table 5.3 reports on the prevalence of each mood per cycle days, Table 5.4 shows the intensity of the mood per cycle days, expressed in the total of all scores for that mood on particular days as well as the average drawn from the total and divided by the number of scores collected for that particular mood (on those particular days). The lowest incidence of a negative mood was on days 22-28, where participants reported feeling weepy on 21% of days recorded. The highest was in the menstrual phase, when feeling aggressive was reported for 70% of days. The intensity of the moods (on a scale of 0 to 5) also varied with the lowest being 1.26 for depression during days 11-14, even though depression was found to be most prevalent during these days. In reality intensity levels fluctuated between low and high depending on person and cycle days. In general, negative moods present almost constantly but at a low intensity.

Table 5.4 Total and average scores (n=28) for all moods, per cycle days; and the number of days with no negative moods

		Feeling Weepy	Feeling Aggressive	Depressed	Feeling Energetic	Feeling Sexually Aroused	Feeling Nurturing
Days 1-5	Total scores	296	347	351	541	246	523
	Average	1.05	1.23	1.25	1.93	0.88	1.86
	Days with zero for negative moods	141	97	110			
Days 6-10	Total scores	208	195	248	504	325	475
	Average	0.84	0.79	1.00	2.03	1.31	1.92
	Days with zero for negative moods	132	122	109			
Days 11-14	Total scores	179	174	223	394	259	379
	Average	0.95	0.92	1.18	2.08	1.37	2.01
	Days with zero for negative moods	100	79	73			
Days 15-21	Total scores	190	301	278	554	314	521
	Average	0.67	1.07	0.99	1.96	1.11	1.85
	Days with zero for negative moods	168	110	115			
Days 22-28	Total scores	195	263	228	484	271	473
	Average	0.76	1.03	0.89	1.89	1.06	1.85
	Days with zero for negative moods	143	105	109			

The days on which feeling aggressive were reported as the most and second most prevalent mood are summarised in Table 5.6. In general scores for feeling aggressive were relatively low compared with those for other moods, and were highest on days 22-28. Feeling aggressive was rated by some women as their dominant mood on all days except days 6-10. Feeling aggressive was the most prevalent mood 6.7% of the time and as second most prevalent 12.7% of the time.

Table 5.5 Cycle days on which feeling aggressive was reported as the most and second most prevalent mood

Cycle days	Most prevalent	Second most prevalent
Days 1-5	2	6
Days 6-10	0	3
Days 11-14	2	4
Days 15-21	2	2
Days 22-28	4	4
Total	10	19

A two-level linear mixed model was implemented using STATA statistical analysis software to assess the effect of cycle days on the various moods (StataCorp, 2015). This was done to differentiate whether moods differ depending on cycle days. In each 'mood' model, the participant was declared a random effect to assess variability among individuals, while cycle days was declared a fixed effect. A covariance structure for the participants where all variances are equal and all co-variances are 0 was specified. For all moods, the distribution of the standardised residuals, which represent the difference between the predicted value and the observed value, did not seriously deviate from the normal distribution and the variance of the error appeared to be constant across the linear predictor. Thus, the data met the assumptions of normal distribution.

For all moods the model was not significantly better than one in which only the intercepts were included. In other words, it was not possible to predict the cycle days in which a specific mood was most likely to occur because the variation both within and between participants was too great (predictors did not improve the model beyond that produced by considering variability in individuals only). The intra-class correlation coefficients indicated that participants could be included as a random second-level unit (to improve predictability) because the assumption of independent errors was violated and errors seemed to be correlated. For the mood, 'depression' the distribution of the standardised residuals did not seriously deviate from the normal distribution but the error variance appeared to be non-constant across the linear predictor.

It can be deduced that standardised statistical analysis methods were a poor indicator of the prevalence and intensity of moods per cycle day.

5.2.3.1 Summary of these findings

On average, the feeling weepy score was lower on days 15-21 than in the menstrual phase, while the feeling aggressive scores were significantly lower on days 6-10 and days 11-14 than in the menstrual phase. The feeling energetic score was

significantly higher on days 6-10 than in the menstrual phase. Feeling sexually aroused scores were significantly higher on days 6-10 and days 11-14 than in the menstrual phase and finally, feeling nurturing was significantly higher on days 11-14 than in the menstrual phase. These results indicate that there was a correlation between cycle days and mood (as well as mood intensity), with some moods being more prevalent on certain days than on others, but when analysing all of the participant data together following standardised statistical methods the results are insufficient to predict mood. This is in accordance with findings from De Leon et al. (2015) that indicated that descriptive methods of representing results tend to better represent subtle yet significant findings, rather than using standardised significance measures.

5.2.4 Individual mood patterns

In this section, a single participant's data was selected to show that particular moods correlated with particular cycle days for individual participants, forming a pattern which would repeat in every subsequent cycle, with only minor fluctuations. Mood and cycle day correlations tended to differ between participants, but even taking the afore mentioned minor fluctuations into account, a particular woman's 'pattern' would still be distinct from those of another woman. A selected example for participant I is provided in Figure 5.4, which is representative of the overall sample group.

Results from the SRD for Participant I (Figure 5.1), indicate that her cycle length is on the normal scale, with her first cycle being 28, and her second, 30 days long. She reported very high negative mood scores during days 11-14 in her first reported cycle, and very few negative moods during her second reported cycle, a cycle during which all her scores were reported with fewer presentations or at a lower intensity. She reports very few negative cycle events during menstruation, with feeling aggressive being the exception. During days 11-14 in her first reported cycle, she experienced high levels of feeling weepy as well as depression and feeling aggressive (last mentioned only on one day). During days 11-14 of her second reported cycle, her negative moods remain quite low, but the second cycle reports lower presence of moods/ intensity of moods throughout the cycle; there seems to

be a short period following days 11-14 when negative cycle events are particularly absent or low and there is a strong inverse correlation between depression and feeling sexually aroused. As with the other participants, there is an inverse correlation between the presence and severity of negative moods and the presence and level of her positive moods. What should be noted is that the mood patterns over her two recorded cycles are similar, following a pattern in the rise and fall of specific moods.

Figure 5.1 SRD scores returned by Participant I. Dark grey shading = menstruation; light grey shading = days 11-14.

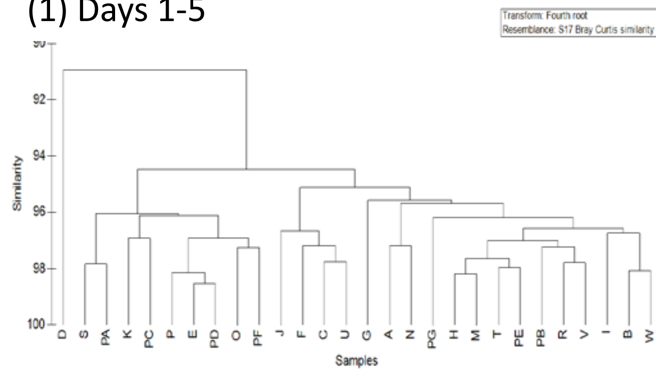
5.2.5 Broad groupings based on mood profiles

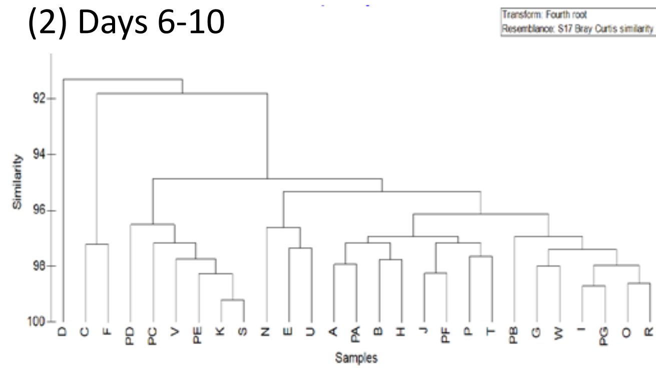
Van Goozen et al. (1997) intimated in their study described under the title 'Psychoendocronological assessment of the menstrual cycle: The relationship between hormones, sexuality and moods', that her team were able to discern two distinct mood patterns among the participants in her study. Following on from indications that this might indeed be the case, as perceived in the in-depth interviews, I partnered with an ecological research and consulting firm to utilise the statistical software package, Primer, for analysis that might best attempt to capture such a differentiation between the study participants. Primer was described as a multivariate statistics package designed for the synthesis of biological data and is described in 4.5.4.

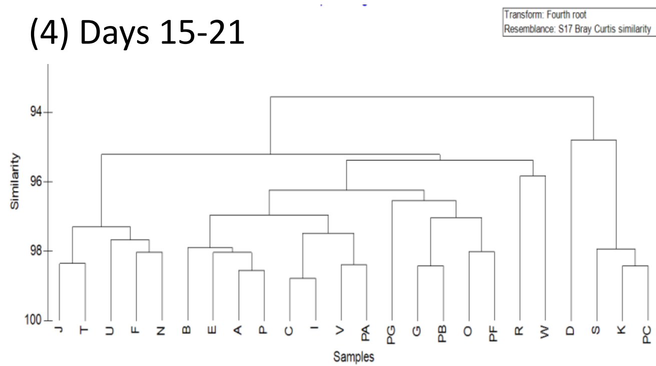
The moods of the participants were compared at two levels: 1) for individual menstrual days and 2) several days combined. For both sets of analyses, multivariate analyses (PRIMER V6, Clarke and Warwick 2006) were used to discern patterns of similarity within the participants based on the suite and intensity of moods they experienced during their menstrual cycle. Bray-Curtis similarity coefficients were displayed using CLUSTER analyses (Clarke and Gorley, 2006). ANOSIM (analysis of similarities, Clarke and Warwick 2001), a non-parametric permutation procedure analogous to Analysis of Variance (ANOVA) was used to determine significance of separation between groups.

In general the participants were similar to one another in terms of the moods they experienced, and the groups in the cluster diagrams only formed at >90% similarity. This high level of similarity notwithstanding, two groupings of participants were distinguishable during each of the clusters of cycle days (Figure 5.2). A global

nested pair-wise ANOSIM[10] of moods between participants (PRIMER V6, Clarke and Warwick 2006) showed that two groups are statistically different, but the members of the groups were slightly different in the different phases (Table 5.6).







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[10] In Primer, the null hypothesis (H_0) is that there is no difference between groups. In this study, ANOSIM scores <0.39 means H_o cannot be rejected for the given significance level (Warwick and Clarke).

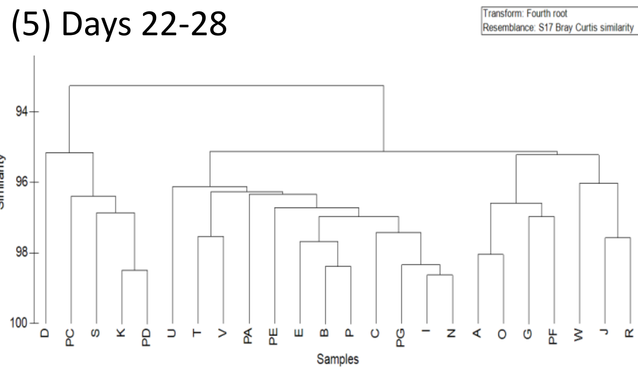


Figure 5.2 CLUSTER of Bray Curtis similarity between mood composition of participants for SRD (1) Days 1-5, (2) Days 6-10, (4) Days 15-21 and (5) Days 22-28 phases (Samples = Participants). The cluster diagrams for (3) Days 11-14 is not shown

The dendograms in Fig 5.5 and Table 5.8 represent the same findings, namely the similarity between groups of women during specific cycle days and shows that the groups are quite consistent. These particular statistical analyses were not intended to discover how women may differ in mood on different cycle days.

Table 5.6 Results of global nested pair-wise ANOSIM of the participant groups identified for Days 1-5, Days 6-10, Days 11-14, Days 15-21 and Days 22-28.

Cycle Days	Group 1	Group 2	ANOSIM
Days 1-5	K, PC, S, PD, PA, P, E, O, PF	Remainder of participants (excluding D)	R = 0.507; p < 0.001
Days 6-10	K, PC, S, PD, PE, V	Remainder of participants (excluding D, C and F)	R = 0.584; p < 0.004
Days 11-14	E, N, PF, F, C, I	Remainder of participants	R = 0.452; p < 0.001
Days 15-21	D, K, PC, S	Remainder of participants	R = 0.718; p < 0.001
Days 21-28	D, K, PC, S, PD	Remainder of participants	R = 0.716; p < 0.001
All days combined	D, K, PC, S	Remainder of participants	R = 0.807; p < 0.01

For days 6-10, and days 15-22, the grouping was remarkably consistent, with participants D, PC, K and S making up the core group and PD, PE and V members in days 6-10. Participant D is consistently an outlier, but does fit closely with K, PC & S. The group (D, PC, K and S) was strongly evident when the mood data for the entire cycle were combined (Figure 5.6)).It was found that Participant D might have

under-reported the intensity of her feelings. Participant PD shows up from time to time in Group 1, but not during all cycle days. Participants PE and V seem to oscillate between the two groups. Days 11-14 show different results from all other cycle day clusters throughout the instruments. As these days could indicate an ovulatory period in the presence of blood tests results, a cautious consideration might be that women react in a specific way to ovulatory hormones. When data from all the instruments are combined, these groups stay fairly consistent, showing that the trend is especially strong during days 15-28. These findings were all statistically significant.

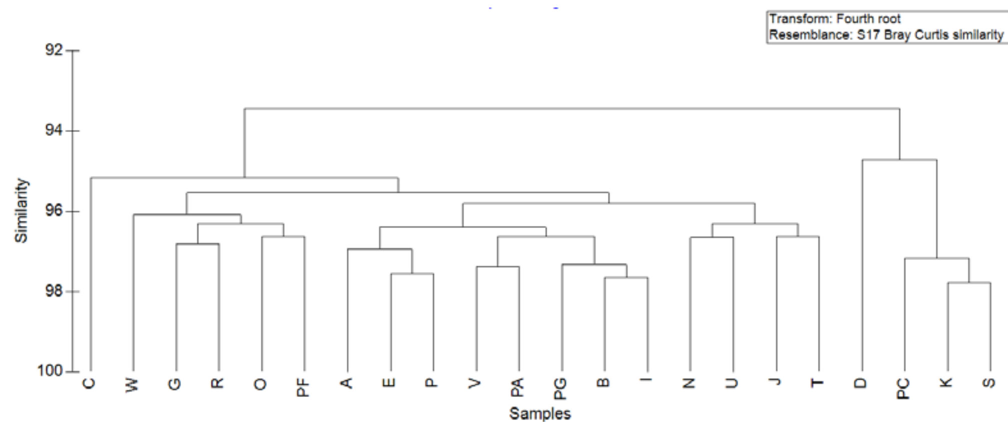


Figure 5.3 CLUSTER of Bray Curtis similarity between mood composition of participants for all days, excluding Days 11-14 (Samples = Participants)

The two groups are consistently different, but the Group 1 is very small. It raises questions around who these participants were and why they were different from the rest of the sample group? The question is particularly prevalent as Group 1 indicated more frequent and higher intensity positive mood experiences. On review of their data (especially from the interviews and MMSQ), it is found that this group includes the participants with the highest academic qualifications who reported highest satisfaction in their work and family lives. There is clearly a relationship between maintaining a positive outlook across all cycle days and living a happier life on a day to day basis, although this study was not designed to ascertain which of these variables was the primary and therefore causal factor.

The SIMPER (similarity percentages) routine in PRIMER (V6, Clarke and Warwick 2006) was used to discern typical and differentiating moods between groups and the results were tabulated Table 5.7. For the individual cycle days, the top two distinguishing moods between the two groups were negative (feeling aggressive, depressed) across all cycle days; with Group 2 feeling these moods more often. Group 1 reported a high intensity of positive moods (feeling sexually aroused, feeling energetic, feeling nurturing) in the menstrual phase as well as during days 6-10 and 22-28, but not during days 15-22. SIMPER was not run for days 11-14 because it was not significant for the core group.

The distinguishing moods were similar for all days combined (except days 11-14) with the higher intensity of feeling weepy and depressed during days 15-21 in Group 2 being the main distinguisher.

Table 5.7 SIMPER (Clarke and Warwick 2006) results for differentiating moods between groups for the Menstrual phase, Days 6-10, Days 15-21 and Days 22-28

Days 1-5		Mean dissimilarity = 5.52	
Mood	Group 2	Group 1	Dissimilarity /SD
	Mean Intensity	Mean Intensity	
Depressed	1.28	1.09	1.87
Feeling Aggressive	1.26	1.12	1.73
Feeling Weepy	1.24	1.39	1.65
Feeling Sexually Aroused	1.16	1.16	1.39
Feeling Energetic	1.27	1.33	1.34
Feeling Nurturing	1.27	1.33	1.39

Days 6-10		Mean dissimilarity = 5.80	
Mood	Group 2	Group 1	Dissimilarity /SD
	Mean Intensity	Mean Intensity	
Feeling Aggressive	1.18	1.04	2.29
Depressed	1.21	1.07	1.74
Feeling Weepy	1.17	1.07	1.72
Feeling Sexually Aroused	1.26	1.14	1.52
Feeling Nurturing	1.31	1.41	1.42
Feeling Energetic	1.32	1.40	1.22
Days 15-21		Mean dissimilarity = 6.45	
Mood	Group 2	Group 1	Dissimilarity /SD
	Mean Intensity	Mean Intensity	
Depressed	1.22	1.00	3.89
Feeling Weepy	1.16	1..00	2.32
Feeling Energetic	1.31	1.41	1.61
Feeling Sexually Aroused	1.22	1.09	1.43
Aggressive	1.21	1.12	1.43
Feeling Nurturing	1.31	2.26	1.16
Days 22-28		Mean dissimilarity = 6.74	
Mood	Group 2	Group 1	Dissimilarity /SD
	Mean Intensity	Mean Intensity	
Aggressive	1.24	1.02	2.25
Depressed	1.21	0.99	2.31
Feeling Weepy	1.18	1.03	1.61
Feeling Sexually Aroused	1.20	1.12	1.46
Feeling Energetic	1.31	1.38	1.44
Feeling Nurturing	1.31	1.27	1.22
All days (excluding Days 11-14)		Mean dissimilarity = 6.56	
Mood	Group 2	Group 1	Dissimilarity /SD
	Mean Intensity	Mean Intensity	
Days 15-21 - Depressed	2.1	1.00	4.05
Days 15-21 - Feeling Weepy	1.16	1.00	2.50
Days 22-28 - Depressed	1.21	0.99	2.49
Menstruation - Depressed	1.24	1.02	2.17
Days 22-28 - Aggressive	1.24	1.02	2.11
Days 6-10 - Aggressive	1.18	1.02	2.10

The SIMPER method analysed all data for all participants across all cycle days to indicate which days and which moods were most different between participant

groups one and two, in other words, to indicate which mood and cycle days contributed most to the differentiation between the two groups. The dissimilarity over the standard deviation indicated that the greatest differentiation was caused by Group 2 being more depressed in the menstrual phase. Group 2's results also indicated higher scores of feeling aggressive and feeling weepy, with Group 1's participants showing higher positive mood scores. The two groups showed similar results for levels of feeling sexually aroused throughout the menstrual phase as well as days 6-10; 15-21 and 22-28. In all instances, the groups varied slightly as some participant's scores were close to the line of division and so migrated to the other group at times.

The BEST routine in PRIMER (V6, Clarke and Warwick 2006) was used to determine which, if any, demographic data (age, education, health, smoker, children, BMI, exercise, alcohol consumption) best explained the observed groupings of participants. This statistical routine is used to link multivariate biological patterns with single or multiple environmental variables. The predictor variables tested were: age of participant during study participation; education level; whether employed or not; any chronic health issues; regular medication; if and/or how much they smoked; how many alcoholic beverages they consumed per week; fecundity; BMI; whether they exercised or did any extra murals; owned pets; who they lived with; whether their sex lives were rewarding and intensity of menstrual periods (length/ pain).

Looking at the participants making up these groups, it appears that they are potentially distinguishable from the rest of the participants in that they comprise the participants with professional qualifications, such as medical doctor, pharmacist and occupational therapist. In terms of their moods, they tend to experience mood intensities that deviate markedly from the group average, and most took regular exercise, had some sort of extra mural activity and owned pets.

The BEST routine revealed that level of education; exercise and hobbies were among the top factors that differentiated the groups across all cycle days (Table 5.8), although generally these differentiations were not particularly strong. These

results are echoed in the findings for the other instruments. Other factors that contributed were living arrangements, pain medication and sex.

The key findings of the SRD data were: That each participant's cycle and related moods were very similar from one month to the next. Certain cycle days correlated with certain moods and the way the moods changed over time followed a rise and decline corresponding with the woman's cycle day. Month on month she is experiencing the same moods at the same time and the same transitions between these moods, even if the emotional intensity varies between cycles. Daily dramatic events can serve to intensify emotions that are already being experienced, such as a heightened level of feeling nurturing or aggressive, or events that are acutely dramatic (such as a car accident) can over-shadow the emotions linked to the endocrine flow. Each woman's cycle is fairly unique, but there are also broad groupings of women who experience similar moods at the same time in their menstrual cycles.

These findings are discussed in more detail in Chapter 6 – Qualitative data.

Table 5.8 Results of the BEST routine on the SRD data

Phase	Number of variables	Correlation	Selection
Days 1-5	3	0.191	Exercise, hobbies, live with, sex life active and rewarding
Days 6-10	4	0.274	Non-smoking; hobbies; pain medication during menstruation
Days 11-14	3	0.123	Exercise, sex life active and rewarding
Days 15-21	2	0.152	Level of education, hobbies, sex life active and rewarding, pain medication during menstruation
All, excl. Days 11-14	4	0.199	Employed, exercise, hobbies, sex life active and rewarding

5.3 The Brunel Scale of Moods (BRUMS)

5.3.1 Description of instrument

As discussed in Section 4.2.2.4, the BRUMS is a shortened version of the Profile of Mood States (McNair et al., 1971).The BRUMS contains 24 items. The instructions for the BRUMS are: 'Below is a list of words that describe feelings. Please read each

one carefully. Then mark the box that best describes how you feel right now. Make sure you answer every question. For 'not at all', give a score of : 0; for 'a little', give a score of: 1; for 'moderately', give a score of: 2; for 'quite a bit', give a score of: 3; for extremely, give a score of: 4'. The list of 24 feeling words mostly include words pertaining to negative affect, such as: 'panicky, anxious and bad tempered' as well as words pertaining to levels of energy, such as: 'lively and active' which would later collapse into the item 'vigour'. The BRUMS' 24 questions collapse into 6 items: anger, confusion, depression, fatigue, tension and vigour (Van Wijk, 2011). Other than 'vigour', the instrument tests only for negative affect; in contrast to the SRD, that tests for both positive and negative moods. The instrument takes a minute or two to answer and was completed once a week by participants. It was felt that it was relevant to use the BRUMS especially because of this brevity; because it is a not a clinical diagnostic instrument but rather aims to identify passing emotions in a normal population and the six collapsed items correlated to a high degree with the SRD. Testing feelings that come and go is also relevant to this study in which the emotional landscape is anticipated to change frequently during a monthly menstrual cycle.

5.3.1.1 Adjustments to content or use of the instrument

The BRUMS was copied into Excel (it is normally administered in paper format) so that participants could complete the instrument electronically. The format was mimicked as closely as possible to the original paper version and all items, numbering, the Likert scale and the scoring was completed according to the paper instructions and manual.

5.3.2 Brunel Scale of Moods (BRUMS) findings

All three instruments (BRUMS, MDQ and BIQ) were completed once a week on the same day by each participant. A total of 126 data sets were collected with: 28 during the menstrual phase; 24 during days 6-10; 21 during days 11-14; 31 during days 15-21 and 22 during days 22-28 (Table 5.9).

As can be seen in Table 5.9, not all participants reported their data on all cycle days, as some cycle days did not coincide with the weekly reporting period. Participant A, for example, was never on days 11-14 when she reported her weekly data. Similarly, for some participants the weekly reporting coincided with the same cluster of cycle days, and so she has more than one data set for those days.

5.3.3 Moods and cycle days

As with all averaged scores, the numbers aggregate towards the middle of the continuum, showing that the overall scores were in the high end of the first quadrant and in the second quadrant. No total averaged scores were in the top two quadrants.

Table 5.9 Total and average scores for Brunel Scale of Mood (BRUMS) data, (n=28) for all moods, per cycle days

	Days 1-5		Days 6-10		Days 11-14		Days 15-21		Days 22-28	
	28 sets of data		24 sets of data		21 sets of data		31 sets of data		22 sets of data	
	Sum	Average	Sum	Average	Sum	Average	Sum	Average	Sum	Average
Anger	1593	53.10	1383	53.19	1161	55.29	1705	51.67	1293	53.88
Confusion	1442	48.07	1221	46.96	1051	50.05	1524	46.18	1170	48.75
Depression	1625	54.17	1392	53.54	1228	58.48	1712	51.88	1297	54.04
Fatigue	1407	46.90	1223	47.04	1032	49.14	1556	47.15	1193	49.71
Tension	1553	51.77	1336	51.38	1151	54.81	1692	51.27	1250	52.08
Vigour	1375	45.83	1148	44.15	1037	49.38	1447	43.85	1044	43.50

For the standard scores, the lowest and highest for each item was:

Anger (44/97)

Confusion (42/94)

Depression (43/98)

Fatigue (38/74)

Tension (42/103)

Vigour (34/77).

Figure 5.4 shows the composite scores of all participants, across all six subscales, during the menstrual phase. As can be seen, even though the aggregated data

seems to indicate negligible deviation, this could be accounted for by high and low numbers neutralising each other at the opposite ends of the measuring scale, as the data below clearly shows the presence of both very low, and very high scores. It is also interesting to note that although there is definite variation between participants, there is also a clear similarity between participants in terms of low and high scores on particular days, such as day 20 (when all negative mood scores are high) and day 18 (when all mood scores are low).

When the data are presented in a format where individual scores can be assessed visually it is evident that negative moods were experienced by all participants, peaking on some cycle days while lower in others, and that some individuals also tended towards higher scores overall, than other individuals.

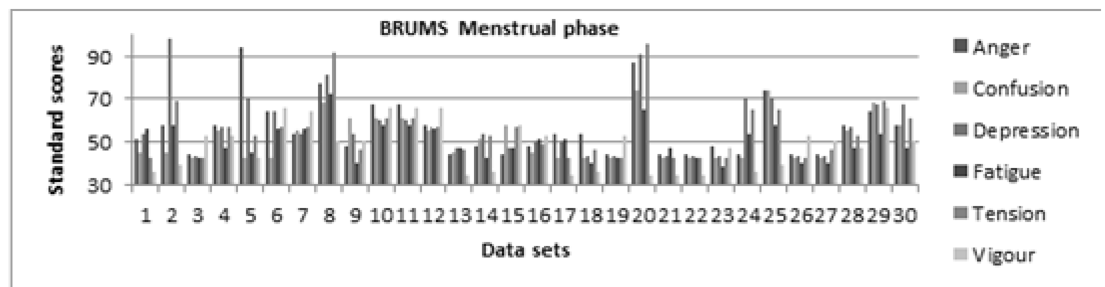


Figure 5.4 BRUMS scores for menstrual phase – all participants

The same two-level linear mixed model used for the self-report data was used to assess the effect of phase on the various mood outcomes for the BRUMS instrument. It was not possible to predict the cycle days on which a specific mood was most likely to occur because the variation both within and between participants was too great.

5.3.3.1 Summary of these findings

This statistical analysis of the BRUMS data did not render pronounced outcomes other than that the fatigue score which was significantly higher on days 22-28 than

in the menstrual phase. None of the other 'moods' (anger, confusion, depression, tension, vigour) show a specific correlation with any of the cycle days. This contrasts with the SRD findings, where moods were shown to significantly correlate with cycle days. While such a deduction might be disappointing, it does indicate the relative value of utilising an instrument which is specific to the field of study, such as the SRD. This lack of significance in a particular aspect of a single research instrument also clearly highlights the importance of utilising more than one instrument in gathering subtle data.

Table 5.10 Summary of number of data sets collected per participant for each cycle phase and in total using the Brunel Scale of Moods (BRUMS), the Menstrual Distress Questionnaire (MDQ) and the Born Steiner Irritability Questionnaire (BIQ)

Participant	Total days recorded	Days 1-5	Days 6-10	Days 11-14	Days 15-21	Days 22-28
Participant A	8	2	2	0	1	0
Participant B	9	0	0	1	1	1
Participant C	5	0	1	1	1	0
Participant D	7	1	0	0	1	0
Participant E	9	1	1	2	1	2
Participant F	9	1	1	1	1	0
Participant G	7	2	0	1	2	1
Participant H	13	1	1	0	1	2
Participant I	6	0	2	1	0	2
Participant J	6	1	1	0	1	1
Participant K	7	3	1	1	0	1
Participant M	7	0	1	0	1	1
Participant N	5	1	1	0	1	2
Participant O	8	1	1	2	2	0
Participant P	11	2	1	1	2	3
Participant R	8	2	1	2	2	1
Participant S	8	3	2	0	2	0
Participant T	7	1	1	1	1	1
Participant U	5	1	0	1	1	0
Participant V	8	0	2	2	2	1
Participant W	9	2	1	1	2	0
Participant PA	3	0	1	1	0	1

Participant	Total days recorded	Days 1-5	Days 6-10	Days 11-14	Days 15-21	Days 22-28
Participant PB	0	0	0	0	0	0
Participant PC	4	1	1	0	1	1
Participant PD	0	0	0	0	0	0
Participant PE	2	1	0	0	0	0
Participant PF	7	1	1	1	2	0
Participant PG	3	0	0	1	1	1
Totals	181	28	24	21	30	22

5.3.4 Individual mood patterns

Examples for four participants' moods as tracked over all cycle days using the BRUMS subscales are provided in Figure 5.5. In this figure, where each line graph represents a different participant, it can be seen that individual women experienced mood patterns that were different to those of the other women, especially in intensity (Participant R's scores are higher and lower than the other participants, whereas Participant P's scores fall within a narrow margin), with some similarities (confusion was rated the same throughout all cycle phases for participants E and P, though at different levels).

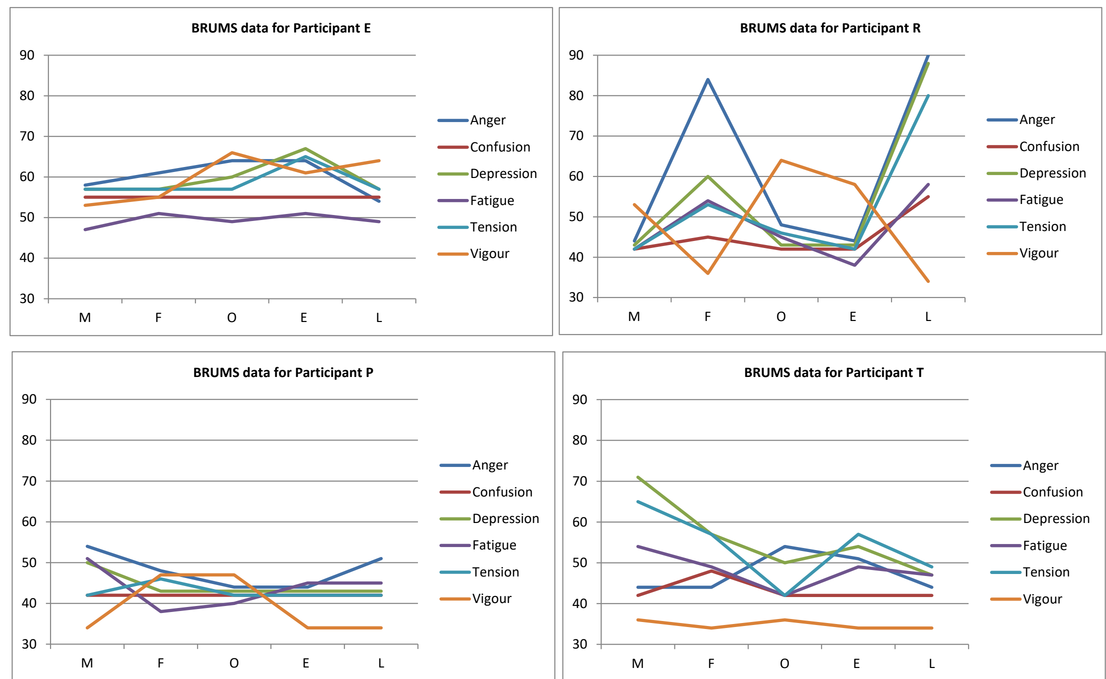


Figure 5.5 Line graphs of all Brunel Scale of Mood (BRUMS) data for four participants: E,R,P and T, indicating the rise and fall of moods through all cycle days. M = Days 1-5; F = Days 6-10; O = Days 11-14; E = Days 15-21 and L = Days 22-28

Participant E's scores indicate that a large percentage of her scores rated above 60 in other words – significantly high, although there is little inter-cycle variability in her scores. Vigour and fatigue fluctuate most, with the negative subscales depression and tension clustering together throughout. Her anger scores are lower at the beginning and end of her cycle, rising slightly towards the middle.

Participant P's scores also fall within a narrow margin, but are situated significantly lower on the rating scale, with fatigue and vigour most often under 40 (significantly low). All negative mood scores, except anger, drop towards the end of her cycle.

Participant R's scores fluctuate widely, with very low and very high scores recorded throughout the menstrual cycle. Her vigour and anger scores show particular highs and lows, with anger escalating to above 80 during days 6-10 and vigour dropping simultaneously to below 40. Her anger, tension and depression scores rise sharply during days 22-28 to reach high scores of 80 and above. This BRUMS graph echoes

the SRD data in that there is a strong inverse correlation between the negative mood scores and vigour (the only positive mood scale on this instrument).

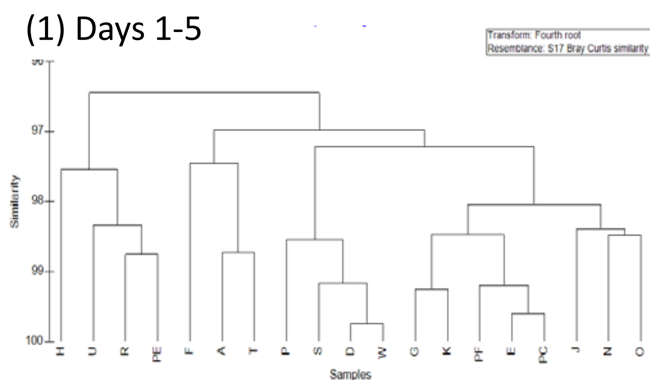
Participant T’s vigour score is consistently low, and significantly so, staying below 40 throughout the menstrual cycle. Her confusion levels only escalate during days 6-10. During days 11-14, confusion, tension, fatigue and depression decreased, while anger increased. There was a rise in all negative moods (except confusion) during days 15-21, when all moods decreased.

These findings will be further deliberated in the Discussion Chapter.

5.3.5 Broad groupings based on mood profiles

The BRUMS responses from the participants were compared to the individual menstrual phases. Multivariate analyses (Clarke and Warwick, 2006) were used to discern patterns of similarity within the participants based on the suite and intensity of moods they experienced during their menstrual cycle. Bray-Curtis similarity coefficients are displayed using CLUSTER analyses (Clarke and Gorley, 2006). ANOSIM (analysis of similarities, Clarke and Warwick 2001) was used to determine significance of separation between groups.

The cluster diagrams for each of the cycle day clusters are shown in Figure 5.6.



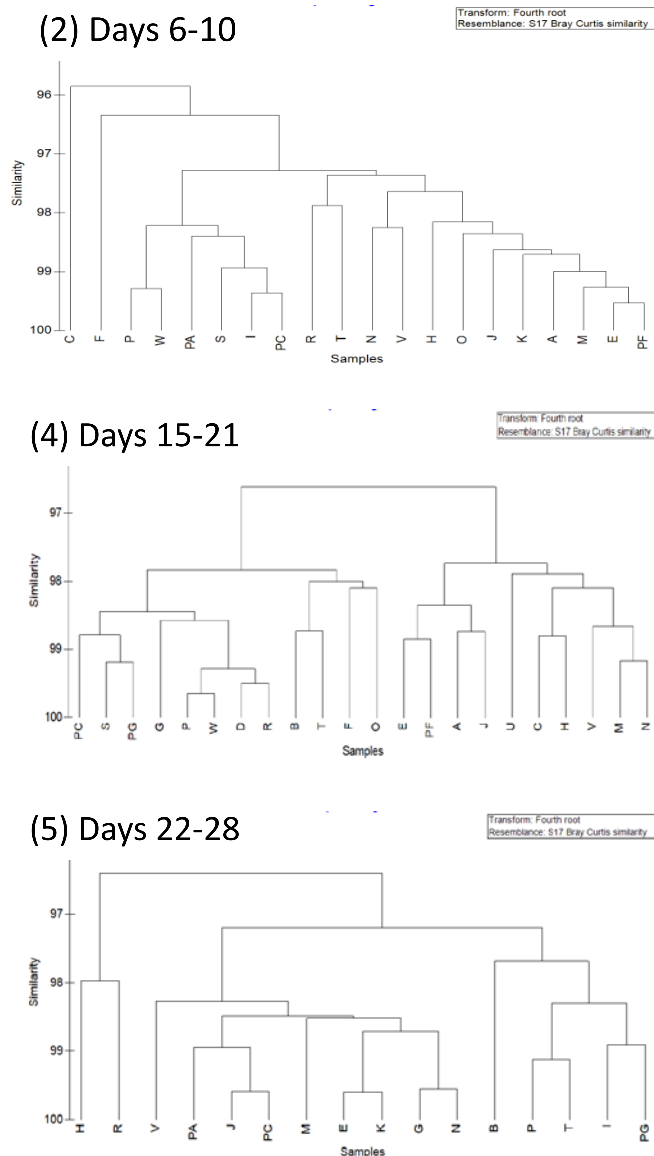


Figure 5.6 CLUSTER of Bray Curtis similarity between mood composition of participants for Brunel Scale of Moods (BRUMS): (1) Days 1-5, (2) Days 6-10, (4) Days 15-21 and (5) Days 22-28 (Samples = Participants)

Even more than was the case for SRD and MDQ, the participants were very similar to one another in terms of their responses. In this case, the groups in the cluster diagrams formed at ±95% similarity. The global nested pair-wise ANOSIM[11] of responses between participants (Clarke and Warwick, 2006) again showed that groups were statistically different, and that members of the groups were slightly

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[11] In Primer, the H_o is that there is no difference between groups. In this study, ANOSIM scores <0.39 means H_o cannot be rejected for the given significance level (Clarke & Warwick, 2006).

different on the different cycle days (Table 5.13). The timing of the collection of the BRUMS questionnaires means that some participants did not provide data for some cycle days, which impacted on the Group 1 and 2 'membership'.

Table 5.11 Results of global nested pair-wise ANOSIM of the participant groups identified using BRUMS for Days 1-5, Days 6-10, Days 11-14; Days 15-22 and Days 22-28 and for all the days combined.

Cycle days	Group 1	Group 2	ANOSIM
Days 1-5	Group 1: P, W, PC, S, PF, D, T, G, K, E, J, N, O, A, F,	Remainder of participants	R =0.625; p < 0.004
Days 6-10	Group 1: P, W, PC, S, PA, I,	Remainder of participants (excluding C and F)	R =0.536; p < 0.001
Days 11-14	Group 1: P, W, PA, PG, I, B, G, R, T, U, V	Remainder of participants	R = 0783; p < 0.001
Days 15-21	Group 1: P, W, PC, S, PG, D, R, B, T, F, O	Remainder of participants	R =0.832; p < 0.001
Days 22-28	Group 1: P, PC, PA, PG, I, B, T, G, K, E, J, N, M, V	Remainder of participants (excluding H and R)	R =0.807; p < 0.001

The SIMPER (similarity percentages) results illustrate that, for all days where they were distinguishable, except for days 6-10, Group 2 participants showed significantly higher scores in the negative subscales than did Group 1 participants (Table 5.12). In the menstrual phase Group 1 also reported greater vigour than Group 2, but this was not consistent through-out the groups or across the cycle days. SIMPER was not run for days 11-14 because it was not significant for the core group.

Table 5.12 SIMPER (Clarke and Warwick 2006) results for differentiating moods between Group 1 and 2 for Days 1-5, Days 6-10, Days 15-21 and Days 22-28 (subscales arranged from top to bottom according to dissimilarity score)

Days 1-5		Average dissimilarity = 3.82	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Anger	2.91	2.70	2.61
Tension	2.93	2.67	1.88
Confusion	2.85	2.64	1.85

Fatigue	2.79	2.61	1.74
Depression	2.92	2.71	1.67
Days 6-10		Average dissimilarity = 2.72	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Depression	2.78	2.63	2.06
Fatigue	2.73	2.54	1.96
Vigour	2.66	2.61	1.62
Tension	2.77	2.61	1.48
Confusion	2.69	2.62	1.42
Anger	2.76	2.67	1.20
Days 15-21		Average dissimilarity = 3.38	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Depression	2.92	2.66	1.98
Vigour	2.73	2.59	1.82
Tension	2.87	2.62	1.80
Fatigue	2.73	2.58	1.70
Confusion	2.78	2.59	1.69
Anger	2.83	2.67	1.43
Days 22-28		Average dissimilarity = 2.80	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Tension	2.77	2.59	2.64
Anger	2.79	2.64	2.42
Fatigue	2.74	2.64	1.89
Vigour	2.70	2.50	1.82
Depression	2.78	2.68	1.51
Confusion	2.72	2.64	1.23

The BEST routine (PRIMER V6; Clarke and Warwick 2006) was used to determine which, if any, demographic data (for example, age, education, health, smoker, children, BMI, exercise, alcohol consumption) best explained the observed groupings of participants using the same predictors as used for SRD. As with the SRD data, the BEST routine revealed that exercise and hobbies were among the top factors that differentiated the groups in all phases. These were strongest during days 6-10 and weakest in the menstrual phase. Other factors that contributed were level of education; general level of health and smoking or non-smoking.

In Summary: the BRUMS data confirmed the trends found in the SRD data, namely that there was a presence of high and low scores (even in the aggregated data, for example, days 20 [high] and 18 [low]) with high scores peaking on particular cycle days and being lower on other days. Some participants reported their moods at a higher intensity than other participants throughout data collection. The scores indicate patterns showing that mood and cycle correlations are not random. Further analysis indicated that there are groups of women who cluster together in terms of specific mood/ cycle patterns and that these groups can be further defined by features from the demographic data.

5.4 The Menstrual Distress Questionnaire (MDQ)

5.4.1 Description of instrument

The MDQ is a standard method for measuring cyclical perimenstrual 'symptoms', as described in section 4.2.2.5. It was designed and has been applied to assist clinicians and researchers make systematic, verifiable observations and evaluations of a woman's cycle events, to ascertain aetiology and/ or prescribe treatment. The MDQ contains 46 questions which collapse into eight subscales, namely:

- three somatic scales: pain; water retention, and autonomic reactions;
- three scales that reflect mood and behavioural changes: negative affect; impaired concentration, and behaviour change;
- arousal;
- a control scale of 'symptoms' that do not usually vary in relation to the menstrual cycle (Moos, 1968).

The MDQ's instructions are: The list below shows common symptoms and feelings associated with your cycle. For each item, choose the descriptive category that best describes your experience during each of the tree time periods indicated. That is, for each item, decide whether you have 'no experience of symptom', or whether your experience is 'present, mild', 'present, moderate', 'present, strong' or 'present, severe'. Then write the number of the category in the space provided. If none of the categories exactly describes your experience, choose the one that most

closely matches what you feel. Be sure to rate every item. The scale is rated from '0' (no experience of the symptom to '4' (present, severe) (Moos, 1968).

5.4.1.1 Adjustments to content or use of the instrument

The MDQ was copied into Excel (it is normally administered in paper format) so that participants could complete the instrument electronically. The format was mimicked as closely as possible to the original paper version and all items, numbering, the Likert scale and the scoring was completed according to the paper instructions and manual.

Participants completed the instrument once per week, regardless of cycle day, therefore the descriptor, 'describes your experience during each of the three time periods indicated', was replaced with, 'describes your experience today'. I ascertained which of the three phases (as indicated by the MDQ – most recent flow [menstrual]; four days before [premenstrual] and remainder of cycle [intermenstrual]) a participant was in when she answered the questionnaire, and the appropriate scoring scale was applied to convert her raw scores to standard scores. If the phase could not be identified, the data was not utilised in the study.

5.4.2 Menstrual Distress Questionnaire (MDQ) findings

The MDQ asks 46 questions which collapse into 8 items. These relate to pain, water retention, autonomic reactions, negative affect, impaired concentration, behaviour change, arousal and control. The standard score range (lowest and highest possible scores) per item are shown in Table 5.13.

Table 5.13 MDQ standard scores - lowest and highest possible scores

	Intermenstrual		Menstrual		Premenstrual	
	lowest possible	highest possible	lowest possible	highest possible	lowest possible	highest possible
Pain	37	153	34	133	36	136
Water retention	37	192	33	150	35	141
Autonomic reactions	45	202	43	175	42	220
Negative affect	36	123	35	122	36	112
Impaired concentration	38	166	36	159	37	158
Behaviour change	39	157	38	145	37	160
Arousal	30	125	29	128	29	127
Control	43	260	43	213	42	236

Ninety seven data sets were collected, of which 20 were on days 1-5; 21 were on days 6-10; 17 were on days 11-14; 21 were on days 15-21 and 18 were on days 22-28.

As was the case for BRUMS not all participants reported their data in all cycle phases and some have more than one data set for a cycle day cluster.

5.4.3 Moods and cycle days

Pain, water retention and negative affect were the dominant negative scores across all cycle days, and arousal was the dominant positive mood. However, the average scores for all moods fell into the lower half of the standard score range (lowest and highest possible scores; Table 5.16), suggesting that (on average) the intensity of the participants' moods was muted.

The same two-level linear mixed model used for the SRD and BRUMS data was used to assess the effect of cycle days on the various mood outcomes for the MDQ instrument. It was not possible to predict the cycle days in which a specific mood was most likely to occur because the variation both within and between participants was too great. In the subscale, 'autonomic reactions', the distribution of the standardised residuals was positively skewed and the error variance showed an outlier for the subscale, 'negative affect' (0.71). For the subscale, 'impaired

concentration', the distribution of the standardised residuals was slightly positively skewed but the error variance was constant across the linear predictor for the most part except for two outlying values. For the subscale, 'behaviour change', the distribution of the standardised residuals did not seriously deviate from the normal distribution and the error variance appeared constant across the linear predictor, except for one outlying value. Lastly, for the subscale, 'control', the distribution of the standardised residuals did not seriously deviate from the normal distribution, except for one outlying value and the error variance appeared constant across the linear predictor, but again showed an outlying value.

5.4.3.1 Summary of these findings

On average the water retention score on days 6-10 was less compared to the water retention score in the menstrual phase. The negative affect as well as control score showed an outlying value while the impaired concentration score on days 22-28 was higher compared to the impaired concentration score in the menstrual phase. Lastly, the behaviour change score on days 22-28 was higher compared to the behaviour change score in the menstrual phase. These results show the relevance of using multiple instruments as well as instruments specifically designed for a field of study, such as the MDQ.

5.4.4 Individual mood patterns

Examples for five participants' moods as tracked over all cycle days using the MDQ subscales are provided below, where each line graph (Figure 5.7) represents a different participant, it can be seen that individual women experienced mood patterns that were different to those of the other women, especially in intensity (for example Participant O's scores are higher than the other participants, whereas Participant W's scores fall within a narrow margin). The MDQ data is slightly different from that gathered from the BRUMS, as there are eight, instead of six subscales, and subscales include somatic 'symptoms' (pain, water retention, autonomic reactions) as well as cognitive functioning (impaired concentration).

The MDQ raw scores were converted to standard scores according to three different conversion tables, depending on the time of the month that it was answered: premenstrually, menstrually or intermenstrually (any time outside of first two categories). The allocation of standard scores ranged quite widely, with the range of scores for each individual subscale, varying from the next. During the menstrual phase, for example, the lowest possible score was 33 (for subscale 'water retention') and the highest during this phase was 213 (for subscale 'control').

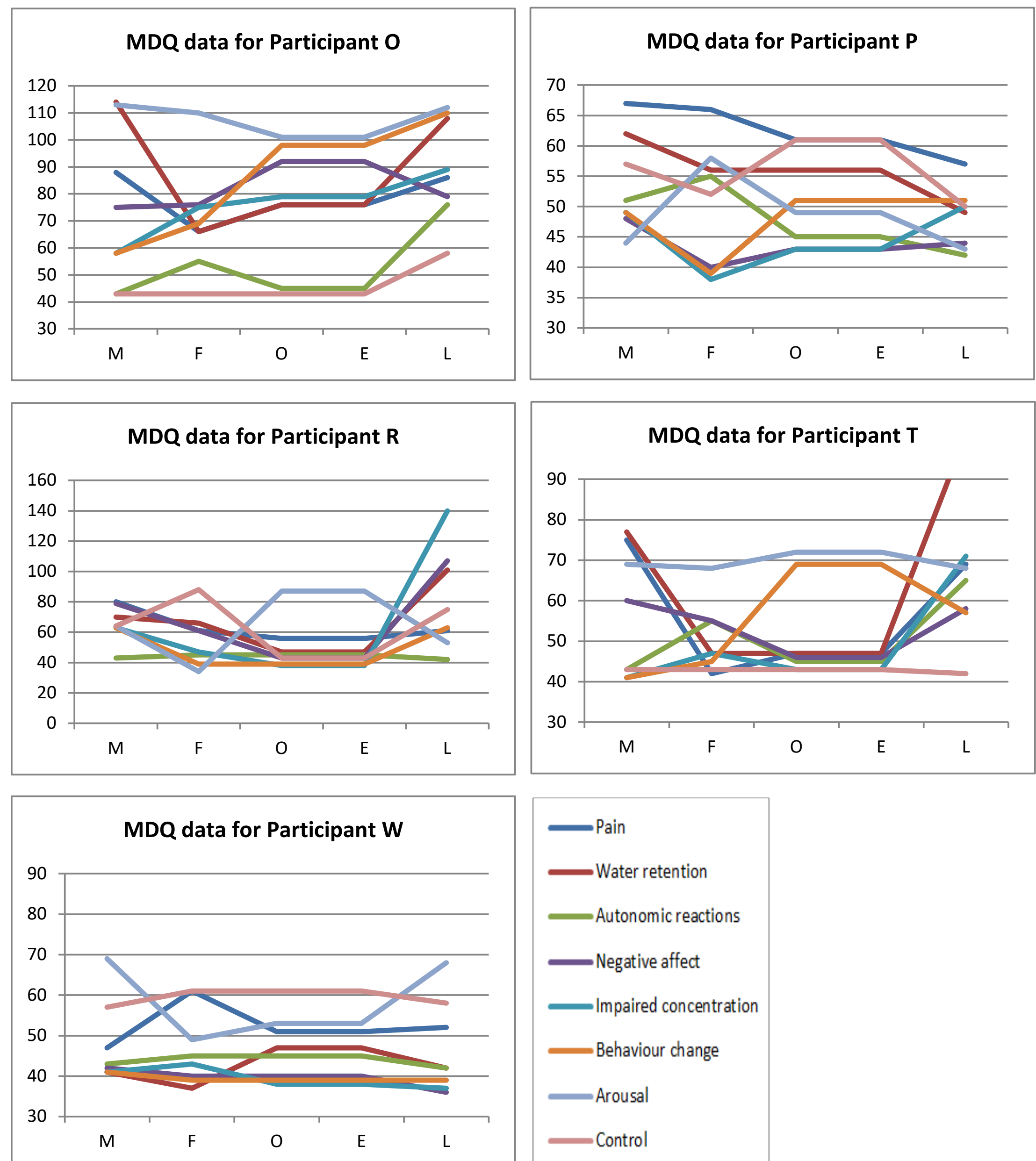


Figure 5.7 Line graphs of all Menstrual Distress Questionnaire (MDQ) data for five participants: O, P, R, T and W, indicating the rise and fall of moods through

all cycle days. M = Days 1-5; F = Days 6-10; O = Days 11-14; E = Days 15-21 and L = Days 22-28

The following five participant's MDQ results were utilised as an example of how their individual profiles appear through the application of the MDQ:

Participant P's data indicated that her water retention, control, negative affect, impaired concentration and behaviour change scores all started moderately high during the menstrual phase, dropping during days 6-10. All these scores then increased again during days 11-14 except water retention and pain, which either stayed at the same level or dropped. Her autonomic reactions and arousal, however, both increased from days 1-5 and days 6-10. All cycle events decline from days 15-21 to days 22-28, except for impaired concentration and negative affect, which declined, and behaviour change, which stayed constant from days 11-14 until the end of her cycle.

Participant O's scores were less subtle, with each subscale occupying a different level of intensity through her cycle. Her control scores were lowest, only rising from days 15-21 to days 22-28. Her autonomic reactions showed a similar tendency, but with an additional rise during days 6-10 and a sharper rise from days 15-21 to days 22-28. Water retention was very high during days 1-5 and days 22-28, which supported the general tendency among a large group of the population of women to report bloatedness, premenstrually and menstrually. Her pain scores ran parallel to that of water retention, but at a lower intensity. Her negative affect was inverse to these two subscales, peaking mid-cycle, while her behaviour change started low during the menstrual phase and escalated throughout her cycle, peaking premenstrually.

Participant R rated her impaired concentration score as 140 during days 22-28, with all other cycle events except her autonomic reactions showing a shared increase over these days (only pain showed a fairly moderate increase). All her cycle events followed a fairly uniform path throughout the whole cycle, with slight differences during menstruation and for a few days afterwards, except arousal, which seemed

to have an inverse pattern to the rest of the cycle events and control, which increased sharply during days 6-10 before dropping and joining a similar pathway for the rest of the cycle.

Participant T's data indicated that her behaviour change scores increased slightly from days 1-5 to days 6-10, and then very sharply during days 11-14. From days 15-21 to days 22-28 the scores decreased again. Her arousal scores were higher than any of her other scores and stayed fairly constant across her cycle, with an increase during days 11-14 and days 15-21. The rest of her cycle events followed the pattern: rising from menstrual todays 6-10, decreasing during days 11-14 and then sharply increasing during days 22-28. Notable exceptions were water retention and pain, which started very high during menstruation and then dropped towards days 6-10. Control stayed low and flat throughout her cycle.

Participant W's scores fall in a narrow margin, with most scores between the high 30's and high 40's. Arousal, pain and control were the exceptions, ranging from the high 40's to the high 60's. Whereas control was always low and flat for Participant T, it was consistently the highest score for Participant W, except for a brief high score for arousal during the very beginning and end of the cycle. Inversely to participant O, her water retention scores were low during menstruation and premenstrually, but higher during the middle of her cycle.

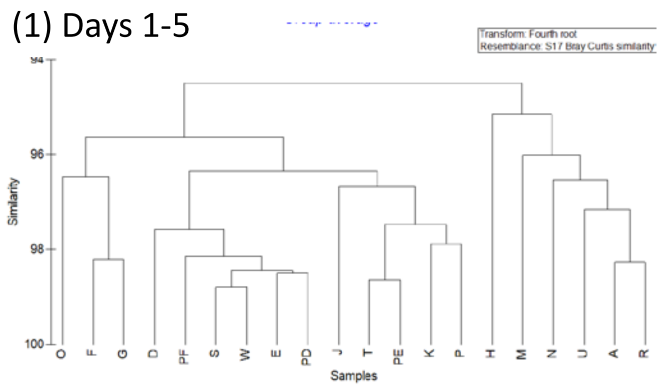
These findings will be further explored in the Discussion.

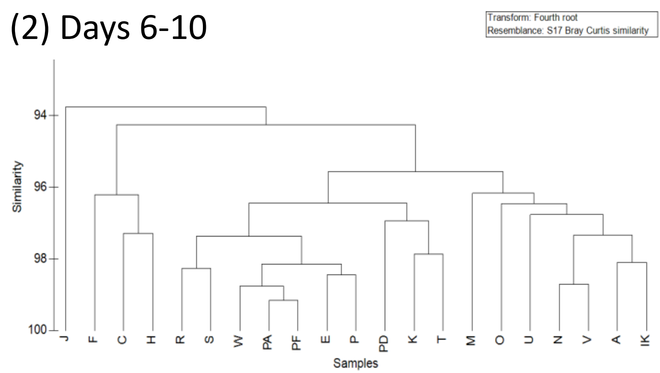
5.4.5 Broad groupings based on mood profiles

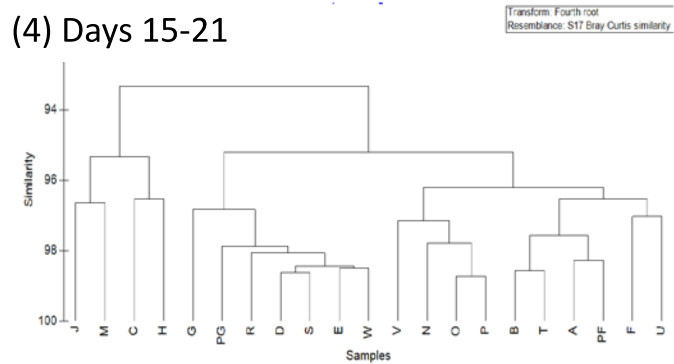
The MDQ responses from the participants were compared to the individual menstrual phases. Multivariate analyses utilising Primer V6 (Clarke & Warwick, 2006) were used to discern patterns of similarity within the participants based on the suite and intensity of moods they experienced during their menstrual cycle. Bray-Curtis similarity coefficients are displayed using CLUSTER analyses (Clarke and

Gorley, 2006). ANOSIM (analysis of similarities) was used to determine significance of separation between groups (Clarke and Warwick 2001).

The cluster diagrams for all of the cycle days are shown in Figure 5.8.







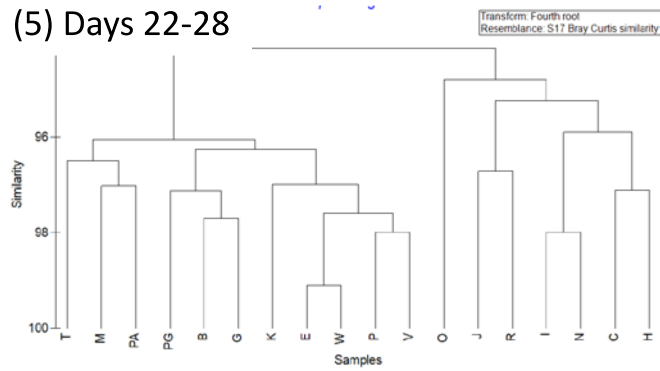


Figure 5.8 CLUSTER of Bray Curtis similarity between mood composition of participants for Menstrual Distress Questionnaire (MDQ):): (1) Days 1-5, (2) Days 6-10, (4) Days 15-21 and (5) Days 22-28 phases (Samples = Participants)

As was the case for the SRD moods, the participants were similar to one another in terms of their responses. In this case, the groups in the cluster diagrams formed at ±90% similarity, with some groups, for example, days 6-10, forming at <90%. The global nested pair-wise ANOSIM[12] of responses between participants (PRIMER V6, Clarke and Warwick 2006) again showed that groups were statistically different, and that members of the groups were slightly different on the different days (Table 5.14). The timing of the collection of the MDQ questionnaires meant that some participants did not provide data for some phases, for example., some phases had data missing from some participants and some participants (such as Q) had no MDQ data, which made the groups seem less clear. Nonetheless, the patterns for the MDQ data were similar to those reported for the SRD.

Table 5.14 Results of global nested pair-wise ANOSIM of the participant groups identified using the Menstrual Distress Questionnaire (MDQ) for Days 1-5, Days 6-10, Days 15-21 and Days 22-28

[12] In Primer, the Ho is that there is no difference between groups. In this study, ANOSIM scores <0.39 means Ho cannot be rejected for the given significance level (Clarke and Warwick, 2006).

Cycle days	Group 1	Group 2	ANOSIM
Days 1-5	Group 1: S, W, E, D, G, PD, K, T, P, PF, PE, J, O, F	Remainder of participants	R =0.624; p < 0.002
Days 6-10	Group 1: R, S, W, E, PD, K, T, P, PF, PA,	Remainder of participants	R = 0.701; p < 0.001
	Group 3: J, C, H, F		R = 0.696; p < 0.003
Days 15-21	Group 1: R, S, W, E, D, G, PG	Remainder of participants	R = 0.716; p < 0.003
	Group 3: J, C, H, M		R = 0.861; p < 0.002
Days 22-28	Group 1: S, W, E, G, K, T, PG, PA, B, V	Remainder of participants	R = 0.748; p < 0.001

For all days excluding days 11-14, the grouping was fairly consistent, with participants E, K, L, P, S, T and W making up the core group. In the menstrual phase, this group was augmented by D, PE, PD and PF; during days 6-10, the group also included PA, PF and R; during days 22-28 it also included B, V, G, P and PG, and; during days 15-21 it also included A, B, D, G, PF and R. Similar to SRD, the groupings during days 11-14 were completely different from the other days, and the core group of participants showed no statistically-significant differences ($R = -0.167$; $p < 0.931$). The nature of the MDQ data meant that it was not feasible to run a PRIMER analysis for all cycle days combined.

The SIMPER (similarity percentages) results illustrated that, for all days where they were distinguishable, Group 2 participants were experiencing significantly more negative moods than were Group 1 participants (Table 5.15). SIMPER was not run for days 11-14 because it was not significant for the core group.

Table 5.15 SIMPER (Clarke and Warwick 2006) results for differentiating moods between Group 1 and 2 for Days 1-5, Days 6-10, Days 15-21 and Days 22-28

Days 1-5		Average dissimilarity = 5.51	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Impaired concentration	3.00	2.57	2.18
Behaviour change	3.00	2.27	2.18
Control	2.91	2.64	1.74
Water retention	2.88	2.79	1.65
Negative affect	2.97	2.71	1.61
Pain	2.95	2.73	1.31

Days 6-10		Average dissimilarity = 4.43	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Negative affect	2.95	2.63	2.50
Impaired concentration	2.89	2.52	2.23
Control	2.85	2.73	1.59
Behaviour change	2.71	2.55	1.48
Water retention	2.84	2.64	1.45
Pain	2.96	2.79	1.26
Days 15-21		Average dissimilarity = 4.63	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Pain	3.01	2.62	2.18
Negative affect	2.94	2.72	1.80
Arousal	2.89	2.69	1.62
Behaviour change	2.85	2.61	1.56
Impaired concentration	2.83	2.66	1.43
Water retention	2.92	2.66	1.57
Control	2.77	2.66	1.21
Days 22-28		Average dissimilarity = 5.87	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
Impaired concentration	3.16	2.67	1.94
Control	3.11	2.69	1.78
Behaviour change	2.95	2.69	1.70
Negative affect	3.05	2.73	1.67
Pain	3.00	2.74	1.66
Water retention	2.84	2.74	1.50

The BEST routine (PRIMER V6; Clarke and Warwick 2006) was used to determine which, if any, demographic data (for example, age, education, health, smoker, children, BMI, exercise, alcohol consumption) best explained the observed groupings of participants using the same predictors as used for SRD and BRUMS data. As with the SRD and BRUMS data, the BEST routine revealed that exercise and hobbies were among the top factors that differentiated the groups during all cycle days. These were strongest during days 6-10, and weakest in the menstrual phase.

In summary: MDQ data indicated that pain, water retention and negative affect were the primary negative cycle events and arousal was the most dominant positive cycle event. When the MDQ data was reduced to overall averages (mean

scores), intensity was quite low. It could be seen, however, that impaired concentration and behavioural change were both higher in the premenstrual phase than during menstruation. The MDQ is different to the SRD, BRUMS and BIQ in that it measures not only mood but also somatic and cognitive cycle events. As with SRD and BRUMS, participants showed variation in moods between cycle days and groups of women feel similarly on certain cycle days. During MDQ data analysis it became apparent that Group 2 was significantly 'unhappier' than Group 1. As with BRUMS, data collected during days 11-14 rendered completely different results to other cycle days.

5.5 The Born-Steiner Irritability Scale (BIQ)

5.5.1 Description of instrument

The BIQ consists of a 14 item instrument using a Likert scale with the instruction: Please mark "x" in the box beside each item that best describes how you have been feeling in the past week: for 'not at all', give a score of '0'; for 'a little or some of the time', give a score of '1'; for 'often', give a score of '2' and for 'most or all of the time', give a score of: '3'. These first 14 items addresses dimensions of irritability such as 'getting mad'; 'losing control' and 'tension through my body'. The second part of the instrument is the VAS scale (see section 4.2.2.6) which contains five items relating to how feeling irritable has affected the participant's relationships; daily activities, ability to deal with frustration and self-esteem. The last two items (also rated on the VAS scale) asks how the participant would rate themselves 'at this moment' and how they would rate their 'usual selves', thereby establishing a base line against which to measure their daily moods (or level of irritability) (Born et al., 2008).

5.5.1.1 Adjustments to content or use of the instrument

The BIQ was copied into Excel (it is normally administered in paper format) so that participants could complete the instrument electronically. The format was mimicked as closely as possible to the original paper version and all items,

numbering, the Likert and VAS scales and the scoring was completed according to the paper instructions and manual.

5.5.2 Born Steiner Irritability Scale (BIQ) findings

One hundred and thirty four data sets were collected, of which 29 were collected in the menstrual phase, 26 on days 6-10, 24 on days 11-14, 32 on days 15-21 and 23 were collected on days 22-28. As was the case for BRUMS and MDQ, not all participants reported their data on all cycle days and some have more than one data set for certain cycle days.

5.5.3 Moods and cycle days

BIQmean and BIQvas both peaked on days 22-28, and were lowest on days 11-14. The same two-level linear mixed model used for the SRD and BRUMS data was used to assess the effect of cycle days on the various mood outcomes for the BIQ instrument. For all subscales, the intra-class correlation coefficient indicated the value of including participants as a random second-level unit.

As for the data obtained using the other instruments, the participant was declared a random effect to assess variability among individuals, while cycle days were declared a fixed effect. For all moods, the distribution of the standardised residuals, which represent the difference between the predicted value and the observed value, did not seriously deviate from the normal distribution and the variance of the error appeared to be constant across the linear predictor. Thus, the data met the assumptions of normal distribution.

For the BIQ mean, the overall model was significantly better than one in which only the intercepts were included (Chi Square = 13.44, $p = 0.01$). The intra-class correlation coefficient was 0.44. For the VAS the model was not significantly better than one in which only the intercepts were included at a threshold of 0.05 (Chi Square = 8.14, $p = 0.09$). The intra-class correlation coefficient was 0.49, indicating that including participants as random second-level unit was appropriate. For

question 20, the model was not significantly better than one in which only the intercepts were included (Chi Square = 4.33, p = 0.36). The intra-class correlation coefficient was 0.27, indicating that including participants as random second-level unit was appropriate.

5.5.3.1 Summary of these findings

On average the BIQ mean score during days 6-10 and 22-28 were higher compared to the BIQ mean score in the menstrual phase. The mid-follicular phase, or days 6-10 of an average cycle, occurs just before ovulation, when testosterone (which forms a bell-curve during the monthly menstrual cycle), peaks (Kruger and Botha, 2011). High testosterone levels are associated with higher levels of irritability (Brizendine, 2007). Irritability levels were also higher during the premenstrual phase. This is the time in the cycle when estrogen is at its lowest (Figure 2.1). It would seem possible then, that women might experience higher levels of irritability when testosterone levels peak as well as when estrogen levels are low. The BIQ is, interestingly, similar to the SRD and MDQ in the context of producing a finding that is aligned with current thinking, but that, as can be seen from the recent study by Hengartner et al. (2017) is hard to show.

5.5.4 Individual mood patterns

Data from the BIQ looked different from any of the other data gathering instruments as it focussed on one aspect of feelings/ mood/ behaviour only, namely irritability and it made use of two different measurement scales, a Likert and a VAS scale. Examples of the results are depicted in Figure 5.9 using line graphs to represent three individual participant's compiled scores for questions 1-14 (aspects of irritability); 15-19 (impacts of irritability) and 20 (current state of irritability). Questions 1-14 were represented as an aggregated score titled, 'Likert scale - aspects of irritability' and these scores were converted to percentages to maintain a comparative visual scale with the VAS scores (the remainder of the questions represented on the line graph) which were scored from 0-100.

Participant E showed moderately low levels of irritability throughout her cycle, but scored higher on the Likert scale which explored aspects of irritability such as 'feeling mad' and 'noises seemed louder'. Both the VAS and Likert scale results followed the same pattern across all questions: irritability started at a low level during the menstrual phase and rose to its highest peak during days 6-10. It then dropped to its lowest level, during days 11-14 and reached its second highest peak immediately afterwards, during days 15-21, after which it dropped to days 22-28. The participant reported that how she would usually feel ('her usual self') followed the same pattern and was situated midway between her lowest and highest reported intensities of irritability.

Participant P showed equally low levels of irritability throughout her cycle, and again her Likert scale, representing various aspects of irritability, was rated higher than her other scores. The following questions followed the same pattern throughout her cycle: irritability and relationships with family; irritability and daily activities; irritability and ability to deal with frustration and irritability and social relationships. The pattern showed that these scores were all high during the menstrual phase, dropping to nearly nothing during days 6-10, slightly increasing during days 11-14, dropping during days 15-21 and rising during days 22-28. The questions that followed different patterns were: the Likert scale representing aspects of irritability; how irritability affected her self-esteem and how she would rate herself at the moment of testing. None of these increased during days 11-14. How she would rate her usual self, took cognisance of the rise of irritability during days 11-14, but not the lack of irritation during days 15-21.

Participant R reported very high levels of irritation during the premenstrual phase as well as days 6-10, interspersed with an absence or near absence of any irritability. She rated her usual self as consistently '0', so the line indicating this runs on the y axis and cannot be seen. Days 11-14 and 15-21 were a time in her cycle when irritability was reported to be very low or not present at all.

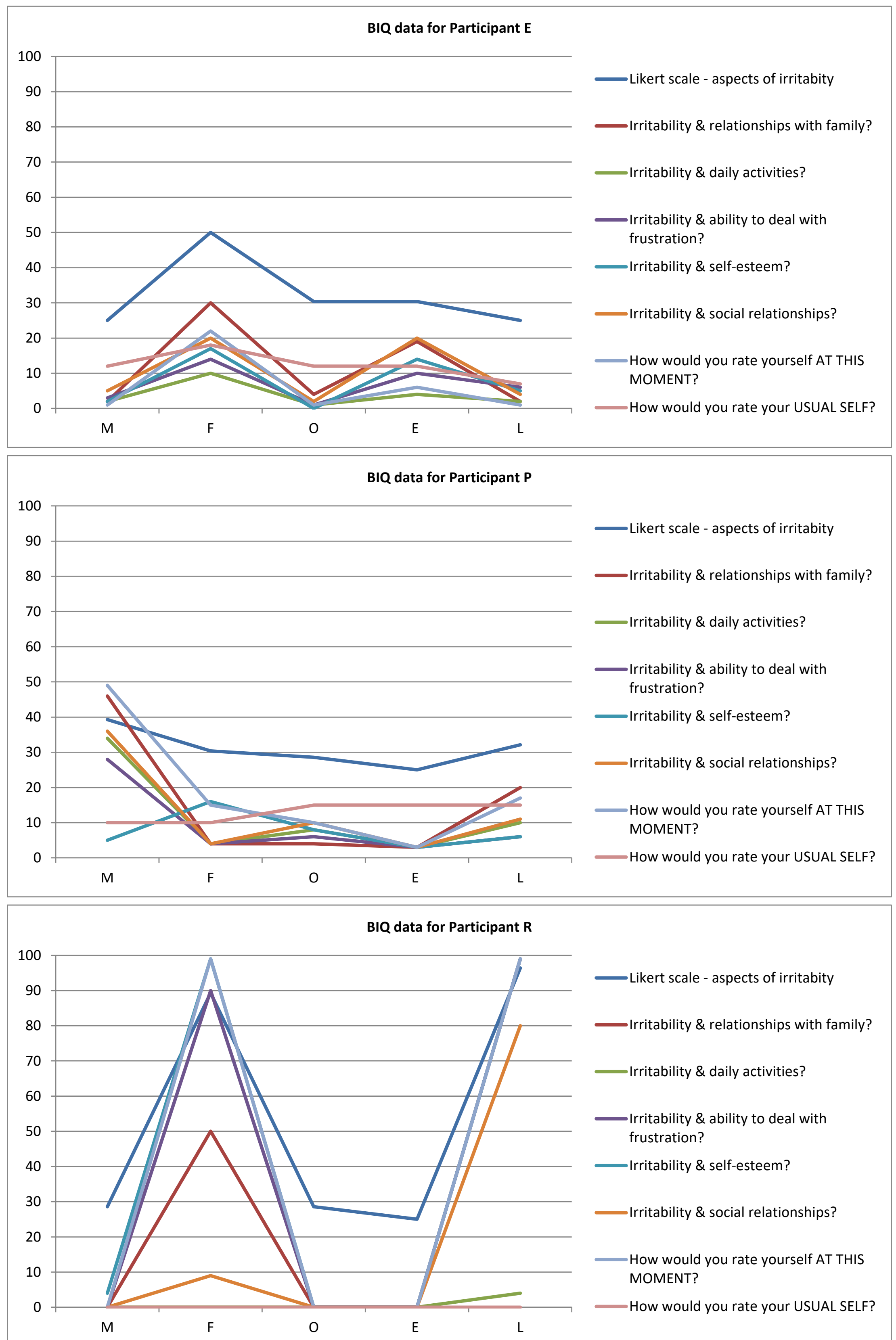


Figure 5.9 Line graphs of all Born Steiner Irritability Questionnaire (BIQ) data for three participants: E, P and R, indicating the rise and fall of irritability during all cycle days. M = Days 1-5; F = Days 6-10; O = Days 11-14; E = Days 15-21 and L = Days 22-28

5.5.5 Broad groupings based on mood profiles

The BIQ responses from the participants were compared at two levels: 1) for individual cycle days and 2) several days combined. For both sets of analyses, multivariate analyses (Clarke and Gorley, 2006) were used to discern patterns of similarity within the participants based on the suite and intensity of moods they experienced during their menstrual cycle. Bray-Curtis similarity coefficients are displayed using CLUSTER analyses (Clarke and Gorley, 2006). ANOSIM (analysis of similarities, Clarke and Warwick 2001) was used to determine significance of separation between groups. The cluster diagrams for all cycle days are shown in Figure 5.10.

As was the case for the SRD moods, the participants were similar to one another in terms of their responses. In this case, the groups in the cluster diagrams formed at ±90% similarity with some groups, for example, days 6-10, forming at <90%. The global nested pair-wise ANOSIM[13] of responses between participants (Clarke and Gorley, 2006) again showed that groups were statistically different, and that members of the groups were slightly different on the different days (Table 5.16). The timing of the collection of the BIQ questionnaires means that some participants did not provide data for some days, for example, some days have data missing from some participants, which makes the groups seem less clear. Nonetheless, the patterns for the BIQ data were similar to those reported for the SRD.

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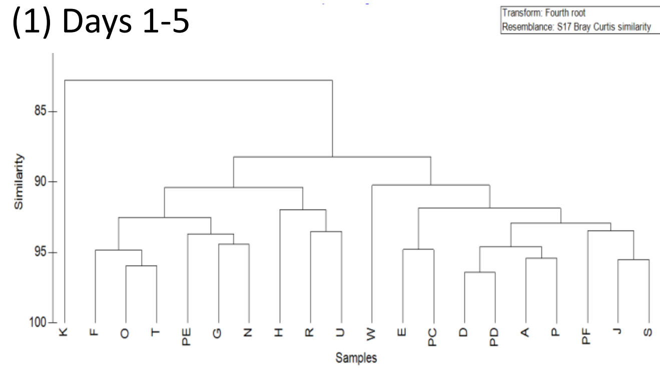
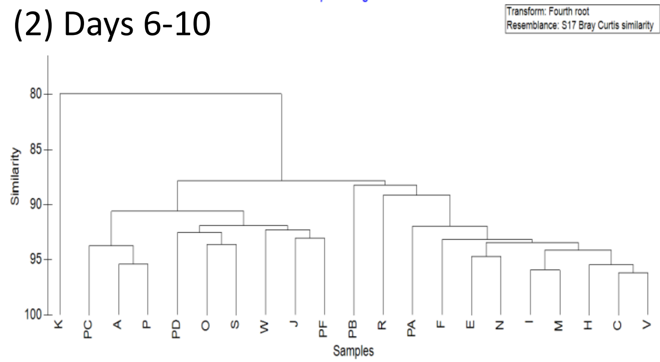
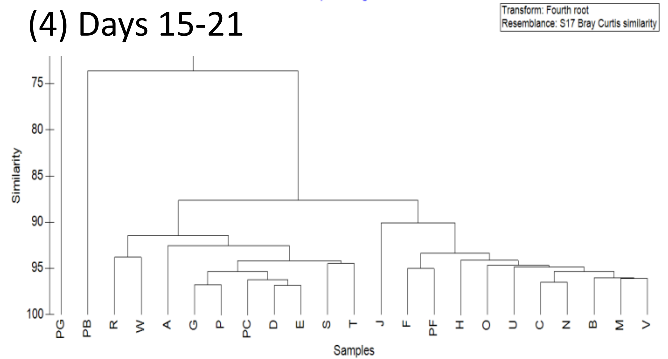
[13] In Primer, the H_o is that there is no difference between groups. In this study, ANOSIM scores <0.39 means H_o cannot be rejected for the given significance level (Warwick and Clarke, 2006).







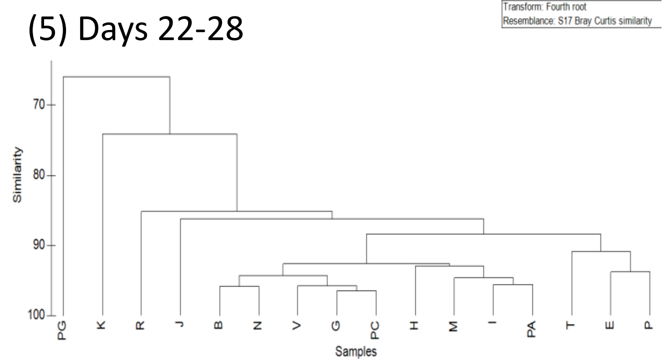


Figure 5.10 CLUSTER of Bray Curtis similarity between mood composition of participants for Born Steiner Irritability Questionnaire (BIQ): (1) Days 1-5, (2) Days 6-10, (4) Days 15-21 and (5) Days 22-28 phases (Samples = Participants)

Table 5.16 Results of global nested pair-wise ANOSIM of the participant groups identified using the Born Steiner Irritability Questionnaire (BIQ) for Days 1-5, 6-10, 15-21 and 22-28

Phases	Group 1	Group 2	ANOSIM
Days 1-5	A, W, P, PC, PD, PF, D, E, J, K	Remainder of participants	R = 0.557; p < 0.001
Days 6-10	A, W, P, PC, PD, PF, O, S	Remainder of participants	R = 0.563; p < 0.001
Days 11-14	Group 1: K, PB, R, W	Remainder of participants	R = 0.976; p < 0.003
	Group 3: E, I, G, P, T, V		R = 0.806; p < 0.005
Days 15-21	A, W, P, PC, D, E, G, R, S, T	Remainder of participants	R = 0.912; p < 0.001
Days 22-28	P,E,T	Remainder of participants (excluding PG, K, R, J)	R = 0.733; p < 0.007

For days 6-10; 15-21 and 22-28 the grouping was fairly consistent, with participants E, J, K, T and P making up the core group. In the menstrual phase, this group was augmented by A, D, K, PC, PD, PF and W; during days 6-10 the group also included A, PC, PD, PF, O, S, W, and during days 15-21 it also included A, D, G, PC, R, S and W. Similar to SRD, the groupings during days 11-14 were completely different from the other cycle days (Table 5.17), and the core group of participants showed no statistically-significant differences. The nature of the BIQ data meant that it was not feasible to run a PRIMER analysis for all days combined.

The SIMPER (similarity percentages) results illustrated that, for all cycle days where they were distinguishable, Group 2 participants were significantly more irritable than were Group 1 participants (Table 5.17). SIMPER was not run for days 11-14 because it was not significant for the core group.

The participants in these groups are discussed in more detail in Chapter Seven – Discussion.

Table 5.17 SIMPER (Clarke and Gorley, 2006) results for differentiating moods between groups for Days 1-5, Days 6-10, Days 15-21 and Days 22-28

Days 1-5		Average dissimilarity = 12.51	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
18. Self-esteem?	2.76	1.34	2.17
17. Ability to deal with frustration?	2.69	1.59	1.74
15. Relationships with family?	2.33	1.81	1.61
19. Social relationships?	2.58	1.49	1.55
20. How would you rate yourself at this moment?	2.35	1.82	1.51
16. Daily activities?	2.51	1.52	1.40
Days 6-10		Average dissimilarity = 13.29	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
6. It feels like there has been a cloud of anger over me	2.30	1.60	2.40
5. I have been easily flying off the handle	2.26	1.86	1.95
12. There has been a flood of tension through my body	2.30	1.94	1.92
10. I have been getting annoyed with myself	2.34	1.97	1.72
2. I have been feeling ready to explode	2.28	1.92	1.66
1. I have been feeling mad	2.33	1.95	1.64
Day 15-21		Average dissimilarity = 12.36	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
11. I have been so angry that I lost control	2.17	1.78	2.43
6. It feels like there has been a cloud of anger over me	2.13	1.78	2.33
15. Relationships with family?	2.61	1.68	2.32
12. There has been a flood of tension through my body	2.21	1.78	2.24
4. I have been irritable when someone touched me	2.16	1.80	2.27
5. I have been easily flying off the handle	2.17	1.82	2.24
Days 22-28		Average dissimilarity = 12.48	
Response	Group 2	Group 1	Dissimilarity /SD
	Average Intensity	Average Intensity	
2. I have been feeling ready to explode	1.26	1.00	3.71
1. I have been feeling mad	1.27	1.02	3.59
12. There has been a flood of tension through my body	1.29	1.00	3.58
14. It took very little for things to bother me	1.30	1.04	3.27
5. I have been easily flying off the handle	1.24	1.00	3.12
7. I have been rather sensitive	1.33	1.05	2.93

The BEST routine in PRIMER (Clarke and Gorley, 2006) was used to determine which, if any, demographic data (age, education, health, smoker, children, BMI, exercise, alcohol consumption) best explained the observed groupings of participants. The predictor variables tested were: Age of participant during study participation; education level; whether employed or not; any chronic health issues; regular medication; if and/ or how much they smoked; how many alcoholic beverages they consumed per week; fecundity; BMI; whether they exercised or did any extra murals; owned pets; who they lived with; whether their sex lives were rewarding and intensity of menstrual periods (length/ pain).

As with the SRD, BRUMS and MDQ data, the BEST routine revealed that exercise and hobbies were among the top factors that differentiated the groups on all days. These were strongest on days 22-28, and weakest in the menstrual phase. Other factors that contributed were level of education, general level of health and smoking or non-smoking.

Table 5.18 Results of the BEST routine on the Born Steiner irritability Questionnaire (BIQ) data

Phase	Number of variables	Correlation	Selection
Days 1-5	3	0.168	Level of education, health, hobbies
Days 6-10	1	0.284	Exercise
Days 15-21	2	0.391	Exercise; hobbies
Days 22-28	2	0.619	Exercise; hobbies

In summary: the BIQ data represented differently from the other measuring instruments in that it measured only one mood and included the use of a VAS scale. Data indicated that irritability scores were higher than in the menstrual phase during days 6-10 and peaked during days 22-28, with the lowest scores being recorded during days 11-14. Correlating with the negative moods identified to be prevalent in Group 2 during SRD, BRUMS and MDQ analyses, women in Group 2 also showed significantly higher levels of irritation than those in Group 1.

5.6 The combination of all quantitative instrument data

5.6.1 Individual profiles

In summary: When individual data sets from the different instruments are set side by side, the following can be observed: a participant's moods were reported very similarly across all instruments. For example, if a participant reported high negative mood scores in the SRD, these would be echoed in the other instruments. When all the scores are combined visually, it can also be seen that the scores are not random, but that a particular woman experienced certain moods according to an apparent pattern, with clusters and definite high and low periods, which correspond with her cycle days. Moving away slightly from answering the research questions and more towards the application of the findings of this study, Figure 5.11 represents the data that was collected for one participant (Participant E), to show the richness, correlation and convergence of mood data that a thorough period of recording can produce. In terms of clinical practice this is the desired outcome as such data creates a comprehensive profile for a client which can then be utilised for gaining valued insights resulting in a co-created intervention to address a client's self-identified negative mood dissatisfaction.

An individual profile – what the composite data of one participant looked like

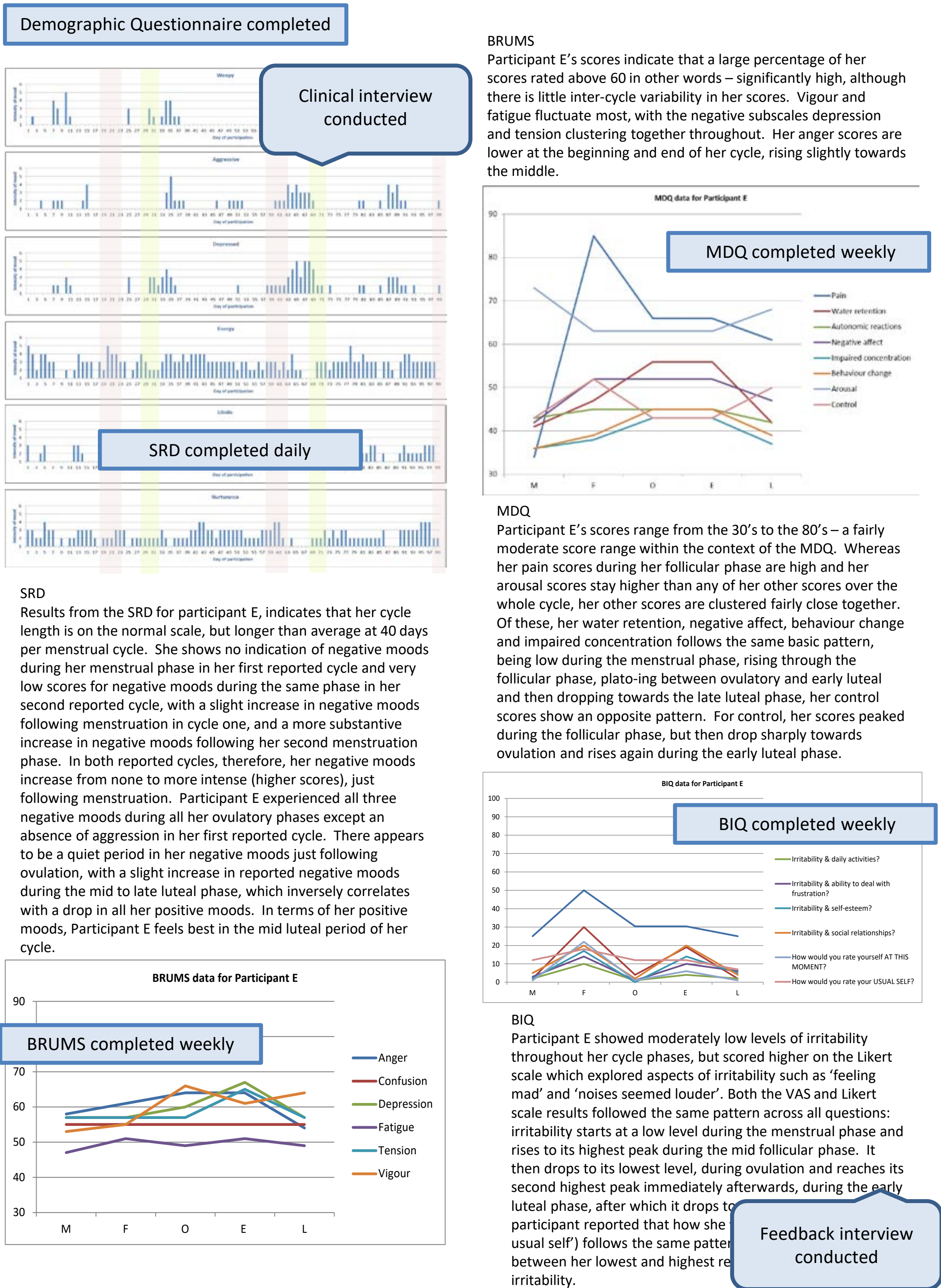


Figure 5.11 Summary of the data collected for one participant (Participant E) for all questionnaires administered.

5.6.2 Groupings profiles

In summary: Figure5.12 shows the groups of participants identified for the four different instruments. To aid interpretation, the Groups are colour-coded (Group 1 = green; Group 2 = blue, and grey indicates that the participant did not return data for the instrument on those days). Group 3 participants have been assigned to Group 1 as their mood patterns were closer to those than to Group 2 (see Sections 5.2.5; 5.3.5; 5.4.5 and 5.5.5). It is clear from the arrangement of the green (Group 1) and blue (Group 2) in Figure 5.12 that although the groupings are not definitive there is a general clustering of participants that were mainly assigned to Group 1 (Q, S, K, L, PC, P, PD, E, PF, W, J, D, G, T and R) versus those mainly assigned to Group 2 (C, A, H, D, O, B, I, PE, V, M, PG, N. U and PB).

Figure 5.12 Indication of similar mood patterns throughout cycle according to individual participants

Based on the data for the individual instruments, the participants who were mainly assigned to Group1 are less anxious, les irritable and, in particular, less capricious than the participants who were mainly assigned to Group 2.

In conclusion - the central research question is whether there is a relationship between the female cycle and a woman’s moods. The findings supported that there

is definitely a relationship between a woman's cycle and her moods and further found that there seems to be different groups of women who can be defined by the types of moods and behaviours they experience during certain cycle days and differentiated from the other groups by factors isolated from the MMSQ. These findings will be discussed in Chapter 7.

6 Results - Qualitative data

6.1 Introduction

This section deals explicitly with the qualitative data gathered for this study. In the background section, this data is contextualised with reference to the quantitative data; the data capturing process and the method of data analysis. Following the background, the five emerging themes and their constituent cluster of themes are outlined, with brief notes about what was found as illustrated by direct quotes from the field notes.

6.2 Background

During the study design stage, it was envisaged that a multi-method design would have to be utilised. The quantitative data would be summarised in graphs and tables, representing data gathered daily and weekly over a period of a few months. This data would be tangible and quantifiable. Qualitative data gathering, on the other hand, presented two opportunities: 1.) providing a process for participants to be seen, heard and recorded and 2.) gathering and representing women's stories alongside their numbers. Through this process and with that outcome in mind, the qualitative modality offered a method that was honouring of the women involved, respecting in its design the time and energy they brought to this study.

The qualitative data were gathered through three avenues: firstly, the 28 participants each completed an intake interview and secondly, a feedback interview, led by me and captured in field notes. Lastly, participants were invited to submit comments with their SRD's every day. The format of the intake interview followed that of the MMSQ and that of the feedback interview incorporated data from the intake interview plus the data collected through the SRD; BRUMS; MDQ and BIQ. The quantitative data captured cycle events that could be linked to cycle days through daily reporting and tracking of cycle days (indicated by onset of menstruation).

Participants were asked direct questions about their overall state of mind and whether they noticed any pattern in their moods. Most participants reported heightened moods, behaviours and physical manifestations (cycle events) just before or during menstruation and, to a lesser extent, during days 11-14. Although a woman might associate physiological experiences such as back ache or breast tenderness with a specific cycle phase, short of urine or blood tests, those phases cannot be confirmed. Thus, the physiological event (menstruation) is a 'marker' that alerts a woman to where she is in her cycle and to events that coincide with this time; whereas this certainty is not possible for events linked to other times in her cycle.

The bulk of the information provided related to a participant's experiences across her lifetime; although a few comments were elicited specifically related to data captured during the study, by pointing them out in the visual representations of the quantitative data.

Collaizi's method of qualitative data analysis was utilised to extract meaning from the interview data, following the process outlined in 4.5.5. These themes are outlined below and discussed in Chapter 7.

6.3 Theme 1: Menstrual cycle related moods, behaviours and physical sensations

Theme 1 was constructed from 42 formulated meanings and rendered seven theme clusters, namely:

- Experience of pre-menstrual moods/ behaviours/ physical sensations
- Correlations between a specific mood and day/s of the cycle (not premenstrually)
- Description of the impact that cycle related moods has had on daily life
- Emotions associated with cycle
- Perceived impact of cycle related mood on others
- Perceived impact of cycle related moods on self
- Moods/ behaviours/ physical sensations that are associated with cycle because they are different to the participant's norm

6.3.1 Experience of pre-menstrual and menstrual moods/ behaviours/ physical sensations

The majority of participants reported a change in their moods in the pre-menstrual period. This period is defined variously by participants as a day to two weeks prior to the onset of menstruation. What all comments relating to cycle events during this cycle phase had in common, was that they were described as negative. What was uncommon, was a rise in libido, with only one participant's quantitative data indicating a rise in libido during menstruation. These findings correlate with especially those of the SRD and MDQ, indicating low positive and high negative mood scores during days 22-28 and menstrual phases:

'I am very moody. I know exactly when my period is going to start.' (Participant C)

'My PMS symptoms [include feeling] irritable and short tempered about minor things.' (Participant E)

'I definitely notice I feel down before my period, possibly a week before hand to a few days...breasts feel sore and I feel ugly...hair doesn't seem to go right you name it.....I may feel like this for a week or longer....so I will just generally feel a bit deflated although I must hide this well because I don't think my family would notice.' (Participant PD)

One participant said that she will 'explode', and the next day, her period will start (Participant B), which is mirrored by Participant W, who indicated that her 'grumpiness' and sensitivity to noise lasts only for a day before she starts menstruating, at which point her mood changes markedly and she becomes tearful. From this one can see that although the time period which is described as premenstrual is variously defined by participants, the particular cycle events (moods/ behaviours/ physical sensations) that they associate with this time in their cycle is distinct to each individual.

6.3.2 Correlations between a specific mood and day/s of the cycle (not premenstrually)

Participants reported cycle events during menstruation, and before, during and after mid-cycle. The only cycle days not included in this section are the few days before menstruation, which are described in 6.3.1. This construction of cyclical experiences subsequently span the entire menstrual cycle except for the premenstrual phase and were selected for this cluster of themes based on: 1.) this temporal guideline and 2.) participants making specific reference to a correlation between time of the month and mood. Participants described irritability, depression and a desire to withdraw and be alone. One participant described a release of tension once her menstruation starts:

'I have… noticed other correlations between my menstrual cycle and moods.' (Participant A)

'There seems to be very slight irritability around ovulation.' (Participant E)

'I am most irritable between days 8 – 14. Edgy. In between I have patches of depression – especially after ovulation. When I am menstruating and for about three days afterwards, I still feel at my best. ' (Participant J)

Participants B and D agreed that they experienced correlations between the different cycle phases and their moods. Participant J confirmed that she is most irritable between days 8-14 (mid-follicular and ovulatory phases) and Participant N said that she was aware of the mid-cycle testosterone spike, which she felt was responsible for this rise in negative mood and behaviour. She stresses that she felt this so keenly, that she wanted to withdraw into her 'cave'. As can be seen from these findings, participants do associate certain cycle event s with days of their cycles outside of the premenstrual phase.

6.3.3 Description of the impact that cycle related moods has had on daily life

This cluster of themes was differentiated from the other clusters in Theme 1 by the participants talking about the specific impact on daily life that they feel their cycle

related moods have had. From the descriptions of their experiences, all participants felt their lives had been impacted in some way by cycle events. In the interviews, two participants stated that they were taking part in the study because they wanted to support scientific developments, but they and the other participants had each been conscious of their cycle in some way and wished to learn more:

'I feel this [mood swings related to menstrual cycle] has had a significant impact on my life.' (Participant A)

'[My cycle] has such a negative influence on my life and I have been thrown into horrible prolonged PMS stages. Rationality thankfully overrides these feelings, but they are quite intense and real.' (Participant L)

'At the time it would be more to do with my self-perception, thinking, this improves once I have moved out of the cycle...I would be very careful about making any decisions around this time as well as I know I can be a bit morose around this time...I will cry more I have noticed that. If I am dealing with a situation it probably feels magnified during this time as well.' (Participant PD)

There was a pervasive feeling amongst participants that cycle related moods were a constant presence in their lives which were at times more, or less acknowledged, but nonetheless never fully absent. Participant W went so far as to say that she has to remind herself constantly to be aware of her mood.

6.3.4 Emotions associated with cycle

This theme cluster used the filter: 'words describing a specific emotion', to extract statements. The moods reported by participants ranged widely, with a tendency to focus on negative moods, such as: temper; irritability; a sense of being uncontained; an inability to curtail anger and; making sarcastic remarks and shouting.

'I am irritable before I start my period.' (Participant A)

‘I have cravings for chocolate and am short tempered [before menstruation]. I have a terrible thing with noise - people who make noises when they eat. It heightens around that time of the month [pre-menstrually].’(Participant C)

‘My temper is shorter, I am irritated and have a feeling of not being loved and appreciated. Not being understood. Not felt empathetic to my needs. I shout. I am tired.’ (Participant E)

Other participants described their cycle related moods as being angry all the time; experiencing persistent bad mood; feeling sensitive and being prone to crying; feeling they could commit murder; feeling fragile and depressed and being uncharacteristically sensitive (Participants B, D, F, G, H, I and K). Although some participants described one over-riding mood, such as anger, most expressed their cycle events in terms of clusters, often combining physical manifestations (such as bloating) with behaviour (like being sarcastic) and food cravings (often for chocolate). Regardless of the fact that participants had no clinical basis for ascertaining where they are in their cycles (other than menstruation), the majority had a strong sense of their cycle phase through tracking their cycle days and furthermore associated specific emotions to different times of their cycles.

6.3.5 The impact of moods on others

The participants reported a range of impacts of their moods on other people in their lives. This included family members and partners, but also work-colleagues and strangers:

‘My husband has quite a hard time. I am snappy and irritable with him. I have many triggers [at that time] and he drives me insane. I definitely have no libido.’ (Participant C)

‘I am irritated with people around me… my daughter doesn’t feel happy and safe here.’ (Participant E)

‘I vacillate between wanting to marry my boyfriend and wanting to break up with him – and he’s so lovely!’ (Participant L)

When it came to how their moods impacted on those around them, all participants experienced despondence and even guilt and shame in acknowledging that they view themselves as impatient; temperamental; angry; cynical; lacking in tolerance and humour and irritable. Whereas participants expected their partners to be understanding, they felt particularly bad about getting angry with their children and embarrassed about showing any negative moods at work, often stating that they rather just 'stay quiet' during these times at work (Participants A, D, H, L, G, PD, W, PA). Participant W expressed the socio-cultural norm that her husband copes better with 'weepy me' than 'angry me'. Moving from the way they feel about themselves to the way they act towards others, is a shift from the intrapsychic to the interpersonal space where behaviour is both a mirror reflecting the intrapsychic state as well as a potential source of conflict and associated remorse.

6.3.6 Perceived impact of cycle related moods on self

This theme cluster develops the theme cluster from 6.3.4 – exploring not just the moods experienced, but how these moods impact on the participant's view of herself or self-concept. Participant H is not happy with the cycle-related mood changes that she experiences. She (and Participants E and K) describes that she becomes someone that she does not like. Almost like being a different person. In isolation, these moods might have caused discomfort and unhappiness, but when played out in an interpersonal context, the resulting negative behaviour causes the unhappiness to spill over into her relationships, which exacerbates her negative feelings. Following an outburst or sarcastic remark, for example, she may then also have to deal with resulting conflict or internal feelings of guilt or aversion:

'I can hear it [becoming sarcastic]. I don't like it. I don't like being that person.' (Participant H)

It is conceivable that persistent negative cycle-related moods and resulting interpersonal conflict will eventually result in a low self-concept.

In summary, menstrual-cycle events were reported by all participants and were similar in that participants felt the events impacted on them personally as well as on those they live and worked with. Some participants were aware of their moods and the timing of cycle events and have either employed strategies to alleviate these or have sought professional help. Participants differed in when and for how long they experienced moods, as well as in the intensity of the moods experienced.

6.3.7 Moods that are associated with cycle because they are different to participant's norm

Life is busy and messy, therefore there are a multitude of confounding factors in trying to determine correlations between emotions and other factors. What was very helpful in the following interviews, was that participants pointed out that they associate certain emotions with specific cycle days because these emotions are so far removed from their self-perceived norm. They reported that these particular moods recur monthly on similar cycle days, and for that reason they had come to associate them with that particular time in their cycles.

'[I have] a personality switch.' (Participant H)

'I am not normally a vulnerable person, so the vulnerable day stands out for me.' (Participant K)

Acting outside of their self-perceived norm seemed to instil fear in these participants as they were essentially expressing that they felt out of control or unable to steer their own behaviour.

Participants were asked direct questions about their overall state of mind and whether they noticed any pattern in their moods. Most participants reported heightened moods, behaviours and physical manifestations (cycle events) just before or during menstruation and, to a lesser extent, during their ovulation. It is worth noting that these two hormonal events are the only times when a woman

has physiological evidence of her cycle (bleeding during menstruation and increased discharge during ovulation). Whereas menstruation is easy to identify, women might mis-identify ovulation. Some women, like H and K here above, have recognised that particular moods seem to prevail during specific days of their cycles, while most other women in the study have only really taken cognisance of a cycle/ mood relationship during their premenstrual phases, possibly due to moods being more extreme during this time than during other phases of the menstrual cycle, but most likely because PMS is a well-known construct in popular media. Notable exceptions can be seen in 6.3.2. All participants felt that what they had identified as cycle related moods had had an impact on their lives and by inference, on the lives of those around them.

6.4 Theme 2: Perceived life satisfaction

Theme 2 was constructed from 25 formulated meanings and rendered six theme clusters, namely:

- Level of satisfaction with work
- Level of satisfaction with home-life
- Significant stressors in life
- Participation in activities outside of home and work
- Perception of own health
- Perception of state of mind

6.4.1 Level of satisfaction with work

Academic qualification varied between the participants (Grade 10 to PhD), which meant the type of work they did also varied widely. Notwithstanding these differences, most participants reported that they were fairly satisfied with their work and that their work was not particularly stressful. Some felt they were not working in the area they would like to and many reported periodic or minor stressors, such as conflict with their employer or colleagues at times, or a long daily commute.

'My work environment is not particularly stressful. I think of my work as a career rather than a job. I do not feel successful in my career and am not satisfied with my career choice and progress.' (Participant A)

'I don't define my career as successful because I am not dynamic.' (Participant B)

As could be seen in sections 5.3.5; 5.4.5; 5.5.5 and 5.6.5, the level of academic qualification was one of the key elements that separated women into groups who could be said to have similar cycle event related experiences. Those participants who were highly qualified were generally very happy with their career choices and levels of success.

6.4.2 Level of satisfaction with home-life

Participants reported a range of experiences with regards their home life. Some were having great difficulties with their life-partners, and others stated that they were content. One participant's husband was having an affair. Factors such as these affected levels of satisfaction at home more than having an ill family member to care for, yet when asked to report extraordinary stressors in the MMSQ, participants were happy to list ill relatives, but none noted unhappy relationships until the actual in-depth interviews.

'My home-life is happy.' (Participant A)

'I have no quality of life with my husband. I feel like a maid and a whore.' (Participant F)

'My husband is an awesome dad, he is so cool.' (Participant G)

As noted in section 2.1, therapeutic interventions which include the woman's partner, have been identified as most beneficial among a variety of therapeutic interventions. Gauging from the interviews, participants who had frequent and good communication with their partners were most satisfied with their home lives.

In the Discussion section the role of partners in dealing with cycle events, will be explored further.

6.4.3 Significant stressors in life

None of the participants reported major stressors in their lives associated with their work. All major stressors identified related to close family members.

'My son's cystic fibrosis has been an extreme stress in the past, but is well managed now.' (Participant B)

'My son was born at eight months. Hectic. (Participant C)

'My elderly mom lives with me. She is not well.' (Participant H)

During the interviews these three participants, especially, described in detail what the impact of having an ill family member living with them, has had on their lives. Although the care of the individual and the anxiety around a loved one having a setback and being very ill, was a constant for all of them, these participants were also very positive in their general disposition

6.4.4 Participation in activities outside of home and work

In terms of recreation and relieving stress, the majority of participants were not part of a formalised social club such as a sports' or recreation club, but did have hobbies and pets. The minority took part in organised sport, with Participant D reporting that she belongs to two social clubs, namely a wine club and a book club. Literature indicates (Winwood et al., 2007) that people who exercise or those who have pets have better mental health, and although the self-reported level of life satisfaction (from the MMSQ) did not show higher life satisfaction for either of these two groups, the quantitative data gathered through especially the SRD, indicated a definite split between groups who exercise and those who do not (Figure 6.1).

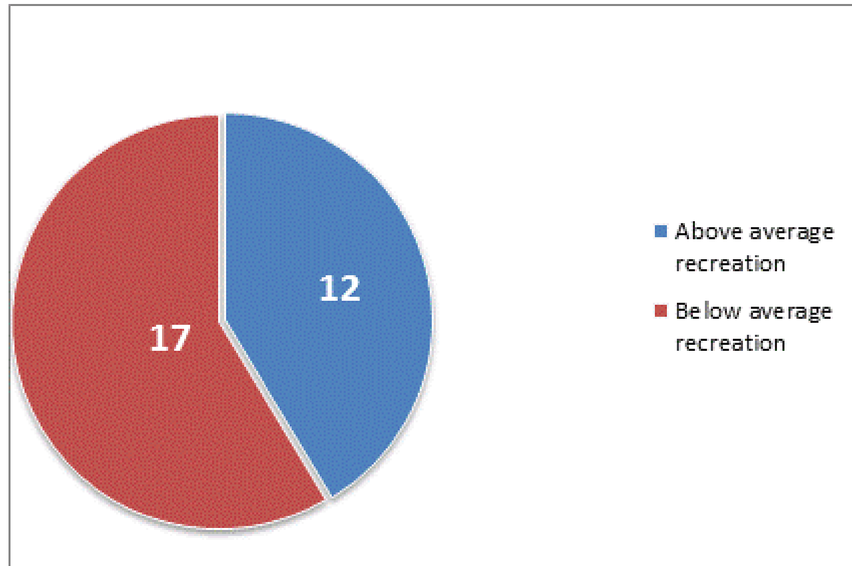


Figure 6.1 Number of participants that exercise; have hobbies; participate in organised sports; take part in volunteer activities and/or have pets

6.4.5 Perception of own health

The majority of participants were healthy and felt well, but some did not. These extracts describe participants' perceptions of their own health in both the nature and level of disease as well as an implied comparison to what they think they should be feeling physiologically or cognitively.

'My health is shocking. I have ulcers, sore joints, no energy. I am full of anxiety and headaches. There are few days that I feel well.' (Participant F)

'I have been diagnosed with adrenal fatigue.' (Participant J)

'I don't remember things...important things.' (Participant M)

Participants who perceived their health to be poor were less content than other participants and most often reported other negative manifestations in their lives such as poor relationships or dissatisfaction with their work lives.

6.4.6 General state of mind

Women with personality-, or serious mood-, disorders were excluded from the study; so although some participants had suffered from clinical depression in the past, all fell within the normal mood range during the study. The reports on their states of mind included both pre- and during study experiences, and ranged from participants who were overwhelmingly positive and happy through those who were anxious and irritable at times, to those who had a slightly gloomy outlook on life. The sample was broadly representative of the general population.

'I am positive and energetic. I smile all the time and laugh a lot.' (Participant G)

'I am very tantrummy, get very upset, jealous, very happy and incredibly sad all day long. Concentration levels are very low.' (Participant M)

Participants described a wide range of emotions to draw a picture of their individual states of mind, including feeling anxious; lonely; resentful; overwhelmed; trapped; grumpy; energetic; abandoned and exhausted. In most cases there was a definite sense that these emotions were transient and that there have been times that have been better or worse.

This section on perceived life satisfaction draws from all facets of life to sketch a picture of the sample group in all their diversity. From the above cluster of themes and illustrating quotes, it can be seen that there is a fair mix of positive and negative feelings around the major constructs that make up the participants' lives.

6.5 Theme 3: Sex life

Theme 3 was constructed from 23 formulated meanings and rendered eight theme clusters, namely:

- How participant feels about her sex life
- Reports on and feelings about perceived low libido
- Frequency of sex and desired frequency of sex
- Interventions to do with sex life

- Feelings about sex
- Thoughts about participant's sex partner
- Reasons for not having sex
- Sex and the menstrual cycle

6.5.1 How participant feels about her sex life

To contextualise this theme cluster, the main differentiator was the inclusion of an implied sex partner in the formulated meaning. A few participants reported being happy with their sex lives, but for most participants, questions around emotions and sex elicited feelings of sadness and even despair. Those who were satisfied with their sex lives seemed on average more confident and relaxed.

'My sex life is almost non-existent and not rewarding.' (Participant A)

'I just don't feel aroused. Big push for me to be here.' (Participant C)

'[low libido] made me feel guilty.' (Participant I)

Participants' reports indicate a longing for a fantasised sex life which they do not feel they are currently experiencing. Their comments imply that they have a strong sense of the roles they feel they need to fulfil with their sex partner. This indicates a gap between the desired and the experiential. Both the perceived role fulfilment and gap between desire and lived experience seems to create an emotional burden leading to negative feelings such as guilt.

6.5.2 Reports on and feelings about perceived low libido

Nearly 30 % of participants reported that they felt they had low libidos. Participants saw low libido as the greatest stumbling block to having more frequent sex and a higher level of satisfaction with their sex lives. However, none of the participants understood why they had low libidos. Some suspected it might be hormone related and at least one sought treatment and was prescribed a testosterone cream. With at least one participant, the perceived low libido was self-identified as the reason

for her husband having an extra-marital affair. Low libido seemed to cause anxiety, depression, guilt and even desperation.

‘[We don’t have sex often because] of [my] low libido.’ (Participant C)

‘My libido is very low at the moment.’ (Participant J)

‘Our low activity is tied to my libido… having kids also play a big role.’ (Participant K)

None of the participants who reported self-identified low libido, were content with having a low sex drive. All of these participants tried to understand why their libido might be low and were seeking ways to improve their libidos. The data from the MMSQ confirms that these participants desired more frequent sexual interactions than what they were currently experiencing.

6.5.3 Frequency of sex and desired frequency of sex

Most participants engaged in sexual activities four to eight times per month. One participant shared that her and her husband had sex every night, as she felt this was part of what kept a marriage together.

‘We have sex on average four times per month.’ (Participant A)

‘I would like to have sex eight and more times per month.’ (Participant A)

‘We are still not having sex as often as I would like to.’ (Participant D)

Participants who were having sex more frequently, reported greater satisfaction with their sex lives. Most participants reported that they would like to have sex more frequently.

6.5.4 Interventions to do with sex life

Although so many participants recorded unhappiness with their sex lives, and most stated that they did not know why their libidos were low or why they could not communicate more successfully with their partners about sex, only one participant had sought professional help to try and improve her sex life.

'I went to see [a doctor] because of my low libido because it is really bothering me. He prescribed a testosterone cream'. (Participant A)

Seeking help to improve libido takes a great deal of courage because the person has to express their most intimate feelings to a stranger while at the same time exposing what they perceive to be an inadequacy, to someone who, they fear, might judge them or think poorly of them. Being sexual and desiring sex has been constructed as a norm and given much value through every form of media. Ascertaining what is 'normal', in order to assess whether their own feelings and behaviour is 'adequate' remains a method of self-judgment and an almost inevitable route to low self-esteem for many women.

6.5.5 Feelings about sex

As opposed to theme cluster reported in 6.5.1, in this theme cluster, participants are expressing directly how they and their partners feel about each other sexually and how this plays out in their sex lives as well as how it manifests in their relationships on the whole.

'My hubbie thinks that I am gorgeous and I think he is, but I just don't feel aroused.' (Participant C)

'I'm not particularly interested, so it is my own stuff that gets in the way.' (Participant D)

'There is friction between my husband and I around sex and I feel guilty because I just don't think I am fulfilling my role as a wife.' (Participant I)

It can be seen that self-concept as well as how participants felt about their partners and their relationships, were intrinsically related to how they viewed themselves sexually, even if their partner was complimentary.

6.5.6 Thoughts about participant's sex partner

Participants also reported on their partner's feelings around sex. Participant B had been with her husband for over twenty years and was having problems communicating with him about sex. A similar lack of comfort in discussing sexual matters with their partners was reported by other participants.

'I think he has rejection issues. If I am not in the mood, he will take it personally. He is inappropriate especially around timing. He doesn't read my signals.' (Participant B)

'We haven't spoken about it. I find it difficult to communicate with him.' (Participant B)

'[My low libido] has caused some friction between me and my husband and might have contributed to him looking for sex elsewhere.' (Participant I)

Even though many of the participants were in long term committed marriages, they reported that they were unable to talk to their husbands about sex. This lack of communication seems to have led to unresolved issues which exacerbated dissatisfaction with either the quality and or quantity of sexual interaction.

6.5.7 Reasons for not having sex

Most participants who did not have sex as often as they would like, cited a self-reported low libido as the main reason (see 6.5.2 and 6.5.3 above). However, other participants felt that feeling stressed, especially due to the extra load they felt they carried with raising children, played a determining role in their lack of desire for sex.

‘I don’t know why I don’t feel aroused and I wonder whether my age plays a role.’ (Participant C)

‘I think having kids has played a huge role in our sex life being in a slump.’ (Participant K)

Although some of the participants seemed to have lost hope of ever having an improved sex life, most were interested to explore reasons for infrequent sexual desire in an attempt to find ways of improving their sexual interactions.

6.5.8 Sex and the menstrual cycle

There was no particular cycle phase that the participants as a group, identified as being linked with sex. Individual women reported an increased interest in sex during menstruation, mid-cycle or just following the mid-cycle.

‘I do get interested at ovulation time.’ (Participant J

The triangulation in data around sexual desire, behaviour and libido was achieved through questions in the MMSQ, followed by discussion during the in-depth interview and then assessed daily with the question around level of libido in the SRD. Overall it can be deduced that most participants felt their libidos were too low and that their sex lives were not ideal, although there were exceptions.

6.6 Theme 4: Strategies for ameliorating cycle-mood dissatisfaction

Theme 4 was constructed from 11 formulated meanings and rendered two theme clusters, namely:

- Strategies devised to cope with cycle related moods
- Interventions for cycle related moods

6.6.1 Strategies devised to cope with cycle related moods

Participants reported whether they used or had thought of strategies for coping with their cycle related moods. Participants B and W gave the most thought to their cycle-related moods and were most aware of mood changes. Participant B had sought therapeutic interventions for her moods and physical manifestations in the past and actively practices alternative exercise techniques like yoga and pilates. She drew up a calendar at some point to try and track her moods but found she could not see it through without support, which the study subsequently provided (6.7.6). Other participants noted techniques such as breathing; counting; removing themselves from situations or talking to themselves to try and keep calm or avoid conflict when they were aware that their emotions were amplified by cycle-related fluxes. Participant D reported that these techniques were not always successful.

'I have not developed or utilised any strategies to cope with moods associated with my menstrual cycle.' (Participant A)

'I am able to remove myself from situations rather than come out fighting because I can read the triggers.' (Participant D)

'I use self-talk.' (Participant E)

Overall, participants could be placed on a continuum from, 'not aware, no strategies utilised' to, 'very aware, strategies utilised regularly', with most falling closer to the 'not aware' (left) side of the continuum. As literature has indicated that the best results in satisfaction around cycle related issues are achieved through structured therapeutic interventions which are facilitated by a professional and where partners play an active role, it is not surprising that Participant B struggled to maintain her own interventions without support (Ussher and Perz, 2017). Nor is it surprising to find that those participants who were least aware (or informed) about cycle related matters, tended to struggle most with negative moods related to their cycle.

6.6.2 Interventions for cycle related moods

Most of the participants have never consulted a psychologist, psychiatrist or other mental health professional, although some had received therapy for short periods during life crises.

'I feel that treatment for my cycle related moods would have helped me to live a happier life. I am looking forward to seeing whether understanding my hormones will make a difference in my life.' (Participant A)

'I have had my fair share of time seeing a therapist or being in group therapy, working on this or that.' (Participant B)

Most of the participants felt that some sort of intervention, especially when they were younger and less aware of how their cycles impacted their moods, would have been helpful in moderating their reactions. However, some participants felt that interventions would not have been helpful to them.

6.6.3 Strategies employed to try and cope with moods

Of those participants who reported an awareness of cycle events, most did not have strategies to manage these events, although they said that they had thought about it. The majority were vague about 'having tried some things', and felt that a structured and facilitated intervention would probably have had a greater and more lasting impact than 'having to do it on their own'.

'[Being aware of where I am in my cycle] – to some extent it makes it easier, so I can moderate it – will be less vocal about it but it doesn't always work. Over the last four to five months [prior to participation in the study] I have consciously said, "I need to do something differently here." Not reacted as extremely as I would have earlier.' (Participant D)

'Exercise, exercise, exercise – any form of cardio works for me and I find it highly effective in reducing and even eliminating my bad mood and depression.' (Participant PA)

Participant PD had a host of strategies to cope with her moods, including eating chocolate; limiting her time in the company of others and reminding herself that her state of mind was temporary, whereas Participant R confessed that she smokes 'weed' to bring her mood down. Trends in coping strategies include taking supplements; exercising; withdrawing from people and asking partners to be more supportive during these times.

6.7 Theme 5: Impact of study participation on participants

Theme 5 was constructed from 34 formulated meanings and rendered seven theme clusters, namely:

- Level of awareness and self-monitoring prior to participation
- Perceived meaningfulness of participation in this study
- What particular benefit the participant experienced
- Feelings related to individual data feedback
- Level of understanding of mood/ cycle correlations after participation
- Reflections on the process of recording moods
- Reports of change in behaviour due to participation in this study

6.7.1 Level of awareness and self-monitoring prior to participation

As mentioned above, monitoring oneself can be challenging in isolation, even if, like participant L (below) a woman was already fairly aware of cyclical mood patterns.

'I have never had reason to monitor my associated moods this closely before.' (Participant B)

'I was fairly aware before this study.' (Participant L)

Taking part in this study or in some other structured monitoring scenario, enables women to see the process through and gain meaningful data about themselves.

6.7.2 Perceived meaningfulness of participation in this study

Participants were given information about sex hormones and the menstrual cycle(during the follow up interview) which they had not encountered before, alongside insights into their own cycles, which were based on the analysis of their own data and presented to them graphically. The feedback sessions lasted between one and a half and three hours. All, bar one, of the participants learnt something new and found the individual feedback of personal value to them.

'[Participating in the study] meant a lot to me.' (Participant A)

'I am keen for my daughter (now 19) to go through a similar monitoring process so that she can be more aware and prepared for what happens to her during her cycle.' (Participant B)

'I enjoyed learning more about myself through this process.' (Participant K)

Participant B's enthusiasm for her daughter to go through a similar monitoring process emphasised the meaningfulness she had found in taking part in the study.

The positive experience of taking part in this study that participants reported on are in line with the findings of Osofksky and Keppel (1985) who reported that repeated application of the MDQ over a three month period resulted in 50% of their participants (patients) not requiring any further intervention. This may be due to the fact that repeated use of self-report instruments leads to a woman observing her reactions more consistently, which can develop self-insight and opens up the possibility of creating strategies to alleviate her cycle-mood dissatisfaction (Moos, 1968).

6.7.3 What particular benefit the participant experienced

Participants experienced various benefits by taking part in this study. As expressed below, they found the structured support of daily monitoring encouraged them to persevere with their self-reflection.

‘To stand still every day and answer the research questions as it was bringing me in touch with my emotions and how I was feeling every day.’ (Participant A)

‘It was good to reinforce the knowledge of the hormonal influence on my moods. Definitely raised my level of consciousness. The one on one interview also helped with identifying other potential factors.’ (Participant D)

‘It was very interesting and I have learned so much about myself through this process.’ (Participant L)

The actual time spent in answering the SRD questions every day, even if it was just a minute or two, benefitted them in that it was an enforced time of quiet reflection. The participants also gained new knowledge and understanding of their own individual cyclical mood patterns.

6.7.4 Feelings related to individual data feedback

As could be seen in the first theme, few of the participants had seen a psychologist or received therapy or counselling (for any reason) before the study. The in-depth interviews were their first experience of seeing a professional and discussing intimate matters relating to themselves and their close relationships.

‘I was surprised.’ (Participant B)

‘It was enlightening and interesting.’ (Participant L)

Participants embraced this process and especially during the feedback interviews, reacted very positively to receiving personal feedback which was specific to them and which could impact their lives.

6.7.5 Level of understanding of mood/ cycle correlations after participation

Participants found the feedback insightful and interesting. They reflected that they had learnt a great deal and that they felt they would be more conscious of their cycle related moods in future and hopefully make better life decisions based on their new insights.

‘Incredibly insightful for me to finally see the patterns.’ (Participant A)

‘The study has given me the opportunity to differentiate between when these feelings intensify, and when I am just having a “normal” day.’ (Participant I)

‘…but the study made me even more aware of specific emotions and behaviours. I did not know that so many different emotions were involved in the menstrual process. I can tell what phase of my cycle I am in from my mood changes that don't appear to be related to anything that happened [external events]. I know more now what to expect.’ (Participant L)

Even though the majority of participants had heard of PMS or experienced it themselves, they were not aware that their moods during the rest of the month could be impacted by their menstrual cycle. Understanding even the basics of a normal hormonal pattern – which hormones peak and wane at certain times in the cycle, led them to draw correlations with moods they had experienced during these times in the past. Participants felt empowered that they would know what was going on inside their bodies from now on, and could monitor any mood fluctuations that corresponded to cycle phases.

‘Now I understand the correlations between my cycle phases and my mood.’ (Participant A)

‘There were strong correlations between my cycle phase and the way I was feeling.’ (Participant B)

‘It was more obvious that there is a predicable cycle.’ (Participant K)

When confronted with their self-report data, which through bar graphs indicate definite mood patterns outside of the ‘PMS zone’, participants expressed that they felt ‘freed’ to acknowledge their feelings now that they had ‘proof’ of the existence of these previously ‘unspoken’ patterns.

6.7.6 Reflections on the process of recording moods

Monitoring one’s own physiology or habits have become infinitely easier with progressive technology such as the FitBit watch and phone applications. In the past such a process might have been tedious and done in isolation, without any support. Under such conditions it is difficult for human beings to maintain a rigid routine. Few people manage to maintain a daily (hand-written) journal, dream diary or other such record of their feelings and experiences.

‘I was able to capture some of that [cycle related moods].’ (Participant B)

‘I was also able to track my irritability levels.’ (Participant I)

‘Yes, by recording info, it was more obvious that there is a predicable cycle.’ (Participant K)

The study offered participants the space in which to complete structured questions and to submit them daily, with the prospect of individualised feedback at the end of their labours. This greatly motivated participants to record behaviour and feelings that they might have been experiencing for decades, but never took the time to capture and analyse.

6.7.7 Reports of change in behaviour due to participation in this study

This study was motivated by the belief that cycle related moods do form a predictable pattern and that women have an obligation toward themselves and their intimate others to gain insight into their own mood patterns so that they may be able to moderate their behaviour positively. Some participants grasped the value of the new things they had learnt almost immediately and started creating positive life strategies.

‘[I have been able to adjust my behaviour] especially towards others. (Participant B)

‘After the study I can anticipate the triggers and try to moderate the associated mood.’ (Participant D)

‘…and to manage these feelings with regards my oldest daughter who knows how to push my buttons. I realised that I didn't make any stress relieving time slots for myself and have since changed this and love my gym time now! … have made some changes… I have more "me" time, gym time and am starting to do some outdoor events. ’ (Participant K)

Having been involved with the study over a prolonged period of time, it was important to gauge how participants felt upon reflection of their experience. They had invested time and energy into their data reporting and it was as key for them to feel that the process had been worthwhile, as it was for me. The general feeling was that most of the participants had not been very aware of cycle related moods prior to the study and that participation had focussed their minds on their cycle events. All participants felt that going through the process of recording their moods and talking about their experiences, had benefitted them.

6.8 In conclusion

The sum of the qualitative data was presented here utilising Collaizi’s method of qualitative data analysis. This method of analysis is helpful in identifying trends and being able to group thoughts together in a cohesive fashion which can be represented in a sensible format. The value of qualitative data gathering, however,

far surpasses the mere factual outcomes in that the one-to-one contact with a significant number of people, where an interview is focussed on a particular topic, elicits a more encompassing sense of attitudes and beliefs than can be captured by observing interview transcripts. It is this 'second tier' of observation which often guided me in pursuing certain lines of inquiry and added value to the final results.

The most unanticipated similarity (between participants) which emerged was that participants were surprised that their moods correlated with their cycle days and that the mood/cycle pattern was alike, month to month. Participants reported that they were aware of premenstrual tension before, but that they had not realized specific moods were so closely linked with other cycle days. The pervasiveness of discontent with themselves for 'being moody' was also a constant during interviews.

In conclusion, the multi-method design of combining quantitative data with qualitative data gathering methods added a valuable dimension of depth to the study findings. As mentioned above, participants were more forthcoming with information (for example about stresses at home and their sex lives) during the interviews, than they were in reporting on these issues in the MMSQ. Using in-depth interviewing skills elicited information that is inaccessible through data gathered by using instruments. The interviews, on the other hand, could only provide information that the participants were aware of, whereas the use of questionnaires and scales such as the SRD, BRUMS, MDQ and BIQ could render data on details that were not seen by participants until elicited by the questionnaires, such as when they experienced heightened libido or irritability.

7 Discussion

This study is concerned with women's psychological well-being and resulting quality of life. Viewed through a systems theory lens (Becvar and Becvar, 2000) and with consideration of socio-constructivist and interpretivist thinking (Kuper and Kuper, 1985), the quantitative and qualitative results of this study clearly show a relationship between a woman's menstrual cycle and her moods and that these moods have an impact on the woman herself as well as her wider systems, including her family and community. It was further extrapolated that women who have self-identified cycle related mood dissatisfaction, can benefit from psycho education and individually structured and facilitated interventions aimed at improving their quality of life. The results of this study are supported by the outcomes of related studies, such as those of Van Goozen (1997) and Björn et al. (2006), both of which demonstrated links between hormones, sexuality, and mood and those of Steiner (2008) and Mehta and Josephs (2011) who showed that psychological interventions can and have assisted women in coping with self - identified cycle mood dissatisfaction. Such interventions should, as Rapoport (1986) implied, be holistic and therefore view a woman as a whole entity rather than a sum of her (physiological and psychological) parts and furthermore, part of wider systems represented by her family and community.

The following discussion highlights the markers along the journey to these discoveries by starting out with a re-visit of the endocrine context and the philosophical landscape before moving on to a conversation about the quantitative and qualitative study findings at the hand of the research instruments and qualitative themes as guided by the research questions. A short synthesis of the study findings are contemplated before the implications of the study findings are explored. The chapter concludes with a look at the study limitations and lessons learnt through the research process.

7.1 The endocrine context

This study is concerned with women's psychological well-being and resulting quality of life within the context of cycle-moods. Rubinow (2015) was ardent in his expression of the impact of women's menstrual cycle related moods on their quality of life and his perspective that cycle moods could impact overall life satisfaction was supported by Malary et al. (2015). Grosholz (1991) explains Cartesian thinking by referencing the dissection of a phenomenon into its composite parts. Even in a study focussed on holism, such as this one, a phenomenon such as menstrual moods need to be partially deconstructed to gain an understanding of its underlying mechanisms. In consideration of the influence of menstrual cycle related moods on quality of life, the physiological processes underlying the monthly cycle, were outlined in section 2.1.

Most women experience menstrual cycles for a number of decades during their lives, with or without interruptions (Kruger and Botha, 2011). Endocrine research indicates a fairly consistent hormonal pattern that repeats approximately every 28 days (while this varies from woman to woman, 28 has been identified as a fair average) (Patel, 2014; Landgren et al., 1980 and Li et al., 2014). Interruptions in this hormonal pattern can occur through genetic determinants, disease, surgery, medication or injury. These might be of a permanent nature through full or partial hysterectomy and oophorectomy or of a shorter duration due to injury; starvation, excessive exertion or pregnancy (amongst other factors) (Patel, 2014). These interruptions may result in a woman resuming her previous normal cycle or her cycle may be permanently altered in some way (Kruger and Botha, 2011). The menstrual cycle, as a (more often than not) permanent feature in a woman's life for (probably) more than half of her life, forms a system with its own natural rhythm. As such, this system contains all the features of systems theory, such as its own rules and boundaries, start and end points and feedback (Rapoport, 1986).

This monthly menstrual cycle may continue for as long as forty years and forms part of the bigger hormonal life cycle for women which includes adolescence, menarche, menopause and beyond (Brizendine, 2007). Monthly cycle-related moods are one layer underlying a range of emotions related to life experiences and other life cycles

(Romans, 2017). Daily experiences such as a drive to work or walking a dog, and dramatic events such as the death of a loved one or a car accident form other layers. During participation in this study, many such life events happened to the participants influencing their moods and over-shadowing their current cycle-moods. One lost a friend in a road accident, another, her beloved cat, yet another her father, one moved house and one was elated when her daughter was selected to go to an international science fair. This study aims to be cognisant of routine and dramatic life events as well as life cycles beyond the monthly menstrual cycle, keeping in mind Moos' (1968) cautionary reminder that features believed to have their cause in even extreme cycle moods can often be confused with experiences of life stress that are unrelated to the menstrual cycle. After all, dramatic life events in particular, will over-shadow cycle-moods . The death of a loved one, for instance, will destroy even the happiest of moods and even a woman who is very depressed will feel a lift in mood if her child performs particularly well, or she receives a promotion, or falls in love (Northrup, 1994).

While remaining cognisant of the impact of daily events on women's lives, this study identifies feelings that are related to the menstrual cycle. In a systems theory view, each of the 'layers' described above can be visualised as a system (or part of a system), for example both daily events and the monthly menstrual cycle can be seen as rings which are three dimensional and dynamic - moving through space and either touching, not touching, over-lapping or partly over-lapping, depending on a woman's experience at a given moment. Whichever of the experiential rings (or systems) dominates her cognitions and behaviour in a given moment, will direct her real-life experience in that moment. This is expressed in Fig 7.1 which shows an example of a woman at work and makes reference to just a few of the systems which are at play in the represented moment in time: the woman is at work; she is experiencing cycle-moods which make her feel withdrawn; she knows she works to support her children, but is not actively distracted by thoughts of them in this moment; her withdrawn mood has caused her partner to be irritable and she is distracted from her work because she is experiencing anxiety about a possible conflict with him and lastly, her mood is causing her to not take part in current office communication. This simple schematic shows just four systems which are at play, but in real-life there would be many more, which could be represented as

touching, over-lapping, small, large, close or more distant. Some of these might include finances; lifestyle choices; extended family; friends; current projects; preoccupations with events from the past and many others.

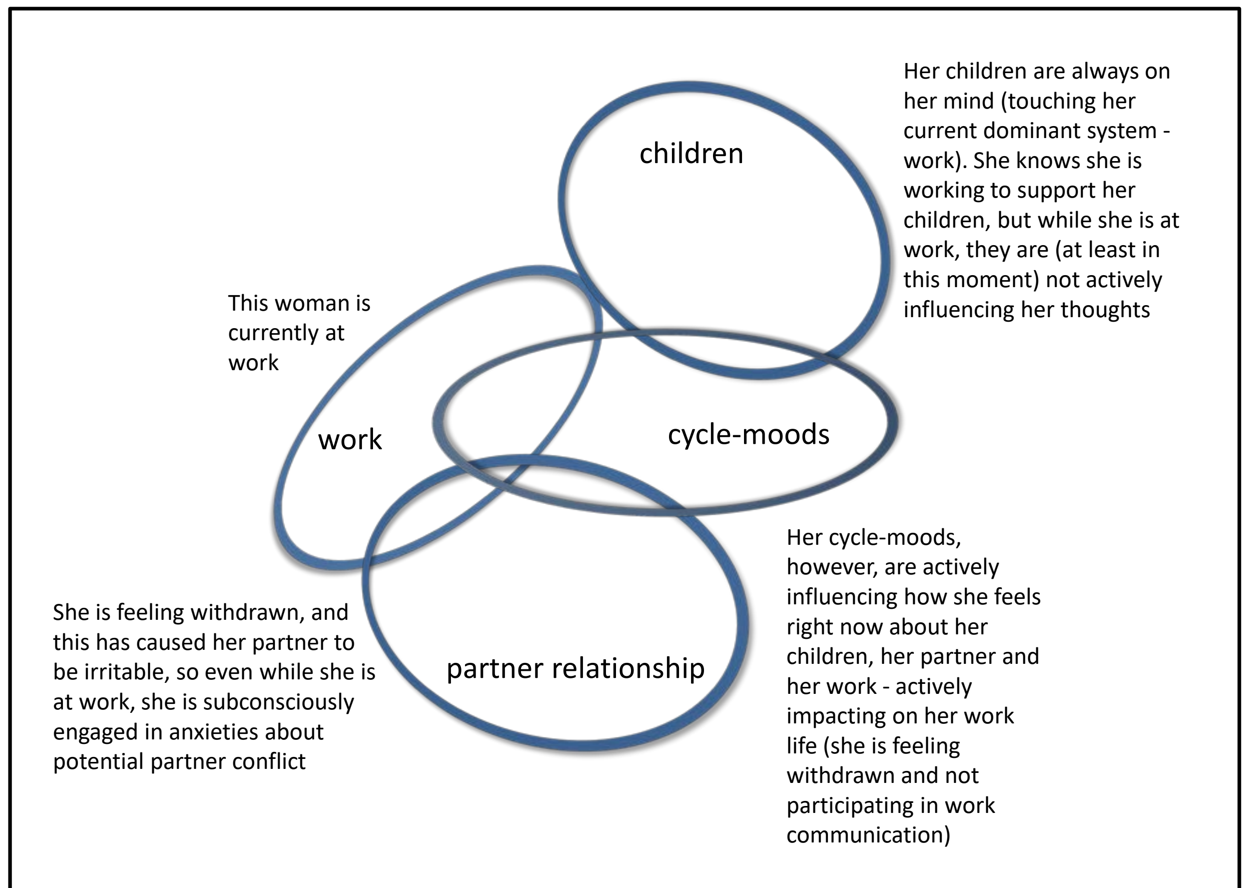


Figure 7.1 Schematic of a simple system view of a woman at work

7.2 The philosophical landscape

This section briefly revisits the philosophical landscape of the study, with reference to the lens of systems theory and social constructs. As discussed in section 3.1, cycle-mood associations have been socially constructed across all cultures and time periods to the present day (Lee and Sasser-Coen, 1996). The social and political drivers behind the constructions have most often been patriarchal and often misogynistic, painting women as witches a few centuries ago to the 'weaker sex' most recently (Johnston-Robledo and Chrisler, 2013). Especially PND and PMS have often become diagnostic labels that serve to limit women rather than help or

enrich them (Ussher, 1997). Feminists have long since called for the end of semantics around menstruation that is loaded with negative associations which they believe disadvantage women doubly – firstly by men believing in the negative and secondly by women themselves buying into negative social constructs around menstruation (Roberts, 2014).

Whereas Lee and Sasser-Coen (1996) are willing to try and walk a line between the biomedical model and poststructuralist theories, Walker (1995) is emphatic that biopsychosocial models will fail to bring new insights to cycle-mood research and that it is our own and our societies' constructs that need to be analysed and adapted to shift perspectives on both an individual and societal level. In this thesis, systems theory has been utilised to illustrate the value of careful analysis and investigation of societal constructs.

So how does systems theory understand cycle-moods? Systems theory postulates that everything is part of a system that moves alongside and is part of other, ever widening systems, like interconnecting circles (Becvar and Becvar, 2000). In this study, the most basic systems are firstly those within the body: endocrine, reproductive, neurological and psychological and thereafter, the woman as a whole system in her interactions with the systems around her, both in her living as well as non-living environment. Through the lens of systems theory principles, her biopsychosocial systems are at play constantly as she moves through her world, experiencing her inner states and acting on her external environment. In this way, what is happening in her psyche, will influence what is happening around her. Her system (made up of her physiological and psychological elements) as well as the systems around her act according to their own rules and boundaries. Poised between these psychological experiences and interactions with the world around them, women experience reciprocal causality, where every feeling and consequent behaviour subtly alters reality. In this principle, there is agency and responsibility as a woman takes cognisance of how she feels and watches how her associated behaviour impacts and affects the reality of those she comes into contact with. According to positive and negative feedback, she might then either bring about

change (positive) or maintain the status quo (negative feedback) according to choices she makes in her acting or playing out of her internal world.

If she decides to act in a way that brings about change in a system, she can then observe whether this change is accepted or rejected leading either to a state of morphostasis (no change) or morphogenesis (change occurs). The systems principles discussed op to this point will vary according to how open or closed a system is and will ultimately impact the entropy and negentropy thereof, in other words, whether the system will accept and move on, or remain in the same place. None of the systems principles are inherently ‘good’ or ‘bad’ even though they seem to be opposites, because there are situations in which either of the two (seemingly opposing) concepts, such as entropy and negentropy or morphostasis and morphogenesis, will benefit the system in that given moment. Labelling a particular course of action with a value such as ‘good/ bad’ is a societal construct which we utilise because it fulfils our need for sorting into categories or ordering our understanding in attempt to make sense of the world. Making use of systems principles such as those outlined in section 3.2.3 and mentioned here, is fitting in cycle-mood analysis as it introduces an alternative perspective to well-established social constructs which can cause women with cycle-mood dissatisfaction to feel prejudiced by society or at a more individual level – simply stuck in their current experience with little hope of change (Maturana, 1980) . When and how a system needs to either remain or move to survive and flourish, can be described through the processes of equifinality and equipotentiality which deal with the start and end points of change, as described by Becvar and Becvar in their book, Family Therapy (1980) . In equifinality, a system starts from different approaches, but always ends the same, such as when Participant B shares that she has approached her cycle-moods from different perspectives and treatment modalities, but has been unable to arrive at a different outcome, whereas in equipotentiality a system can arrive at different endings even if it starts from the same place, such as Participant D described when she shared that her cycle-moods have always been the same, yet the input from the study helped her to arrive at a different perspective about her cycle-moods, thus encouraging her to change her behaviour and experience more positive outcomes. As with entropy and negentropy, neither of these contains an inherent value, as either might be preferable given a certain set of variables.

But how is all this theory applicable and relevant to cycle-moods? Drawing on the above principles, for example, a woman might investigate whether she is cognisant of her feelings before she acts on them and whether she is able to ascertain what the impact of her associated behaviour is on her family system. Does the family system absorb her behaviour and integrate it, adjusting accordingly and what is the net result of this input? If she keeps on inputting the same behaviour, does the family system keep on arriving at the same outcome? If the woman is agitated and her associated behaviour is to request her family members to clean the house, do they, in fact, clean the house? Does her input bring about change? If she is able to ascertain that her input does not bring about change, she can take a step back and try to determine what behaviour she has applied in the past which might well have brought about change in her family system. Would it be possible for her to find a similar way to bring about a different outcome re: house-cleaning?

Whereas the feminist and constructivist philosophies are primarily concerned with assigned values and the impact of these assigned values or social constructs, systems theory is an analytical model which has continually strived to avoid value judgments in its drive to untangle webs and make sense of the world through the mechanism of deconstruction (Maturana and Varela, 1980; Ussher, 1997). The systems theory principles explained in section 3.2.3.1 and referenced above, as well as the practical integration of the theory as in this example of house cleaning, will be taken into the next section where the quantitative and qualitative findings of the study are discussed.

7.3 Study findings

In this section, we re-visit the research questions and see whether the findings as reported in chapters five and six, answered these questions. Firstly, the MMSQ findings are used to describe the sample and with reference to the initial interview (in which the MMSQ data was used as a guide), some deductions are drawn about the participants. This is followed by a discussion of the findings from the four research instruments, especially in relation to research question one: ‘how do

women feel and act during the different days of their menstrual cycles?', where after I discuss the value of analysing individual cycle-mood relationships and then findings about groups of women who share cycle-mood relationships and in so doing, contemplate research question two: 'if you group women together who feel and act similarly on the different days of their cycles, what will the groups look like?' The discussion then moves on to a contemplation of the data as reflected by the themes identified in chapter six before considering the implications of the study findings which culminate in a reflection on the therapeutic space or practical application of the study findings. The chapter draws to a close with a look at the limitations of the study and lessons learnt.

7.3.1 MMSQ data

Twenty eight data sets from the MMSQ were reported in the Quantitative Results chapter. This number compares favourably to some well-published research such as that of Symonds et al. (2004) and Haskett and Abplanalp (1983) whose sample groups consisted of 15 and 24 participants, respectively. The MMSQ contained 12 sections: biographical information; educational information; occupational information; income; health; pregnancy and children; diet and exercise; stress and relaxation; relationships and sex; menstruation and hormone history; self-care and hormone/ mood history. This is in line with Cohen's (2002) research design, where he made use of the following measures in his survey: lifestyle characteristics; gynaecological history; psychiatric morbidity and medical conditions as well as the work of Rubinow (2015) and Malary (2015), who recognised sexual desire as a noticeable predictor for quality of life. These twelve sections can be seen as discernible systems which form part of the whole of a particular woman's greater system or life and all need to be explored because the effects of the behaviour of some parts on the whole depend on what is happening to other parts (Fuenmayor, 1991). Although a woman cannot be separated from her wider social system which has major influential forces and diverse environments, the researcher has to ascertain what these systems are at the outset of the study (Ackerman, 1967). Georges (2010) advocates for the systems theory principle of 'synthetic' thinking as an approach. Synthetic thinking can be defined as trying to understand the wider context (systems) before looking at the individual. Once the initial individual data

had been explored, participants were asked to extrapolate on the behaviour of the system – in other words, to tell the interviewer more about the facets of their lives only briefly touched on in the MMSQ (Anderson and Carter, 1990). Synthetic thinking is applied in this study by administering the MMSQ to determine why the parts of the system (different features of a participant's life) play the roles that they do. The point of departure lies outside the parameters of a system (general questions about features of life), working inwards (through the interviews) to discover the role of that system within this wider context and explaining the system's behaviour in this context (Atwater et al., 2005). This is referred to as a 'systems approach', and includes both qualitative (interviews) and quantitative data gathering methods (MMSQ, BRUMS, MDQ, BIQ), resulting in inductive analysis (Becvar and Becvar, 2000).

Study participants were mostly in their late thirties, white, English speaking, heterosexual, married with one child and living a middle-class life. Even though in this summation the group appears fairly homogenous, it is a strength of this study that women were diverse in terms of their educational levels; ages and vocational fields, in contrast to most studies reviewed which made use of hospital staff; clinic patients or university students to make up their samples (Abdalla and Gibreel, 2016; Balaha et al., 2010; Bertone-Johnson et al., 2010 and Borenstein et al., 2007, amongst others). Similarities in general life features as viewed through a systems lens, lends the data analysis towards "organisation rather than reduction as the unifying principle" (Gray et al., 1969, p.7), seeking similarity (or 'isomorphisms') in structures. Most of the participants had had some tertiary education and were employed. The average participant was in good health, exercised, did not smoke and consumed fewer than five alcoholic beverages per week. Most of the participants described menstrual flow as medium, used tampons and thought they knew when they ovulated. Although most participants were content with their sex lives, a large percentage were not satisfied with the frequency or quality of their sex lives. Rubinow (2015) and Malary (2015) have both indicated that level of sexual desire was a good indicator of satisfaction with life and this study found that participants who were most content with their sex lives, also reported more positive moods overall than the rest of the participants, while Matejovica et al. (2016) advised that the interplay between sexual identity and especially attitudes

towards self and others within these constructs, could reveal little known relationships between psychology and physiology. The majority had experienced pre-menstrual dissatisfaction with their moods and had experienced other correlations between their menstrual cycle and moods. In line with the studies of Ehalaiye et al. (2009) Balaha et al. (2010) and Tenkir et al. (2003), participants who reported most PMS type cycle events were also more negative in their general outlook on life.

From the MMSQ results, the participants can be described as living within a fairly small geographic area. As most of the participants' children went to the same schools and as they would shop at the same shopping centres and attend the same community events, it is safe to say that they would have many shared experiences beyond the choice of where they live – which is in itself a strong indicator of lifestyle preference. Relating these two factors, geographical placement and life-style preferences to systems theory, it can be postulated that the women's wider networks (or systems) overlap to varying degrees and that their systems will share some similarities in the way that they function (for example, in their family composition and the way this and their geographical positions impact on lifestyle choices such as leisure time expenditure).

The initial interviews were conducted mostly using the MMSQ as a guide, asking participants to clarify or expand on their replies. The MMSQ results are therefore additionally reflected in the qualitative data. From the interviews it was ascertained that only a few participants had serious concerns about their cycle-moods and that the majority were simply interested in taking part because they wanted to learn more about cycle-moods whereas a small number were not particularly interested in cycle-moods but participated for altruistic reasons. The systems concepts of openness versus closedness are at play here in the manner in which participants 'opened' their systems (lives/ cognitions) to new thinking and is reflected in the participants' desire for morphogenesis, namely to 'move' or adapt their lives according to the new information they have opened themselves up to.

The completion of a two-month participation period with frequent self-reporting led me to realise that the group of women who participated were also fairly motivated and outward looking people, who were aware of what is happening in the world around them. This was deduced as they were 1.) aware that the study was taking place; 2.) made further inquiries and decided to take part and 3.) were motivated enough to see the endeavour through. Finally, it could be said that the MMSQ yielded data that was useful in answering the central research question partially, by providing the wider context, with systems theory being used to explore this first layer of data and deepen understanding further during the interviewing process.

7.3.2 The SRD, BRUMS, MDQ and BIQ

The SRD is a self-report diary designed by me as described in section 4.2.2.3. Participants answered the questions daily, via e-mail, at more or less 18h00 in the evening. The idea of designing a new short questionnaire for this study was mostly informed by Van Goozen's (1997) study and her use of self-constructed daily self-report questionnaires by her participants. The results from the SRD are outlined in sections 5.2 and 5.6. The BRUMS, MDQ and BIQ were completed once per week, (they are outlined in sections 4.2.2.4; 4.2.2.5 and 4.2.2.6) and their results are reported in sections 5.3; 5.4; 5.5 and 5.6 (combined results).

In terms of findings across all instruments where all participants showed general trends during similar cycle days, the SRD findings indicated that feeling energetic[14] and feeling nurturing scored highest across all cycle days; the BRUMS indicated

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[14] In terms of the SRD's 'feeling energetic' scores: during the feedback interview this was interrogated and I found that most participants had related their level of energy and their level of nurturance according to events that had taken place during that day, for example, how much work they were able to accomplish or which nurturing acts (such as lifting children and cooking) they performed during the day. This was an interesting discovery in two ways. Firstly, it indicated to me that if I wanted participants to relate more of their feelings, rather than their behaviours, the SRD would have to state such overtly. Secondly, I found it interesting that women measured their own emotions according to their behaviour, rather than calling on a more intra-psychic sense or gut feel about their emotive sense.

lower energy scores during the premenstrual phase and the MDQ showed that pain, water retention and negative affect were the dominant negative scores across all cycle days, with arousal being the dominant positive mood. These MDQ results align with those of Moos (1968) in testing his own instrument repeatedly over the years in large sample groups. The BIQ showed that irritability was highest during the premenstrual phase and lowest for the few days following menstruation.

Participants reported feeling most weepy during menstruation and for a few days afterwards and most aggressive, premenstrually. This seemed to be a consistent pattern applicable to the majority of the participants. It appears as though feeling aggressive and feeling weepy did not overlap and it can be said that these two emotions are in some ways mutually exclusive, at least to the extent that they were never reported as being experienced at the same time. Symbolically, in terms of social constructs, I feel that weepiness represents a vulnerability whereas feeling aggressive is a more outwards facing emotion with participants turning inwards during weepy times and projecting their emotions to the world during times when they were feeling aggressive.

Systems theory has been used as an underlying philosophy in other studies where mood investigations were central to the research questions (Mapp, 2006). Especially family therapy, as an application of systems theory, has been utilised to look women as the central figures in the family and by implication, cornerstones of wider society (Atkinson and Heath, 1990). In this section we start to see how a participant's mood impacts on herself and how she feels about herself, and how this, in turn, impacts on her family and work life.

Depression was most prevalent during days 11-14 and the menstrual phase. During an average ovulatory cycle of 28 days, days 11-14 might have represented the days during which some participants ovulated and had corresponding higher levels of testosterone. As this was not confirmed by concurrent blood tests, it can only remain a supposition, but as was seen throughout the findings for all four measuring instruments, days 11-14 tended to show mood profiles that differ markedly from the other cycle days. Van Goozen (1997) found that the experiences

women reported during ovulation (her participants had clinical blood tests taken to confirm cycle phase) differentiated her participants into two distinct groups, indicating that cycle-moods outside of the premenstrual phase should also be monitored and data from especially the ovulatory phase can indicate very specific cycle-mood relationships.

In this current study, it was observed that negative moods presented constantly, but on average, at a low intensity, with variability in intensity, between participants and on certain days. This was confirmed by the BRUMS and as can be seen in the bar graph (Fig 5.4) there are definite days on which scores are either very low or very high for all participants.

From this I deduced that women do not experience the same emotions on the same cycle days *at every measuring moment*, for example, where one might be feeling depressed during menstruation, another might be feeling weepy and the intensity of any one of the feelings measured, would depend on the person and the particular cycle day. In terms of the variable levels of sensitivity to (especially) negative moods, Craner et al. (2016) and Simon et al. (1985) explored the role of self-focussed attention in anxiety sensitivity, finding that women who were more sensitive, reported cycle events more frequently and at a higher intensity than other women. Wetherhill et al. (2016) found that levels of hormones such as estrogen and progesterone were at the root of particular sensitivities, whereas Cohen et al. (2002) and Romans et al. (2013) speculated that other extraneous factors such as stress, social support and work demands had a much stronger influence on anxiety sensitivity rather than a woman's hormone levels or intrapsychic beliefs. These findings highlighted that women do seem to have a relationship between specific moods (and their intensities) on certain days, from month to month, but that this pattern will (largely) be different from woman to woman and that cognisance should be taken of the woman's whole system, including her home-life (family systems), work life (collegial systems) and support systems (social systems) when considering her mood profile. Levels of sensitivity can therefore be generalised to factors outside of the cycle-mood landscape, for example some women will be more upset by life events (even less personal events

such as news reports of political goings-on) than others. Sigmon et al. (2000) indicated that women vary in their levels of sensitivity to anxiety and that heightened anxiety can impact on overall 'symptom' reporting. This was noted in the level of intensity (high positive or low negative scores) of the participants' reporting during the current study, with similar fluctuations happening at the same times, but with less or more intensity, across various participants. This could be seen between participants E and R in the BIQ scores, where a similar pattern was indicated, but Participant E scored her irritability low whereas Participant R's corresponding scores were very high.

From the BRUMS data it can be deduced that some participants experience more negative feelings throughout their cycles, feel these negative feelings more intensely, or tend to report their feelings as more intense, than other participants. Throughout this thesis reference is made to confounding factors and the impossibility of determining cause and effect. The systems principal of recursion within first order systems theory, recalling that reciprocal causality relates to non-linear consequences, captures these concepts best when expressed as reciprocal causality (Skyttner, 2005). Participants who reported more negative moods, according to reciprocal causality, are altering their own realities, with every action having a consequence and interacting with other components of the system (Bateson, 1970). A general sense of negativity will therefore permeate the whole system and affect all aspects of it, unless the system is open enough to receiving new information (feedback) and adjust its structure (morphogenesis) towards a different and more viable outcome (equipotentiality) (Anisman et al., 1998).

BRUMS data indicated (Fig 5.5 – with four participants given as examples of varying moods on the same cycle days) that there are some similarities across the whole sample, such as day 20, when all negative mood scores were high and day 18, when all mood scores were low – for all participants. The MDQ confirmed the relationship between a woman's mood-cycle patterns month on month, with differentiation between women, as can be seen from Figure 5.7. The importance of this finding in terms of clinical practice is that, should a clinician wish to include cycle-mood data to assist their client, the client will need to monitor and report her own data, rather

than the clinician using a standardised hormonal pattern or mood calendar to pronounce on when that client might be feeling a particular way. Utilising the systems concept of feedback, 'positive' feedback (facilitated by the clinician) can bring about a change in a system, such as introducing new information (self-monitored cycle-moods) that leads to changes of self-identified undesirable feelings or behaviours and 'negative' feedback (referring to feedback that does not bring about any change in a system) can be cycle-mood data that indicates moods or behaviours that are desirable and which a participant might want to maintain and/ or develop (Powers, 1973).

The relationship between a participant's mood data (month on month) was borne out by the statistical analysis making use of a two-level linear mixed model, which indicated that for the participants, as a group, particular cycle days could not be said to correlate with specific moods. Some generalised results could be identified, chiefly that the participants felt a lack of energy and nurturing feelings during the menstrual phase and that they felt sexually aroused mid-cycle rather than menstrually or premenstrually (this is a general trend – there are exceptions).

The significance of these findings cannot be underestimated as there are currently many phone applications available which claim that a generic mood calendar can be applied to all women. This new technology is further supported by articles in social and popular printed media and can do more harm than good in terms of creating further socially constructed beliefs around a uniform cycle-mood pattern which women might eventually feel they need to conform to, rather than understanding their own unique cycle-mood relationships, as concluded at the end of section 5.6.1. It therefore makes sense to subscribe only to digital applications which take individual data into account rather than those that make use of generalised deductions about cycle-moods.

7.3.2.1 Value of analysing individual cycle-mood relationships

In both sections 7.3.2.1 and 7.3.2.2, the quantitative findings are discussed alongside reflections from the participants (qualitative data) collected during (especially) the feedback interviews.

In 5.2.4 a single participant's data (Participant I) is outlined, to indicate the discoveries that can be made through analysing the data individually. Participant I was able to observe that she feels high levels of aggression during menstruation, with weepiness and depression setting in mid-cycle and the few days following mid-cycle were particularly rosy for her, with high scores on all positive mood determinants and very low negative scores. She was able to see that there is a negative correlation for her between feeling depressed and feeling sexually aroused, which was very helpful, as she reported feeling guilty about being sexually uninterested during times when she felt 'blue'. This correlates with Givshad et al.'s (2016) finding that knowledge about cycle events was a positive mediator for experiencing cycle events at disruptive intensity. Alleviating feelings of guilt around these times, should have a positive impact on Participant I's depression, instead of exacerbating her negative mood when she is already feeling low. Systems theory refers to communication and information processing and points out that discovering information about the system and then communicating this new information to the person's wider systems, facilitates understanding by intimate others that such information is an expression not of a fixed reality, but rather that it is "the personal truth for the person who has given it a particular meaning" (Becvar and Becvar, 2000, p. 72). Participant I was also able to see that her month one and month two data followed the same basic cycle-mood relationships and, especially with further monitoring, she would, for the first time, be able to anticipate certain emotions. There is a particularly robust correlation between a woman's first and second month of data. This finding is in line with reports by other researchers in the field (Van Goozen et al., 1997; Sandstrom et al., 2016; Reuveni et al., 2016; Pearlstein and O'Brien, 2017). She reported that she would find this very helpful as it was often the 'surprise element' of a feeling arriving when she least expected it, that upset her the most. Finally, she discovered that although the mood patterns between months one and two were very similar, month two showed her feelings

experienced at a lower level of intensity. She realised that this meant that some months would bring stronger emotions, whereas other months might be more muted in that regard. She found this information very helpful, as she said that, during intense months, she would now be able to say to herself, 'remember, it is not always this intense, and it only lasts for a few days'. As Ferree et al. (2011) found in their study of spontaneous intrusive recollections (SIRs), female study participants tended to report far more SIRs during the luteal phase (salivary tests were conducted to determine phase) than any other menstrual phase, displaying a heightened sensitivity during these few days, compared to the rest of their cycle. In line with the discussion of anxiety sensitivity above, Participant I could be educated in the psychosocial constructs that are linked with a more intense experience of negative moods and in that way create her own strategies to ameliorate intense negative moods by, for example, enlisting social support during critical times in her cycle.

The individual data of four participants (BRUMS – 5.3.4); five participants (MDQ – 5.4.4) and three participants (BIQ – 5.5.4) were analysed and graphically represented through similar graphs. These participants' data can be described similarly to Participant I's above, indicating individual cycle-mood relationships and insights that the participants gained from their represented data and which they reported made them feel empowered. Several studies have investigated the use of CBT in alleviating negative cycle moods and have shown positive results that seem to be more long term than other (for example, pharmaceutical) interventions (Maddineshat et al., 2016; Ussher and Perz, 2017), with psycho education being a prominent feature of CBT interventions. Other studies such as those of Abdalla and Gibreel (2016) identified that single element, namely more information about cycle moods, to reduce negative moods without any further therapeutic input.

All participants shared during their in-depth interviews that their moods were somehow affected by their menstrual cycle, making statements which supported findings from the quantitative research instruments, for example: Participant B experienced high levels of aggression and sexual arousal during days 11-14; Participant F experiences the same combination during menstruation. Participants

H, O and T both experience a combination of high levels of feeling nurturing and feeling sexually aroused, but on different cycle days.

The data also show that there are groupings of mood states that rise and fall together (such as fatigue, tension and depression for Participant R's BRUMS data) and there are others that are mutually exclusive, such as depression and feelings of sexual arousal for Participant M (SRD) or arousal and negative affect for Participant O (MDQ). Clusters of moods are also identified in the qualitative data findings, such as when Participant PD describes her emotional landscape during the premenstrual phase as knowing that she could be a bit morose around this time and cry more. Furthermore, the mood states correlate with specific cycle days. Moods do not stay high or low through the cycle but show a definitive shift upwards or downwards as the woman cycles from one cluster of cycle days to the next as can be demonstrated by Participant T's data for BRUMS. When the figure for one month is superimposed over a following menstrual cycle, a very similar 'pattern' emerges. Month-on-month then, her moods are closely aligned to her individual 'pattern'.

The individual interviews pertaining to the premenstrual phase illustrates variability in the moods experienced by different participants, during the same time period in their cycles, with Participant C saying that she is 'snappy', 'irritable' and 'has no libido', during this time, whereas Participant PD says she is quieter both at home and work and Participant PA, in contrast, sharing that she subjects her children to her 'venomous anger' during this cycle phase. Broderick (2005) and Reuveni et al. (2016) advocated for tailored interventions with an emphasis on mindfulness and coping which would work very well for a woman, such as Participant PA, who struggles to control her unusually negative behaviour when her emotions are intense and then suffers from regret, shame and guilt. Systems theory's principles of relationships and wholeness is a constant reminder that participant PA is always dynamically part of larger, more complex systems, like her family (Bowen, 1976).

Variation in mood between participants is found across all instruments. In the MDQ for example, Participant O's control scores are lowest, only rising from days 15-21 to days 22-28, whereas her autonomic reactions show a similar tendency, but with

an additional rise during days 6-10 and a sharper rise from days 15-21 to days 22-28. Participant P's MDQ scores show that most of her mood states rise and fall together, with only her autonomic reactions and arousal increasing from the menstrual phase to the days following the menstrual phase. Participant W has the same high levels of arousal during the beginning and end of her cycle, every month, whereas Participant T experiences mid-cycle increases in arousal. Participant P notes during her in-depth interviews that she 'over exercises' during the winter months and she feels this might be why her cycle shortened to 28 days (from her usual 35 days) reminding us that extraneous factors need to be kept in mind during cycle-mood data analyses.

Within each participant's data, however, whether reported with smaller or bigger scores overall, there is some fluctuation, indicating that moods are not constant, but change alongside cycle days. Taken together, the suite of data collected shows that moods correlate with cycle days and form patterns that repeat consistently.

7.3.2.2 Broad groupings based on mood profiles

This section addresses research question two: 'if you group women together who feel and act similarly on the different days of their cycles, what will the groups look like?', and incorporates both findings from the quantitative as well as the qualitative data. In order to further explore whether the differences between women meant that all women's cycle-mood experiences are individualised entirely, or whether some women experience similar patterns, ecological system software (as described in section 4.5 and 4.5.4) was utilised and rendered the results as depicted in section 5.2.5 (SRD); 5.3.5 (BRUMS); 5.4.5 (MDQ) and 5.5.5 (BIQ). Most notably, it was found that there are groups of women who experience certain moods at the same time, but that when the days were clustered broadly along menstrual phase days (with five phases during each menstrual cycle), the groupings changed slightly per menstrual phase (or cluster of days).

The possibility that there are groups of women who experience similar clusters of mood 'symptoms' was explored by Bäckström et al. (1983). Bäckström et al, (1983)

and later Van Goozen, (1997) who found that some women had more positive moods during times in the cycle when estrogen levels were high, whereas other women had more positive moods during times when levels of progesterone were high, leading to those who reported experiencing PMS having a distinctly different mood/ cycle correlation, to those who did not. Of particular significance is that whether they fell within one group or the other influenced whether their feelings of sexual arousal were higher during the mid-follicular versus during the late luteal phase (Schreiner-Engel et al., 1981). This single defining factor was the strongest correlator determining the group to which a woman 'belongs' in these studies.

The MDQ findings confirmed that there were two groupings, with group one being the group with lower negative scores. Even more than was the case for SRD and MDQ, the BRUMS data indicated a higher similarity in terms of responses, in other words, differentiating two groups. The BIQ confirmed the groups with a high percentage of similarity between participants in each group. In line with group two showing higher rates of negative scores (as depicted by the findings from the SRD, BRUMS and MDQ), the BIQ indicated that group two had higher and more frequent scores for irritability than did group one. Again, as blood tests were not taken for all participants on all days, it cannot be stated that participants were in a particular menstrual phase, but only that certain 'clusters of days' displayed particular mood profiles. So, for example, a particular group of women would be experiencing similar moods during the same few days, and to some extent, similar sorts of moods for each cluster of days, comprising in totality - the entire cycle - but it is indicated that the groupings changed slightly from one cluster of days to the next. This means that women can be grouped according to a particular mood profile as measured over one menstrual cycle and that these groupings would probably be even more pronounced in a bigger sample group.

The results hint at the possibility that there is a finite amount of cycle-mood combinations and that most women would identify with one of these cycle-mood profiles. It would be very exciting to determine these finite groupings and to further analyse what women who belong to a particular mood profile grouping might have in common. In terms of this study, these groupings were then further analysed and

it was found that group one showed consistently higher and more frequent positive mood scores and lower and less intense negative mood scores than group two. This was confirmed with the data analyses from the BRUMS, with group one showing consistently lower scores on negative feelings. The main distinguisher was that group two felt more weepy and depressed than group one during days 15-21. When analysed against data obtained from the MMSQ, it was shown that group one was found to be the group with the women who had the highest academic qualifications and who reported most satisfaction with their work and home lives. The BEST routine used as analysis for the BRUMS data showed that this connection between lifestyle and groupings were strongest during days 6-10 and weakest during the menstrual phase (when most participants were feeling pretty low). The strongest correlations for groupings in BRUMS were level of education; general level of health and smoking/ non-smoking.

As stated in the Results section, it is of course unclear whether these women feel 'happier' because they are experiencing fewer negative emotions during their cycles, or whether they experience fewer negative emotions during their cycle because they are generally 'happier'. This reciprocal causality refers back to the systems theory principle of recursion (Minuchin and Nichols, 1993). When combined with the lifestyle variables, similar questions could be asked about whether choosing to own pets and take part in sports and have hobbies, for example, is making them live a happier life, or whether they chose those things because they are generally 'happier'. However, when one considers the finding that members from group one had higher academic qualifications, it becomes plausible to argue that women who are more informed in general, make lifestyle choices which benefit their health and wellness (Fontana and Badawy, 1997; Givshad et al., 2016; Abdalla and Gibreel, 2016).

Pseudo-correlations and confounding factors are difficult to navigate, but at least at some level one can also propose that participants from group one may have become better educated and made more beneficial life choices because they had a more positive disposition at the outset. Although group one, with their higher level of educational (and in some instances, associated vocational) achievement, appear

to have higher levels of life satisfaction, this might have more to do with the presence of an internal locus of control in their personalities versus an external locus of control for the second group. This single personality trait, first postulated by Rotter (1966), has been shown to have a definitive impact on life experience (Strickland, 2016; Skinner, 1996; Strand et al., 2007). The possible influence of locus of control was affirmed by the feedback interviews, when I investigated whether women from group one had an internal locus of control while women in group two had an external locus of control. Internal and external locus of control is best captured by the systems theory principle of feedback, where those with an internal locus of control will receive input and cogitate on it, either accepting or rejecting the information based on their own inner constructs, whereas those with an external locus of control will struggle to discern between feedback that could be useful or harmful to them. The interview data confirmed that there was a definite positive correlation between internal locus of control and membership of group one. Lastly it is a possibility that having had more tertiary training (for whatever reason) positioned these participants more equitably in the work place and that now having employment which might be more rewarding, financially and otherwise, positions them more favourably for feeling positive, with this positive effect then permeating other aspects such as home-life and lifestyle choices. Whatever the causal relationship, Steiner reminds us that ultimately cycle related depression impacts on both length and quality of life (Steiner, 2008). It can be surmised that recursion, the systems theory principle whereby every consequence alters reality, is at play when one considers multiple positive occurrences such as the opportunity to partake in tertiary education and subsequent vocational opportunities.

7.3.3 Findings according to themes

Qualitative data gathering methods were outlined in 4.2.2.2 and 4.2.2.7 and qualitative data analysis was discussed in 4.5.5. Using Collaizi's method of thematic analysis, the qualitative data rendered five themes, each containing a cluster of (sub) themes, as reported in chapter six. The five main themes that emerged were: menstrual cycle related moods, behaviours and physical sensations; perceived life

satisfaction; sex life; strategies for ameliorating cycle-mood dissatisfaction and the impact of study participation on participants.

The main concern in analysing the findings from the qualitative data, was to report accurately those results in which participants were speaking directly to their cycle-moods. Distilling cycle-moods from the participants' 'normal' (see below), challenged the authenticity of relationships drawn between moods expressed as 'influenced by my cycle' as opposed to 'outside of cycle influence'. A third influence, namely 'influenced by current events', was more easily identifiable as participants were able to report on any dramatic events they might have experienced, and this data was analysed alongside their daily mood reports. In terms then of moods reported as influenced (or not) by the cycle, one has to firstly, acknowledge that any mood reporting will have a subjective basis or even bias (Fadnes et al., 2009). Moving on from that assumption, the researcher has to trust in her own clinical interviewing abilities to allocate reported moods as either 'closer to the participants normal' or 'amplified due to cycle day'. Part of this distillation was based on a profile building process during interviews which included looking at perceived life satisfaction, which ultimately became theme two.

Theme one was constituted from participant responses about their experiences of cycle-related moods as well as behaviours and physical sensations (cycle events). Most of the descriptions of self-identified cycle-mood dissatisfaction centred around the premenstrual phase when moods such as feeling weepy, feeling aggressive and feeling irritable were dominant over positive moods such as feeling caring and loving towards partners and children. Some participants reported bloatedness and food cravings during this period and most were emphatic that they were not interested in sex or affection premenstrually or menstrually. These findings are in alignment with those of Bancroft et al. (1983) who studied 55 women through both hormone testing and concomitant questionnaires about sexual interest and behaviour throughout the menstrual cycle and found that sexual interest was particularly low during the premenstrual and menstrual phases.

A large percentage of the participants stated that they thought they knew when they ovulated, and some felt that they experienced particular emotions during ovulation. Several research studies have explored whether the ovulatory phase of a woman's menstrual cycle has an influence on her moods and behaviour, specifically around mate perception as ovulation is the only time of the month when a woman might fall pregnant. For example, Gildersleeve et al. (2014), Haselton and Gangestad (2006) as well as Pillsworth et al. (2006) found correlations between women's sexual desire and partner preferences during these few days when their participants were shown (through blood tests) to be ovulating, while Gangestad et al. (2005) and Durante (2008) showed that ovulation had an impact on their participants' social and consumer behaviour. Some of the participants from this study reported that they felt a definite positive shift in their feelings post menstrually and during the first few days after their mid-cycle. This was also the finding of Vincenzo et al. (2003) in their study of women's dreams during the menstrual cycle, with their sixteen participants reporting an improvement in mood during the middle of their cycles. In the current study, these times were described by the participants as their 'normal'. It is interesting to note that, in the majority of cases, what the participants described as 'normal' comprised a smaller part of the month than what they described as 'not myself'. The 'normal' constituted positive emotions and a general sense of well-being whereas the 'not myself' invariably reflected a more negative disposition. As a result of these perceptions, women felt that cycle-moods had a negative influence on their lives, especially in the way they felt about themselves and acted towards those closest to them.

In order to explore the concept of 'normality' as described above, in other words, who women thought they were as opposed to who they were or how they felt/ acted because of (as attributed to by them) cycle-moods, I discussed their general well-being and state of mind with them. From this discussion, theme two arose, with women reflecting on home-life; work; significant stressors; participation in activities outside of work and home as well as the participants' perceptions of their own health and state of mind.

Most of the participants were employed and quite satisfied with their work-life even though the range in employment and income varied widely, with some women reflecting in the meaningfulness of their work, while others were happy with their work-life but didn't feel it was particularly meaningful. Some experienced stress at work with only a few feeling that their work-life was particularly stressful. A very similar trend was shown in terms of satisfaction with home life: only a few participants reported extraordinary stressors at home such as having to look after an aged parent or a child with health difficulties. Most participants were happy at home most of the time while a few were clearly having marital issues and were not satisfied with their day to day life at home.

During the quantitative data analysis, it was ascertained that participants who took part in activities outside of home and work, such as volunteering, exercising or having hobbies, were less unhappy about their cycle-moods and generally had a better sense of well-being. This was reflected in the interviews as well, with participants who had pets, hobbies or who belonged to sports' clubs being effusive about these activities and clearly displayed excitement and enthusiasm when these topics were discussed. Most of the participants were in good health and aside from the couple who were experiencing marital distress, were in a good state of mind at the time of interviewing.

As Malary et al. (2015) stated that satisfaction with one's sex life is a good indicator of general quality of life, participants were asked to share their feelings about their sex lives. Their responses and comments about their sex lives grew into theme three. Most of the participants reported that they were not entirely satisfied with their sex lives and that their dissatisfaction was mostly due to their own (perceived) low libidos and the infrequency of engaging in sex with their partners. The majority of participants said that they wished they could have sex more often. Some women reported that they were not able to communicate about sex with their partners and that this played a role in them not having sex as frequently as they would like to. Most of the mothers who participated felt that parenting and the presence of children in the home inhibited their sex lives but also acknowledged that general life stress seemed to affect them being able to feel and act sexually. In terms of the

menstrual cycle, as reflected in the quantitative data, all but one participant did not feel open to sex during the premenstrual and menstrual phases, with the majority feeling aroused for the few days following menstruation and following their mid-cycle. The Ovulatory Shift Hypothesis (OSH) holds that women experience changes in subconscious thoughts and behaviours related to their sexual partners across the ovulatory cycle, with indicators that women might, amongst other feelings, feel more negative about their current partners during ovulation, in spite of the fact that these could be the days in the cycle when some women feel most sexualised (Gangestad et al., 2005 and Gangestad et al., 2007). The OHS explains this seeming paradox in terms of an evolutionary development that motivates women to seek more suitable progenitors for possible offspring. OHS would align with the findings in this study that showed some women felt aggressive toward their partners during their mid-cycles and preferred masturbation to partner intimate contact. The preference for masturbation over partner intimacy during ovulation was mirrored by Bancroft et al.'s (1983) study. Next to 'angry outbursts' towards their children and intimate others, it was the perceived cycle-mood influence on lowered sexual interest that participants were most concerned about in terms of their cycle-mood experiences.

Theme four developed around participants devising strategies to better cope with self-identified cycle-mood dissatisfaction. A few participants noted that they had tried to be cognisant of their cycle-moods and even attempted tracking their moods, but felt that, prior to participation in the study, they had not done so with enough diligence to arrive at an overall understanding of their cycle-moods. Some participants sought help from health professionals, but were not satisfied with the help they received. The majority of participants felt that some sort of intervention, especially psycho education when they were younger, would have been a great help to them and they feel learning to track their cycle-moods as well as learning coping strategies (for coping with aggression) and communication skills (to share their feelings and ask for support) would have a positive impact on their life satisfaction.

Lastly, theme five emerged from participants' reflections on how study participation had impacted on them. Participants shared that they had never monitored their cycle events to the extent which they had during study participation. One participant reported that quite apart from the cycle-mood focus, just the experience of being asked to reflect on how she felt daily over a two-month period, gave her a sense of being centred and feeling at peace. Being mindful was advocated by Broderick (2005) as a strategy that had positive results in coping with cycle-moods. Participants further felt that they had a far better understanding of their own cycle-moods after completion of the study and that this knowledge empowered them. Participants specifically enjoyed the feedback sessions and expressed a sense of amazement at seeing their data compiled and presented to them. One participant was overwhelmed and tearful - stating that she couldn't believe someone could be so interested in her feelings. Some participants reported that they had made adjustments to their behaviour based on their study experiences and felt positive about these changes.

7.4 A synthesis of the study findings

In the sections above, the study findings from both the quantitative and qualitative data were discussed alongside each other. To draw a synthesis of these findings, the following section provides a short summary of these relationships.

Systems theory, is derived from a convergence of several disciplines, including engineering, biology and psychology (Ashby, 1956), mirroring the holistic field of psychoneuroendocrinology, where an atomistic focus is foregone in favour of a convergence of psychology, neurology and endocrinology. Maturana (in Ruiz, 1996, p. 286), states that, "Every system operates according to its structure, that is, according to how it is made, in the interplay of the properties of its components… The structure of such a system determines everything that occurs in it or to it in terms of its internal changes as well as in terms of what it can encounter in an interaction". The following synthesis of the study findings show the interplay not just between quantitative and qualitative data, but how participants' systems

(lives) is an intricate dance, incorporating internal changes as well as what they encounter in exchanges with others and their non-living environment.

Theme one (menstrual cycle related moods, behaviours and physical sensations) found that participants experienced cycle events and theme three described sexual behaviour as reported by participants in relation to their menstrual cycle. This is borne out by the work of Moos (1968), who has found correlations between both behaviour and physiological cycle events with many thousands of women over a long period of time and by Gildersleeve (2014), Haselton and Gangestad (2006) and Pillsworth (2006) whose study findings indicate a change in sexual behaviour across the menstrual cycle, especially around ovulation. Data from the research instruments confirmed that specific feelings; clusters of feelings and/ or intensity of feelings were experienced on specific days of the cycle, forming a pattern that repeats month on month with varied intensity. Gangestad (2005) and Durante (2008) also found that their participants' cycle associated behaviours formed a pattern that was consistent over more than one cycle. In the constructions of the participants, certain moods were therefore linked with certain cycle days, forming a discernible pattern.

Theme four captured the strategies that participants had utilised in the past to ameliorate self-identified cycle mood dissatisfaction and theme five represented participants' thoughts about the impact of participation in the study on them. Although I could not find any studies that reported on women's own efforts to manage their self-identified cycle mood dissatisfaction, Fontana and Badawy (1997) found that participants who presented with pre-existing coping skills such as situational redefinition seemed to be less intrusively affected by cycle related moods, indicating that at least some women do consciously create and employ their own strategies for coping with cycle events. Reflecting on the compiled graphs created based on individual data sets, participants stated that a review of their own data: alleviated their feelings of guilt around their moods and behaviours; gave them perspective as they could remind themselves that moods only lasted for a few days and were not always as intense as their current experience; showed them a predictable pattern which they could use to anticipate

and prepare, thus removing the surprise element, which they found most disconcerting, from their mood cycles and alleviated their fears and negative self-beliefs. These findings correlate with those of Matejovicova et al. (2016) and Potter-Effron et al. (2016) who found that their participants benefitted from being prepared for certain moods in advance. Those participants who had employed strategies to manage their cycle-moods prior to participation stated that they were not very successful as they struggled to maintain strategies on their own, whereas the way in which their own data was captured and represented to them made them feel empowered. Rezaee et al.'s(2017) findings found better results when women who had self-identified mood dissatisfaction were supported by their spouses, indicating that a web of support can invigorate women who report negative cycle moods and have better long term outcomes than attempting to manage cycle-moods in isolation.

Findings from theme two, pertaining to perceived life satisfaction of the participants, aligned most closely with data about the groupings of women who seem to experience similar cycle-mood patterns. Van Goozen (1997) identified similar groupings in her study. This data indicated that participants who were more highly educated; reported themselves to be in good health; didn't smoke; had pets and participated in activities such as sport outside of their home or work environments, were markedly more content than the remainder of the participants. It is difficult to ascertain a cause and effect with this data, as discussed above, but what can be shown is that women who were in the more content group exhibited thoughts and behaviours that are associated with an internal locus of control (Rotter, 1966) and that their lifestyle choices and quality of life were more positive than those from the other group. As mentioned above, both the systems principles of recursion and feedback address patterns in systems where consequences perpetuate to create more of the same – for example positive or negative outcomes.

7.5 Implications of using systems theory

Systems theory was utilised as a philosophical underpinning in this study and its utility as analysis method was that the data could be considered simultaneously at individual level, taking cognisance of the systems internal to one individual, as well as on a wider level, where the individual could be contextualised within her wider network (home/ work) of systems. This duality in analysis made it possible to reflect on all aspects of a complex construct (cycle-moods) while staying clear of Descartian fragmentation and staying true to a more holistic contemplation of the individual. Systems theory guided this holistic philosophy with cognisance of social constructions in that its tenets are based on the reciprocity of influence between adjacent systems such as the participant and her social environment. Furthermore systems theory enabled the theoretical framework by guiding the research methods and specifically, the research design, from data gathering to analysis, by introducing concepts such as starting with the wider context and interviewing for deeper information (as was discussed above with the expansion from MMSQ to interviews). Ultimately, systems theory is reflected in the outcomes of the study as the study implications and recommendations are expressed in terms of individual systems (menstruating women) and the mutual influence between these and wider systems (their families and communities). Implications of the study findings and recommendations derived from these, will be discussed in the Conclusion chapter.

7.6 Limitations of the study and lessons learnt

7.6.1 Sample size

The convergence of these three factors: blood tests were to be facilitated by PathCare via their wide network of laboratories; the daily SRD could not be made available via phone application; and participants preferred submitting data via e-mail, led to the research design being adapted to data submission via e-mail.

The unanticipated consequence of this development was that participants could in fact, have been sourced from all over South Africa, thus potentially providing a bigger sample group. Unfortunately I had exhausted my recruitment campaign

resources at this point and was able to source only three more participants in cognisance of the now wider access to my sample population. The limitation of recruiting only locally had a direct impact on the size of the sample group.

The manner in which data were collected for this study changed between the planning and execution stages. As collecting data in person limits the sample size, it is recommended that future studies plan to collect data electronically (and remotely) as this can inform a much wider recruitment process, which should attract a larger and more diverse pool of participants. The small sample size in the study represents a limitation and hence the results are not generalisable to larger populations.

7.6.2 Lack of funding

This study was an independent piece of research, not part of an existing funded research project. The study topic has not historically nor is it currently, one that draws funding in a research environment where resources are more readily allocated to wide-spread and life threatening diseases such as HIV/ AIDS, Tuberculosis or Malaria. Nor is the research population, namely women who are essentially healthy and not impoverished, a group which easily draws funder attention in a developing economy where populations such as babies, young children and pregnant mothers are a priority for interventions.

There is no doubt that had funding been available to: take blood samples from all participants rather than a small sample; develop a digital self-report diary phone application and to widen the scope of the recruitment campaign for participation, that more data sets would have been collected resulting in a greater amount of data from which more extensive data analysis could have been conducted. Pletzer et al. (2011) states that, studies which consider particular hormones are lacking as they are expensive and she references two studies, namely those by Weis et al. (2008) and De Bondt et al. (2015) as having been researched following a design which tested women's hormones at the three critical measuring points in the menstrual cycle: menses, pre-ovulation, and mid-luteal.

A final limitation of the lack of funding for the study was that participants could not be financially compensated for their participation. Although this was clearly stated before start of participation and I therefore feel it did not impact on the participants who chose to participate, it is possible that potential participants who came to know about the study decided not to take part, based on the lack of financial compensation.

7.6.3 Reporting burden and multiple instrument data analysis

The schedule of data collection for the various research instruments is a conundrum. The SRD data were collected daily and as discussed it is desirable to gain data from every day in the menstrual cycle. However, providing a broader base of instruments, which can provide a different range of data, significantly increases the reporting burden on participants. For this reason, the other instruments were only reported once per week. This posed a problem for data analysis as the weekly interval meant that the data was represented for different cycle days from one cycle to the next. This resulted in a small number of data sets for the weekly data that showed data for at least two cycles for each cluster of cycle days.

7.6.4 Statistical analysis

In the social sciences data are analysed using different statistical software packages from those used in the natural sciences. In this study the available social sciences' software was not adequate for identify groupings for the assembled data, and so multivariate analysis software more commonly used in ecological studies was used to look for correlations and groupings in the data. This is not unusual in studies that 'cross over' disciplines, as was the case in this study and offers exciting interdisciplinary possibilities for future research in this field of study.

7.6.5 Blood tests

Collecting of blood samples raised two challenges. The first was funding and the second was ensuring that participants had blood drawn on specific testing days. I had limited funding and this restricted the number of participants that could have blood sample analysis. In terms of the collection dates, one out of the five participants had two of her blood samples collected on days that were on the outer limits of her cycle phase. The endocrinologist was able to interpret these data, but consideration should be given as to how collection might best be synchronised with participant cycles in a possible future study, in order to avoid data loss.

7.6.6 Use of a newly constructed self-report diary

If the SRD data aligned closely with those collected by the other instruments, it could be said that the SRD was a valid and reliable instrument for collecting daily mood data. This was the case with one notable exception. The descriptor to question four - How energetic did I feel today, was: could accomplish a lot/ exercised/ feeling on top of my work/didn't need to take a break/had an easy day. Unfortunately almost all participants assessed 'feeling energetic' according to how much they did or achieved, rather than how energetic they felt. As described by one participant when questioned about this, she said that she would, 'rather have stayed in bed and done nothing that day', even though her energy score was reported as quite high. She explained that she could not stay in bed as she had a job and children, and so she got up as usual and went about the business of her day accomplishing a great deal before finally being able to lie down at bed time that night. The descriptor should therefore emphasise the intrinsic emotional perception of energy levels, both physiological and psychological, rather than allowing the participant to assess her energy level according to how much she managed to do that day. As it stands, the energy scores on the SRD are not a true reflection of how energetic women felt but is rather a testament to how most women will ignore, by choice or obligation, how they feel and push themselves to achieve whatever they need to do or feel they are responsible for. This descriptor will have to be modified in future applications of the instrument to indicate a range of feelings related to vigour, from tired to energetic, specifying the perception and experience of vigour rather than a measure of how much was accomplished. Both

the BRUMS and MDQ captured similarly high energy scores, although not as high as the original questions (which then clustered into sub-scales) spanning a wider range of items testing for levels of vigour/ energy.

7.6.7 Practical implementation of study recommendations

In terms of the translation of the research findings to practice, it is clear that women's moods cannot be accurately represented by answering a few short questions at only one time point. Each woman's cycle is unique and she needs to carefully monitor her own moods over extended periods of time to ascertain her mood-cycle patterns.

7.6.8 Researcher/ supporter

With respect to the role of researcher/supporter it is important that the researcher supports participants through the long data collection process to prevent attrition. However, the support needs to be sufficiently limited so as not to change the participant's mood, as this would bias the research data. In this study, I was able to explain this to participants during the intake interview. Consequently, when participants shared personal information during their daily reporting, I made use of simple emoticons (such as a smiley face) or a simple short note such as, 'I am very sorry to hear that', so as not to alienate a participant when she experienced a sad life event (or similar).

8 Conclusion

The implications of the findings regarding cycle-mood relationships are that individual cycle-mood patterns can be determined by close monitoring and self-observation and that a woman can benefit from this awareness (Givshad et al., 2016). For those women who experience self-identified cycle-mood dissatisfaction, understanding their cyclical mood pattern can help them strategise, prioritise and design a management plan (Fontana and Badawy, 1997) (Broderick, 2005). Even a basic educational programme about PMS has been shown to "increase knowledge of and decrease the signs, symptoms and severity of PMS" (Abdalla and Gibreel, 2016, p.200) and beyond the individual, women can communicate these insights with those close to them (Rezaee et al., 2017). This is relevant because it can improve the quality of life of many women and by extension, those closest to them. Such awareness and communication can lead to a better quality of life (Peranovic and Bentley, 2016).

To illustrate the importance of developing interventions that are more individualised, this study found that the general consensus in the minority of participants who did seek help from a health professional to alleviate cycle-mood dissatisfaction seems to be that the treatment was 'general', such as the prescription of an anti-depressant. This is echoed by Halbreich et al.'s (2003) findings, which indicated that women from several studies reviewed by his team approached three to four health care professionals over a period of five to six years before cycle-moods were identified as causing their mood dissatisfaction. In their study, Halbreich et al. (2003) reported that the most common treatments included vitamin/mineral supplements (62%), exercise (59%), natural progesterone (51%), diet changes (44%), antidepressants (15%), stress reduction (12%), estrogen (11%), and anxiolytics (10%). Only one-third of this sample was satisfied with their treatment. Participants from this study indicated that the interventions they received may have helped them to feel slightly better, but that the help was insufficiently specific to adequately address their cycle-related mood difficulties. Thirteen out of the twenty eight participants had sought therapeutic intervention for pervasive cycle related mood dissatisfaction prior to engaging in the study, whereas nineteen felt their cycle related moods had in fact had a significant impact

on their lives. Twenty of the participants reported that they felt some sort of intervention for their cycle related moods would have helped them to live a happier life. What can be concluded from these findings is that health professionals should consider focussing on interventions that can improve quality of life, going beyond conventional responses such as prescribing anti-depressants.

Similarly, health care professionals need to be aware that most women are reluctant to seek support for cycle-related moods, particularly those such as perceived low libido (Dillaway, 2012). They are also reluctant to acknowledge moods and associated behaviours that seem ‘not feminine’, such as irritability, anger and aggression (Born and Steiner, 1999). Women often express these moods under the more socially-acceptable guise of feeling weepy or even depression (Alonso et al., 2004). Thus guided by social constructions, women seem to subvert their natural feelings in favour of what they think would be socially acceptable.

Health professionals should consider that the degree to which certain emotions are experienced, depends on various factors. As mentioned, the endocrine system holds both the fertility clock as the daily emotions experienced in reaction to thoughts or experiences. In the human experience, our emotions are as varied in their level of enjoyment as they are in their intensity. The intensity of emotion associated with the menstrual cycle is experienced differently by women. This is due to factors that we understand, and others, that we do not. For example, some women might have higher levels of hormones released throughout their cycle, intensifying their experience of certain emotions. If even this element could be experimentally controlled, women would still experience the cyclical moods with different levels of intensity. Why is this?

This can best be explained illustratively: a friend related that she has a condition associated with her adrenal glands that causes her to feel all but the most acute of emotions, as a very low hum. Parachuting out of a plane or bungy-jumping off a bridge would have her hardly breaking a sweat. In contrast, I just have to think about missing a step going down the stairs, and my heart rate instantly accelerates. My friend’s flattened affect might have a physiological cause, but other causes for

varying emotive intensities could be due to social conditioning; lack of support or higher levels of self-focussed attention (amongst others – as discussed above). Both nature and nurture can cause a person to experience emotions with a low hum or a resounding crescendo.

What one should be mindful of is that for couples who might have been suffering from erroneous beliefs about the female partner's moods, a realisation that there are other possibilities could introduce understanding and end confusion. Participant R experiences feeling nurturing as high for most of her cycle, and feeling sexually aroused only as high during the few days when she does not feel nurturing. Clearly this could cause confusion for her partner and indicates that cycle related mood interventions can never be a 'one-size-fits-all' strategy as might have been the general belief before. Her SRD results are echoed by the MDQ where her arousal scores formed an inverse correlation to her other mood states.

Normally menstruating women world-wide will fall somewhere on a continuum of being highly sensitive to the fluctuations in their menstrual cycle to being minimally susceptible to the hormone flow and changes their bodies are going through. The word 'susceptible' is carefully chosen. In this sentence, 'aware' could not have been a synonym. The reason for this is that even women who are 'unaware' of the fluctuations are probably still susceptible to them and are acting on them. Their behaviour is nevertheless influenced by cyclical moods.

To visually illustrate the seemingly intangible 'levels' of understanding one's own cycle-moods, I created an algorithm (Fig 7.1) which can be viewed below. This algorithm summarises the process of becoming self-aware and empowered through gaining insight into cycle-moods, starting with a low level of awareness and eventually moving through the interpersonal space. For a woman to have even a first level awareness (Figure7.1) - a fleeting understanding that some feelings are associated with an endocrine cycle and not only a reaction to circumstances, is helpful. Understanding that the anger she feels towards a partner or irritation with a child's messy room may be exacerbated by her current cycle-moods, can help to tone down her response, even if she does not know why or how it is linked to her

cycle. At the next level, being able to predict how she may feel at a particular time in the month, and possibly the likely intensity of that feeling, does not only aid in the way she reacts, but also assists her to plan better.

The next level of awareness (Figure 7.1) and associated psychological benefit from knowing her own cycle is at the interpersonal junction. Women can relate their cycle patterns to their partners, children or other live-in relatives such as parents. A simple calendar can be utilised to indicate certain mood states by using coloured stickers. Partners can be helped to understand what a woman's particular needs may be around that particular time.

Male partners, who often feel on the outside and even at the mercy of women's hormone cycles, can learn to track associated moods and needs. With communication, honesty and empathy, partners can discover how to make the best of each cycle-mood, even the hitherto 'impossible' ones like anger and irritability. There may be a time of the month when the best course of action, for example, is for the partner to withdraw (consensually), thereby avoiding conflict and allowing both him and his partner much valued 'alone time'.

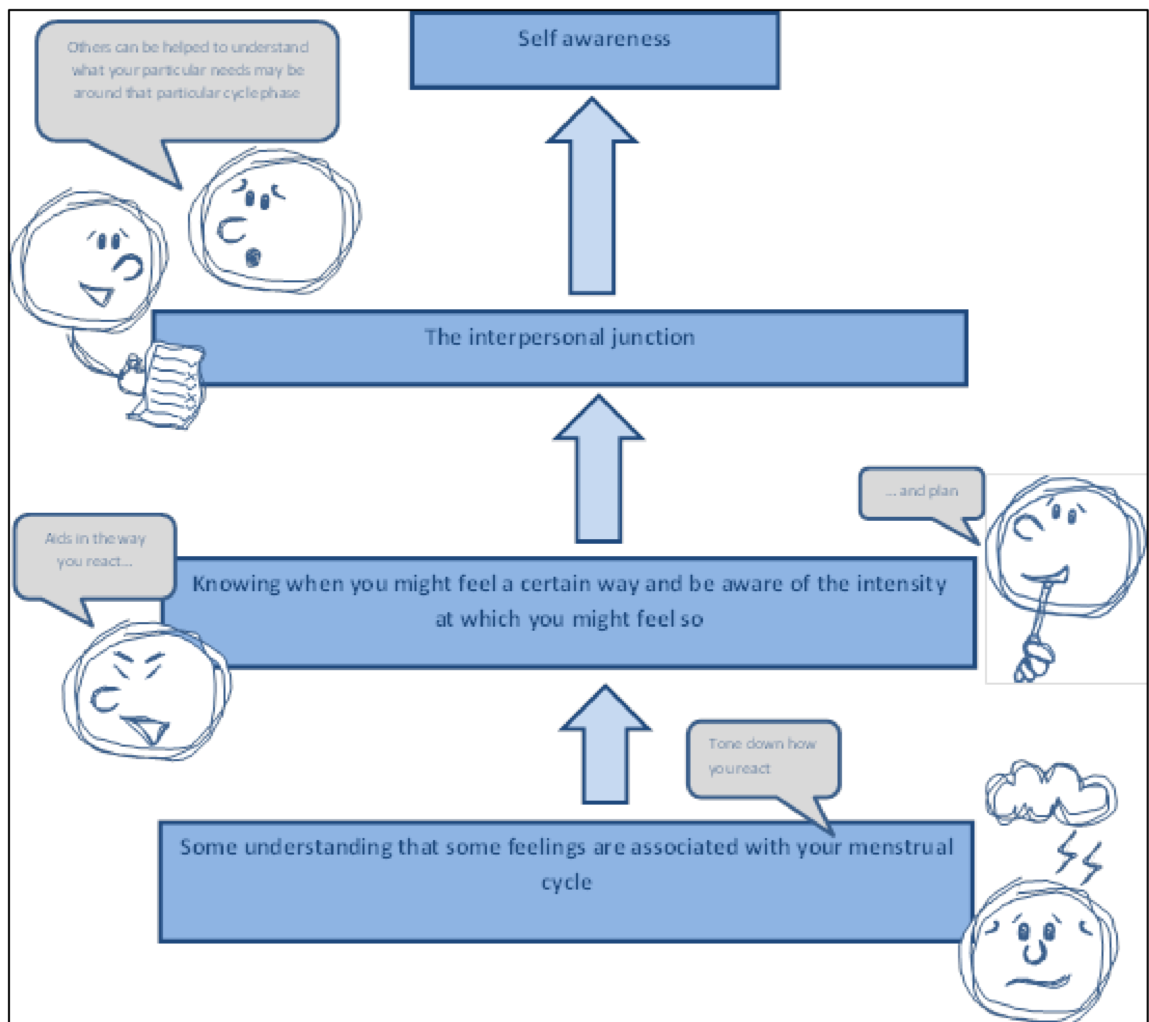

Figure 7.1 Algorithm to demonstrate how knowledge of menstrual cycle related moods can help women, 'How can knowing my cycle-related moods help me?'

The last level (Figure 7.1) of benefit from cyclical mood awareness is at the level of self-awareness. Almost every human being can benefit from taking time out to be more aware of their own moods and behaviour. In order for a woman to get to know her cycle and associated moods, she will have to monitor her moods closely for a few months until her patterns become apparent. Self-mastery can only be achieved through self-awareness.

Although the algorithm appears very simple, it captures a complex process succinctly and can serve as a therapeutic guideline for both women and health professionals. In this study much research has been cited in terms of successful

interventions with cycle-moods, which can create the impression that cycle-moods are already widely addressed by the medical community. This is not the case. In spite of the fact that much research has been done, this work has not been disseminated to or adopted by health professionals on a wide scale.

8.1 Recommendations

Psycho-education; open discussion; support from clinicians and social support regarding all of these issues can help to remove some of the taboos (Graham and Bancroft, 1993) and connect like-minded people to each other in a safe space where they may be able to explore and understand their cyclical moods and behaviours (Newton, 2016; Sveinsdóttir, 2016).

In the Literature Review Chapter, no fewer than five articles cited, used the word 'tailored' in describing what the authors perceive to be the best possible fit for cycle-related therapies (Sandstrom et al., 2016; Tracy et al., 2016; Chiyoung and Nam, 2016;Reuveni et al., 2016) (Pearlstein and O'Brien, 2017). The participants' intuitive sense that their interventions should have been more specific, or 'tailored', is an indication that a determining factor in therapeutic success and client/ patient satisfaction, is a therapeutic design that is sufficiently multi-dimensional and flexible to be easily individualized. In several studies cited in chapter two, various strategies and interventions have been tested in terms of alleviating cycle-mood dissatisfaction. The work of Ussher and Perz (2017) indicated that the use of CBT, especially with partner involvement, rendered the best long term results. Lustyk et al. (2009), Broderick (2005) and Rezaee et al. (2017), amongst others, also support the use of CBT and mindfulness as gentle and effective interventions for women who are dissatisfied with their cycle-moods.

Menstrual-cycle related mood dissatisfaction affects many women and is therefore of concern to psychologists. The focus of this study is on identifying mood patterns that span the entire length of the cycle, not just those that are only at play pre-menstrually. At least one of the texts I encountered during this study seems to indicate a pervasive attitude that women who struggle with their cycle-related

moods are somehow deficient and should be treated with circumspection (Kruger and Botha, 2011). This raises concerns about how cycle-mood related issues are viewed in our society and specifically handled at our higher centres of learning.

The importance of understanding the link between cycle days and moods is two-fold: it shows that women can anticipate the emotions in their next cycle and it reveals to themselves and their partners that a particular combination of emotions (for example, high levels of assertiveness, irritability and even verbal aggression), does not signal a specific attitude or behaviour (for example, disinterest in sex) that it might seem to imply.

8.2 The therapeutic space – suggestions from the findings

The core premise in the management of cycle-moods is that a woman who desires an intervention for her self-identified cycle-mood dissatisfaction should first complete daily report diaries that capture her mood data over at least two menstrual cycles. Once this detailed diary has been produced, the therapist and client can analyse the data together, drawing graphs such as those in this thesis to visually represent the moods as they change through the different cycle days, and looking for individual correlations between mood and cycle day. As confirmed by Kaplan et al. (1990) in their study about psychophysiology and the menstrual cycle, women do show different reactivity and baseline scores on tasks, depending on the day of their cycle during which testing took place. This supports the supposition in this thesis that menstrual days have a varying impact on moods and cognitions which, when monitored and recorded, could be utilised to enhance quality of life. It is important to note that heightened endocrine releases caused by the experience of intense emotions, as discussed in section 7.1, can over-shadow the influence of menstrual cycle moods and as shown by Sigmon et al. (2000), menstrual cycle phase can have a lesser impact than anxiety sensitivity in women who have high anxiety sensitivity.

The 'detailed history', traditional interview or conversation between therapist and a woman at the start of a therapeutic relationship, which is used to devise

treatment strategies, should be expanded to include socialisation around menstruation, social and cultural constructs in her world and any recent relational issues around her cycle, such as her relationship with her partner and family. The interview should include the therapist asking when and from whom the client received guidance about their menstrual cycles, and should explore the depth and nature of this guidance. For example: did the client's mother tell her only the 'basics' of sex education or did she also discuss feelings associated with the menstrual cycle? This 'second tier' information is often lacking: most participants shared that they had little prior knowledge of anything to do with menstruation, feelings associated with menstruation or even monthly fluctuations in fertility. They also had received little or no guidance about sexual interactions other than that gained through their own experiences, and shared that they attached symbolic value to behaviours and actions based on what they had learnt from novels and movies (acculturation).

Once a thorough understanding of all the role playing elements in the client's cycle-mood related issues have been explored, the therapist and client partner to create strategies that will address the issues which most worry the client and design such strategies along the norms which are best suited to the client's experiential world. Making use of feedback, as described through systems theory, clients are guided through their own individual mood data, and as such receive guidance from someone who now has an acute insight into their moods but also experience a normalisation of previously uncomfortable psychological experiences through the knowledge that they are shared with other women. This concept can guide the therapist's questions by prompting them to ask, 'How does one frame questions and gather data that will be useful for constructive feedback?' The next part of the therapeutic process is for the therapist and client to co-monitor her progress as she applies these strategies. Monitoring includes reflection and adjustments, as well as celebrating small successes along the way. When the client feels that she is able to continue implementing strategies without assistance, the therapeutic process can be suspended until (or if) further support is needed.

The therapeutic techniques utilised could be guided by the basic premises of narratology or narrative analysis, as first used by Vladimir Propp and later, Tzvetan Todorov (Herman and Manfred, 2008), according to which clients are invited to join in a conversation with the therapist where they are encouraged to share their stories about hormones, sex, partner relationships, and other aspects of their lives. The central idea of analysis is that the narratives offer translucent windows into cultural and social meanings. Narratology extends the idea of hermeneutics by including in-depth interviewing, unfolding as life history narratives and historical memories (Culler, 1997).

How does this study hope to make this therapeutic process become more widely applied in clinical practice? The key to this question lies with the identification of cycle related difficulties. More than a third of the participants in this study sought help and yet none felt that the interventions they were offered addressed their difficulties adequately. The required intervention therefore lies with educating clinicians in including history taking in every in-depth interview and to specifically make cycle related mood questions a part of this interaction. Clinicians further need to receive instruction in how to obtain detailed self-report diaries from their patients, and how to either follow the process of analysing and interpreting the results, or to build a network with suitably qualified counsellors or therapists who have an interest in and deep understanding of this field.

In summary, cycle-mood dissatisfaction is a reality for many women but remains mostly unidentified and unaddressed by health professionals. Cycle-related moods are best addressed through tailored interventions starting with detailed self-monitoring. Interventions should address these issues at an individual and interpersonal level and can result in markedly higher life satisfaction.

8.3 In conclusion

As noted in the Discussion, confounding factors complicate the study and dissemination of data from menstrual cycle related research. This study took a strong view in favour of holistic investigation and reporting, a paradoxical position

when one contemplates the study of 'a part of' a construct, in this case, a part of a woman's psychological make-up. As noted throughout the text, human beings will have emotions as a result of a diversity of factors and trying to deconstruct these with the aim of deepening one's understanding of them, is in itself Descartian. The focus of this study was to investigate the cycle-moods a woman might experience during her monthly menstrual cycle, an investigation which necessitated the consideration of the endocrine system; social constructions; systems; psychology and each participant's living and non-living environment. While some of the participants' data focussed on deconstructions such as differentiating between different cycle days, other data focussed on the greater whole, such as a woman's experience within her wider social system. Data obtained through both the methods of focussing in or zooming out to get this wider view, were organised systematically in order to attempt answering the research questions.

The struggle to take into account all salient elements of human experience related to a research project, is not unique to this study, as Graham and Bancroft found in 1983, "Presenting a dispassionate account of the relevance of the menstrual cycle to the well-being of women is consequently not easy. It will readily fall prey to the accusation that, from one point of view it is too biological and from the other, too sociological" (Graham and Bancroft, 1993, p.15). In fact, the challenge in menstrual cycle research is not just methodological, but also philosophical, with social scientists such as feminists holding forth that social constructions such as those created through patriarchy have turned menstruation into a political issue centring on power or more to the point, the disempowerment of women.

Ussher contemplates the difficulty of acknowledging the physiological and psychological reality of menstruation while at the same time maintaining women's position of equality in a misogynistic society, "At the risk of further clouding the issue, I want to argue both that there is some truth in the contention that menstruation is not inevitably a debilitating force, and yet also that there is some truth in the argument that the menstrual cycle does have an effect upon many women—an effect that may, in some cases, be negative." (1992, p.132). Maybe the view to the future should be to acknowledge all sex differences in the hope that

showing male and female strengths and weaknesses across a very wide field of studies will bring a more equitable view to the gender divide. The highs and lows of menstruation, for example, could be off-set against studies of functional cerebral asymmetries (FCA's) which indicate that the female brain is less asymmetrical, resulting in expedited and easier access to both brain hemispheres, a trump card from battle ground to boardroom as seen through a wide review of FCA's by Hausmann (2017).

Ussher stated that one must be careful to take menstruation completely away from the biomedical model and to the social constructionist model, as that would negate the corporeality of menstruation. In the same way, I think one should be cautious to reject all interventions including the use of testosterone to boost self-identified low libido (where it causes the woman distress); contraceptives (where pregnancy is undesirable) and menstruation suppression (where heavy bleeding and cramps impinge on self-desired levels of productivity, whether in work or socially) amongst others.

We all make choices about our bodies every day. Some are of little consequence, such as whether we decide to colour our grey hairs, others are profound, such as whether we decide to pursue invasive cancer treatments, but in all instances the empathic and respectful stance is to allow free choice and actively work against judgments which limit or inhibit free choice. While I therefore do not believe that menstruation is a medical condition and that concomitant physiological and psychological factors need to receive medical treatment, it is my opinion that many women, through social constructions or own lived experience, have self-identified cycle-mood dissatisfaction and can benefit from psycho education and counselling.

This study has shown that women do experience similar emotions at the same time in their cycles, month on month and that groups of women experience a similar pattern of emotions during their cycles. It has shown that there are factors which these groups of women who share cycle-mood patterns, have in common and that one group is markedly more satisfied with life and as a result enjoying a higher quality of life, than the other group. By studying these factors and groups, it should

be possible to explore the elements that the more content group has in common and learn how to assist women who are less satisfied, to enhance their quality of life.

Future research could focus on how to capture subtle mood fluctuations more accurately, following norms that are becoming established, such as testing on all days of the cycle and across at least two full cycles. Other norms might include concurrent rather than retrospective testing and make use of electronic data gathering systems such as phone apps which log data accurately and with a digital record. A research focus which was not explored with great depth in this study is that of the social and cultural taboo of speaking about menstruation and how to raise interest for psycho education about cycle-moods in an already heavily saturated psycho educational environment. As with other 'sensitive' issues within the wider gender domain, such as sexual preference, history has shown that boundaries delineating cultural taboos can be shifted with enough political will (Stubbs, 2008).

9 References

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Addendum A Menstrual Mood Study Questionnaire

Research Participant Questionnaire

1 Participant number ______ *(for official use only)*

(This study aims to collect as much reliable data as possible. In order to make this possible, your identity will remain secret. You will be allocated a number which will be linked with your data throughout the study.)

2 Biographical info:

2.1	Your cell number	
2.2	Your e-mail address	

(I need to be able to give you feedback. Should you feel your e-mail address will compromise your identity please create a new, free address with gmail or other service provider of your choice.)

2.3	Date of Birth	dd	mth	yr
2.4	Age			
2.5	Area & town / city where you live			
2.6	What is your nationality			
2.7	What ethnic group do you belong to			
2.8	What is your home language			
2.9	How many languages can you speak			

3 Educational Info:

3.1	Highest Academic Qualification	std 8/gr10	gr 12	tertiary	degr.	Mast degr.	PhD
3.2	Are you currently studying	yes	no				
3.3	If so, what is the nature of your studies		gr 12	tertiary	degr.	Mast degr.	PhD
	other						

4 Occupational info:

4.1	What is your occupation					
4.2	Are you currently working	yes	no			
4.3	If not, when was the last time you worked	2013	2012	2011	2010	before 2010
4.4	If not working, what would you say occupies most of your day			studies	children	sport
	volunteering	leisure activities	a combination of these		other	
4.5	Are you currently working in the area for which you studied/ trained				yes	no
4.6	Would you describe your working environment as (above average) stressful				yes	no
4.7	Would you say that you are happy in your work		yes	no		
4.8	Would you describe the work you do as 'just a job' or 'your career'				job	career
4.9	Are you looking forward to retiring or would you like to work for as long as possible					
	retiring	work for as long as possible				

4.10	Tick yes or no in the boxes next to the following statements:		
a	I feel I have been successful in my career	yes	no
b	I feel satisfied with my career choice and progress	yes	no
c	I would rather have followed a different career path	yes	no
d	I look forward to going to work most days	yes	no
e	I feel my health prohibited/ prohibits me from progressing further with my career	yes	no

5	**Income:**	
5.1	Do you earn below R10 000 per month/ between R10 000 and R20 000/ between R20 000 and R30 000	
5.2	or above R30 000 per month	below R10 000 / R10 000 - R20 000 / R20 000 - R30 000 / above R30 000
5.3	Do you earn the highest income in your home	yes / no
5.4	If applicable, does your partner earn below R10 000 per month/ between R10 000 and R20 000/ between R20 000 and R30 000 or above R30 000 per month	below R10 000 / R10 000 - R20 000 / R20 000 - R30 000 / above R30 000 / not applicable
6	**Health:**	
6.1	Would you describe your health as good, average or below average	good / average / below average
6.2	Do you have any particular health issues like a chronic disease or disorder	yes / no
6.3	Do you have diabetes or other disease/ illness that impacts on your life on a daily basis	yes / no
6.4	Do you take any medication on a daily basis	yes / no
6.5	Indicate which	Vitamins / Anti-depressants / Hormone supplements / Chronic disease related / Pain killers / Other
6.6	Have you had any life-changing accidents, surgery or illnesses	yes / no
6.7	Please indicate your parents' life/ age status	mother's age or mother's age at death; father's age or father's age at death
6.8	Do you have longevity in your family	yes / no
6.9	If not, are there any specific diseases that are causing family members to die prematurely – please indicate	diabetes / cancer / heart disease / liver or kidney disease / lung diesease / stress/anxiety / other
6.10	Do you have low or high blood pressure or any other features of your health profile that you feel might have an impact on your life/ moods	low blood pressure / high blood pressure / other
6.11	Do you smoke, if so, how many per day	yes / no / how many
6.12	How many alcoholic beverages do you consume every week	
6.13	Are these mainly wine, mainly beer, spirits or a combination	wine / beer / spirits / combination
6.14	Would you describe yourself as a light/ social or heavy drinker	light / social / heavy
6.15	Would you describe yourself as an alcoholic	yes / no
6.16	Are you an alcoholic in recovery	yes / no
6.17	Do you take any recreational drugs or prescription drugs to the purpose of 'doping'	yes / no
6.18	Have you in the past taken recreational drugs or prescription drugs to the purpose of 'doping'	yes / no
6.19	Would you describe yourself as a drug addict	yes / no
6.20	Would you describe yourself as a drug addict in recovery	yes / no
	(If 'no', go to question 6.24)	
6.21	Have you ever been in rehab	yes / no
6.22	If not currently in recovery, have you been in recovery & relapsed	yes / no
6.23	Are you currently in relapse	yes / no
6.24	Do you see a chiropractor regularly	yes / no
6.25	Do you go for alternative therapies or take any homeopathic remedies	yes / no

7	**Pregnancy & children (biological or other - raised by or living with you**								
	(If you have never had a pregnancy or had any children living with you, go to section 8)								
7.1	How many, if any, pregnancies have you had								
7.2	Are you currently pregnant			yes	no				
7.7	How many children do you have (if any)								
7.8	Please indicate genders, ages and if own pregnancy								
		age	gender	own pregnancy					
	child 1			yes	no				
	child 2			yes	no				
	child 3			yes	no				
	child 4			yes	no				
	** if more, please indicate at bottom of questionnaire*								
7.9	If more pregnancies than children please note discrepancy by indicating								
	miscarriage	abortion	still birth	child death	other				
7.10	Do they live with you full time			yes	no	some do/ some don't			
7.11	If not living with you full time, please indicate								
	they are adults		they live with their father			they live with another family member		other	
7.12	Please indicate whether you are								
	a parent living with the other parent who is the father of your children								
	a parent living alone with the children due to					divorce	separation	death	
	a parent living alone without the children due to					divorce	separation	death	
	a parent living with a partner who is not the father of your children								
	a parent living with a partner who has children who are					living with you		not living with you	
	other								
8	**Diet and exercise:**								
8.1	How many kilograms do you weigh								
8.2	What is your height, in centimeters								
8.3	Would you desribe yourself as over weight					yes	no		
8.4	Would you say that you eat a fairly balanced diet					yes	no		
8.5	Do you eat an above average amount of sugar/ chocolate						yes	no	
8.6	Have you noticed how the way you eat has affected your moods							yes	no
8.7	Would you describe yourself as having or having had an eating disorder							yes	no
8.8	If so, which of the following would apply to you					over-eating	binge eating		anorexia
	bulimia	starving yourself periodically		always on a diet			other	none	
8.9	Do you exercise at least twice a week			yes	no				
8.10	If you are exercising five or more times a week at a fairly high level of intensity, please indicate								
	I am an athlete		I take part in organised sport			I enjoy fitness		other	
9	**Stress and relaxation:**								
9.1	Do you have any hobbies or interests that take up a reasonable amount of time per month								
	(including gardening/ reading)			yes	no				
9.2	Do you belong to any recreational clubs or sports' teams						yes	no	
9.3	Are you a volunteer at any school/ institution/ organization						yes	no	
9.4	Do you, or have you ever, had a regular practice of meditation or taken part in Yoga, Tai Chi								
	or similar		yes	no					
9.5	Are there any extraordinary stressors in your life such as						a child in prison		
	a very high profile career			a live-in relative in the final stages of dying					
	a child with a serious disability			other					
9.6	Do you own any pets			yes	no				
9.7	Would you describe your home-life as (above average) stressful							yes	no
9.8	Would you say that your home-life is a happy one					yes	no		

No.	Question	Options
10	**Relationships and sex:**	
10.1	Would you describe yourself as *(you may need to tick more than one box)*	married / divorced / re-married / living with your partner / living apart from your partner, but involved / living on your own - uninvolved / other
10.2	Is your partner a man or a woman	man / woman
10.3	Have your partners in the past been men or women (or both)	men / women / both
10.4	Would you describe your sex life as fairly active and rewarding	yes / no
10.5	Would you describe your sex life as almost non-existent	yes / no
10.6	Would you describe your sex life as abusive	yes / no
10.7	Are you happy with your sex life	yes / no
10.8	Do you feel you have a high/ low or average libido	high / low / average
10.9	How often do you masturbate	*(indicate per month)*
10.10	How often do you have sex	*(indicate per month)*
10.11	How often would you like to have sex	*(indicate per month)*
11	**Menstruation & Hormone History**	
11.1	Do you still menstruate	yes / no
11.2	*(If not, answer all questions in reference to what it was like when you still menstruated)*	
11.3	At what age did you start to menstruate	
11.4	Would you describe your periods as light/medium/ heavy/ very heavy	light / medium / heavy / very heavy
11.5	Have your periods always been like this, or do they fluctuate	always / fluctuate
11.6	How many days does your average period last	
11.7	Do you use	tampons / pads / moon cup / combination / other
11.8	Do you experience so much pain during your period that you take pain killers	yes / no
11.9	Do you experience so much pain during your period that you take time off from work	yes / no
11.10	Are you, or have you ever, taken any hormonal supplements (including birth control injection or tablets) – please indicate	birth control tablets / birth control injection / loop with hormones / hormone supplements / other
11.11	Have you had a hysterectomy	yes / no
11.12	If so, at what age	
11.13	Were your ovaries also removed	yes / no
11.14	Do you know when you ovulate	yes / no
11.15	Have you had issues with fertility,if yes, please describe	yes / no
11.16	Do you have PMS	yes / no
11.17	Have you noticed any other correlation between your period and your moods	yes / no

12	**Self care**				
12.1.1	Do you know what self care means			yes	no
12.1.2	Would you say that you self care		yes	no	don't know
12.2.1	Do you make sure that you eat regularly			yes	no
12.2.2	Do you take care to feed yourself fresh and healthy food			yes	no
12.3.1	Is hygiene important to you			yes	no
12.3.2	Would you say that your nails and hair are mostly cut, clean and cared for			yes	no
12.3.3	Do you mostly wear clean clothes in a good state of repair			yes	no
12.4.1	How many hours of sleep do you get per night	0-3	3-5	6-8	more than 8
12.4.2	Do you regularly take naps during the day			yes	no

13	**Hormone/ Mood history**		
13.1	Have you noticed a link between your moods and your hormone cycl	yes	no
	If yes, please answer the following:		
13.2	Did you notice the link only during your premenstrual phase	yes	no
	If no, during what other stage of your cycle have you noticed a correlation		
13.3	ave you employed any strategies to plan for or cope with moods associated with your cycle		
	yes / no		
13.4	If yes, can you briefly outline your strategies		
13.5	Do you feel that your cycle related moods has had a significant impact on your life		
	yes / no		
13.6	Have you ever sought treatment for the mental, not physical, symptoms of your cycle		
	yes / no		
13.7	Do you feel treatment for your cycle related moods will have helped you to live a happier life		
	yes / no		

I hereby declare that all the above information is accurate and truthful. By signing this document I give permission for my data to be used for research purposes, with the understanding that my identity and/ or personal details will not be divulged and my contact details will at no point be given out to any third party.

Name & surname ____________________ Signature ____________________ Date __________

Thank you very much for completing the questionnaire. I realize it seems very personal, but all the factors above will have an impact on how data is analyzed, and are therefore essential to this study. I appreciate your honesty and effort!

Addendum B Self Report Diary (SRD)

Each day of your cycle, answer the following 8 questions:
(look at the examples to guide you, use a scale from 1 - 6 as indicated below)

1.) How weepy did I feel today
(reacting to TV/ children/ music/ news stories/wept or nearly wept/ finding the world harsh/ seeing love and pain acutely)
2.) How aggressive did I feel today
(road rage/ impatience/ screaming at kids/ partner/ feeling intolerant and short fused)
3.) How depressed did I feel today
(blue/ feeling overwhelmed/ not sure where I am at/ wanted to, or did, indulge in comfort food/ wanted to take a nap/ hide)
4.) How energetic did I feel today
(could accomplish a lot/ exercised/ feeling on top of my work/ didn't need to take a break/ had an easy day)
5.) How sexually aroused did I feel today
(thought about sex/ masturbated/ went to trouble with my appearance/ found people attractive)
6.) How nurturing did I feel today
(wanted to cook & clean/ spend time with my children, partner/ wanted to buy a homeless person a meal)

A score of:
1 - Not at all
2 - Maybe just a little
3 - A bit
4 - Quite
5 - Very
6 - Incredibly so

7.) Did your period start today? Yes or No

8.) Did anything dramatic happen in your life today? Yes or No
(pet passed away/ lost my job/ won the lottery/ got engaged/ moved house)

The Brunel Scale of Moods

Below is a list of words that describe feelings. Please read each carefully. Then mark the box that best describes HOW YOU FEE NOW. Make sure you answer every question.

For NOT AT ALL, give a score of : 0
For A LITTLE, give a score of: 1
For MODERATELY, give a score of: 2
For QUITE A BIT, give a score of: 3
FOR EXTREMELY, give a score of: 4

Item	Score
1. Panicky	
2. Lively	
3. Confused	
4. Worn out	
5. Depressed	
6. Downhearted	
7. Annoyed	
8. Exhausted	
9. Mixed-up	
10. Sleepy	
11. Bitter	
12. Unhappy	
13. Anxious	
14. Worried	
15. Energetic	
16. Miserable	
17. Muddled	
18. Nervous	
19 Angry	
20. Active	
21. Tired	
22. Bad tempered	
23. Alert	
24. Uncertain	

There are 24 items in this list. If you have rated all of them, please proceed to the next sheet - Irr. Scale.

Addendum D The Menstrual Distress Questionnaire (MDQ)

Menstrual Distress Questionnaire

The list below shows common symptoms and feelings associated w
cycle.
For each item, choose the descriptive category that best describes
experience today.
That is, for each item, decide whether you have "no experienceof
symptom", or whether your experience is "present, mild", "present,
moderate", "present,strong" or "present, severe.
Then write the number of thecategory in the space provided.
If none of the categories exactly describes your experience, choose
one that most closely matches what you feel.
Be sure to rate every item.

Descriptive Categories:
0 No experience of symptom
1 Present, mild
2 Present, moderate
3 Present, strong
4 Present, severe

Item	Rating
1. Muscle stiffness	
2. Headache	
3. Cramps	
4. Backache	
5. Fatigue	
6. General aches and pains	
7. Weight gain	
8. Skin blemish or disorder	
9. Painful or tender breasts	
10. Swelling (breasts abdomen)	
11. Dizziness, faintness	
12. Cold sweats	
13. Nausea, vomiting	
14. Hot flashes	
15. Loneliness	
16. Anxiety	
17. Mood swings	
18. Crying	
19. Irritability	
20. Tension	
21. Feeling sad or blue	
22. Restlessness	
23. Insomnia	
24. Forgetfulness	
25. Confusion	
26. Poor judgment	
27. Difficulty concentrating	
28. Distractible	
29. Minor Accidents	
30. Poor motor coordination	
31. Poor school/work performance	
32. Take naps, stay in bed	
33. Stay at home	
34. Avoid social activities	
35. Decreased efficiency	
36. Affectionate	
37. Orderliness	
38. Excitement	
39. Feelings of well-being	
40. Bursts of energy, activity	
41. Feelings of suffocation	
42. Chest pains	
43. Ringing in the ears	
44. Heart pounding	
45. Numbness, tingling	
46. Blind spots, fuzzy vision	

There are 46 items in this list. If you have rated all of them,
please proceed to the next sheet - BRUMS.

Addendum E The Born Steiner Irritability Scale

The Born Steiner Irritabilty Scale

Please mark "x" in the box beside each item that best describes how you have been feeling in the past week:
For NOT AT ALL, give a score of : 0
For A LITTLE OR SOME OF THE TIME, give a score of: 1
For OFTEN, give a score of: 2
For MOST OR ALL OF THE TIME, give a score of: 3

Item	Score
1. I have been feeling mad	
2. I have been feeling ready to explode	
3. Ihave yelled at others	
4. I have been irritable when someone touched me	
5. I have been easily flying off the handle	
6. It feels like there has been a cloud of anger over me	
7. I have been rather sensitive	
8. Ihave been quick to criticize others	
9. Noises have seemed louder	
10. I have been getting annoyed with myself	
11. I have been so angry that I lost control	
12. There has been a flood of tension through my body	
13. I said nasty things to others that I did notmean	
14. It took very little for things to bother me	

Please draw a vertical mark on each line as shown in the example:

In the past week, how has feeling IRRITABLE affected your:

Item			
15. • Relationships with family?	not at all		extremely
16. • Daily activities?	not at all		extremely
17. • Ability to deal with frustration?	not at all		extremely
18. • Self-esteem?	not at all		extremely
19. • Social relationships?	not at all		extremely
20. How would you rate yourself AT THIS MOMENT?	not at all		extremely
21. How would you rate your USUAL SELF?	not at all		extremely

[To draw a line on the dots: Click on the dotted line. Then click in the text window above. Go to where you want the line to be drawn. Now type " l " (lower case "L").
Press enter and move on to the next line - repeat.]

There are 21 items in this list. If you have rated them all - you are done for the week! Well done and thank you.